

PART 2 PROJECT PROPOSAL - Demonstrate interoperability of S-101 and S-102 on an S-100-compatible Electronic Chart System

Project Objectives:

1. To portray and overlay high resolution S-102 bathymetric data onto S-101 ENC for optimal display in an S-100-compatible testbed ECS.
2. To validate interoperability of S-101 and S-102.
3. To investigate both identified and potential technical/technological constraints and challenges, and thereafter recommend and justify possible resolution paths.
4. To explore the possibilities of using S-102 data for marine digital twin applications.

Project Deliverables

1. Fit-for-purpose portrayal of high-resolution S-102 bathymetric data onto S-101 ENC, for example use of colour banding or depth contouring in the testbed ECS.
2. Functional standards-based methodology to enable the integration of S-101 and S-102 datasets.
3. Validation of methods (as per S-98 Interoperability Catalogue) for deconflicting discrepancies and to process a variety of S-102 data formats and its derived products (contours and/or depth areas) with other data such as S-101.
4. Recommendations on appropriate bathymetric data i.e., at various resolutions to produce optimal S-102 products, including examining the use of shoal-bias or exact bathymetric data for data processing.
5. Test cases of applying S-102 data to marine digital twin.

Practical relevance to Hydrographic Community/Industry:

1. Validation of S-102 enhancing navigational safety and efficiency as a use case, and that it can be implemented and function as envisioned.
2. Validation and better understanding of interoperability between S-101 and S-102.
3. Identifying of and solutions to any possible gaps to better understand the suitability of colour display, contour lines, depth areas, navigable waters etc described in S-102 product specification.
4. Assessment of production of suitable and feasible S-102 products for the desired outcomes.
5. Encourage further iteration, refinement and application in context of other high-traffic navigation areas.
6. Facilitate other applications such as buoy tending, channel dredging, and reclamation works.
7. Lay foundation for digital twin developments and other applications such as S-104 Water Level Information for Surface Navigation datasets with S-101 and S-102 on S-100 ECS/ECDIS to improve end-users' operational overview of the dynamic physical environment.

Members of Project team (See Appendix 1 for details)

Project Lead

Dr. Sewoong OH, Principal Research Engineer, Korea Research Institute of Ships and Ocean Engineering (KRISO)

Advisor to Project

Mr. Eivind Mong, Senior Advisor, Canadian Coast Guard (CCG)

Hydrographic Offices

Ms. Lynn Patterson, Vice-Chair, S-102 Project Team, IHO | Manager, Canadian Hydrographic Service (CHS)

Ms. Izzy Kim, Vice-Chair, S-100 Working Group, IHO | Korea Hydrographic and Oceanographic Agency (KHOA)

Mr. Lee Weng Choy, Maritime and Port Authority of Singapore (MPA)

Collaborator scope of work:

KRISO will provide:

i) S-100-compatible testbed ECS for the duration of the project, including basic User Interface (UI) mock-ups and interactive “clickable” functions/features.

ii) Research & development (R&D) resources and capabilities for harmonisation and portrayal of S-101 and S-102 datasets in the testbed ECS.

CHS will provide:

Past S-102 trial results, including test scenarios and parameters.

KHOA will provide:

S-100 testbed resources including software for S-101 and S-102

MPA will provide:

S-102 dataset at various resolutions for the corresponding S-101 cells in the identified demonstration areas

Project schedule (See Appendix 2 for details)

Estimated project duration: Twelve (12) months.

Summary of project cost (See Appendix 3 for details)

No cost to the IHO-Singapore Lab. Self-funded participating applicants will provide their respective in-kind support/contribution.

Other source of funding

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

NIL

Do you require a workspace at IHO Lab? (If so, please elaborate):

Work area needed at the Lab (physical or virtual)

- 2-desks space for workstations
- 2 to 4 pax meeting area

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:

Dr. Sewoong OH, Principal Research Engineer, Korea Research Institute of Ships and Ocean Engineering (KRISO)

Date: 21 July 2023

Appendix 1

PROJECT TEAM LEADER AND MEMBERS

Korea Research Institute of Ships and Ocean

| | | |
|----|---|---|
| A) | Name | Dr. Sewoong Oh |
| B) | Designation | Principal Research Engineer |
| C) | Education / Professional Qualifications | Industrial System Engineering, PhD |
| D) | Department | Maritime Digital Transformation Research Centre |
| E) | Organisation | Korea Research Institute of Ships and Ocean Engineering |
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Canadian Coast Guard

| | | |
|----|---|---------------------------|
| A) | Name | Mr. Eivind Mong |
| B) | Designation | Senior Advisor |
| C) | Education / Professional Qualifications | |
| D) | Department | |
| E) | Organisation | Canadian Coast Guard |
| F) | Postal Address | |
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Canadian Hydrographic Service

| | | |
|----|---|------------------------------|
| A) | Name | Ms. Lynn Patterson |
| B) | Designation | Manager |
| C) | Education / Professional Qualifications | |
| D) | Department | |
| E) | Organisation | Canadian Hydrographic Office |
| F) | Postal Address | |
| G) | Tel No. | |
| H) | Email Address | |

Korea Hydrographic and Oceanographic Agency

| | | |
|----|---|---|
| A) | Name | Ms. Izzy Kim |
| B) | Designation | Assistant director |
| C) | Education / Professional Qualifications | |
| D) | Department | |
| E) | Organisation | Korea Hydrographic and Oceanographic Agency |
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Maritime and Port Authority of Singapore

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|----|---|---------------------------|
| A) | Name | Mr. Lee Weng Choy |
| B) | Designation | Deputy Chief Hydrographer |
| C) | Education / Professional Qualifications | Degree |

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|----|----------------|--|
| D) | Department | Hydrographic Division |
| E) | Organisation | Maritime and Port Authority of Singapore |
| F) | Postal Address | 7B Keppel Road #20-00 (S 089055) |
| G) | Tel No. | 65-63252031 |
| H) | Email Address | Lee_Weng_Choy@mpa.gov.sg |

Appendix 2

PROJECT SCHEDULE

| Task | Year 1 Q1 | Year 1 Q2 | Year 1 Q3 | Year 1 Q4 | Year 2 Q1 | | | | Parties Involved |
|---|-----------|-----------|-----------|-----------|-----------|--|--|--|---|
| Production of S-101 and S-102 dataset for demonstration area | | | | | | | | | <ul style="list-style-type: none"> MPA |
| Investigation and validation of S-102 interoperability with S-101 | | | | | | | | | <ul style="list-style-type: none"> KRISO CCG |
| Display of S-102 dataset in Testbed ECS/ECDIS (Demonstration) | | | | | | | | | <ul style="list-style-type: none"> KRISO CCG |
| Exploration of marine digital twin utilization possibilities of S-102 data and production of test cases | | | | | | | | | <ul style="list-style-type: none"> MPA KRISO CCG |
| Project documentation | | | | | | | | | <ul style="list-style-type: none"> MPA KRISO CCG |

Appendix 3

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

| Qualifying Project Costs | | Cost of Item €K | Collaborator Contribution (If Any) €K |
|---|---|--------------------|---|
| Category* | Details of Items | | |
| Manpower (Please provide itemised details and budget breakdown) | 1 project management | €10K | In-kind by KRISO, CCG and MPA |
| | 1 expert on S-101 and S-102 production | €10K | |
| | 1 expert on providing feedback on S-98, identifying gaps and validation checks on S-102 | €10K | |
| | Project documentation | €5K | |
| Equipment | 1 x CARIS tools (BASE Editor and S-100 Composer) | €12K | In-kind by MPA |

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|--|-----------------------|-------------|--------------------------|
| (Please provide itemised details and budget breakdown) | 1 x Testbed ECS/ECDIS | €10K | In-kind by KRISO |
| Other Operating Expenditure (Please provide itemised details and budget breakdown) | IT support | €3K | In-kind by KRISO and MPA |
| Total €K | | €60K | |

*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.