OGC Federated Marine Spatial Data Infrastructure Pilot

Call for Participation (CFP)

Version 1.1 - November 24, 2021

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Chapter 1. Introduction

The Open Geospatial Consortium (OGC) is releasing this Call for Participation (CFP) to solicit proposals for the OGC Federated Marine Spatial Data Infrastructure Pilot (FMSDI) **Phase Two**. For more information on phases, please see section FMSDI Pilot Phases below.

This initiative builds on what has been accomplished in previous initiatives; the Marine Spatial Data Infrastructure Concept Development Study, the Maritime Limits and Boundaries Pilot, and the Arctic Spatial Data Infrastructure Pilot. The Marine Spatial Data Infrastructure Concept Development Study summarized the efforts and information gathered from a Request for Information which focused on in-depth data requirements, architecture, and standards needs for a Marine Spatial Data Infrastructure. The Maritime Limits and Boundaries Pilot worked to build a detailed implementation for testing S-121 Standard data. The Arctic Spatial Data Infrastructure Pilot aimed to utilize international standards to support a spatial data exchange focusing on the complex issues of Arctic marine space.

This Call for Participation is broken into three segments of focus:

1. Developing a federation of S-122 Standard Marine Protected Area (MPA) data sets;
2. Exploring a data fidelity, mobility, and versatility of S-100 Product Specification as well as other marine standards and data;
3. Designing a UNGGIM-IGIF (United Nations Global Geospatial Information Management-Integrated Geospatial Information Framework) derived Marine Spatial Data Infrastructure maturity model which provides a roadmap for MSDI development.

This initiative is being conducted under the OGC Innovation Program. The Call for Participation PDF is available here.

Chapter 2. Master Schedule

Milestone	Date	Event
M01	**September 6, 2021**	Initial Request for Information
M02	**October 14, 2021**	Supplementary Request for Information
M03	**November 8, 2021**	Release of Call for Participation
M04	**December 10, 2021**	*Close of Call for Participation*
M05	**January 5 - 7, 2021**	Kick-off Workshop
M06	**January 8 - 20, 2022**	Scenario Development
M07	**January 10 - 27, 2022**	Phase 1 TIE (Technology Integration Experiment) Testing
M08	**January 24 - 28, 2022**	Phase 1 Documentation Completion
M09	**February 28, 2022 - March 18, 2022**	Phase 2 TIE Testing
M10	**March 31, 2022**	Phase 2 & 3 Documentation Completion

Table 1. Master Schedule

Chapter 3. Scope

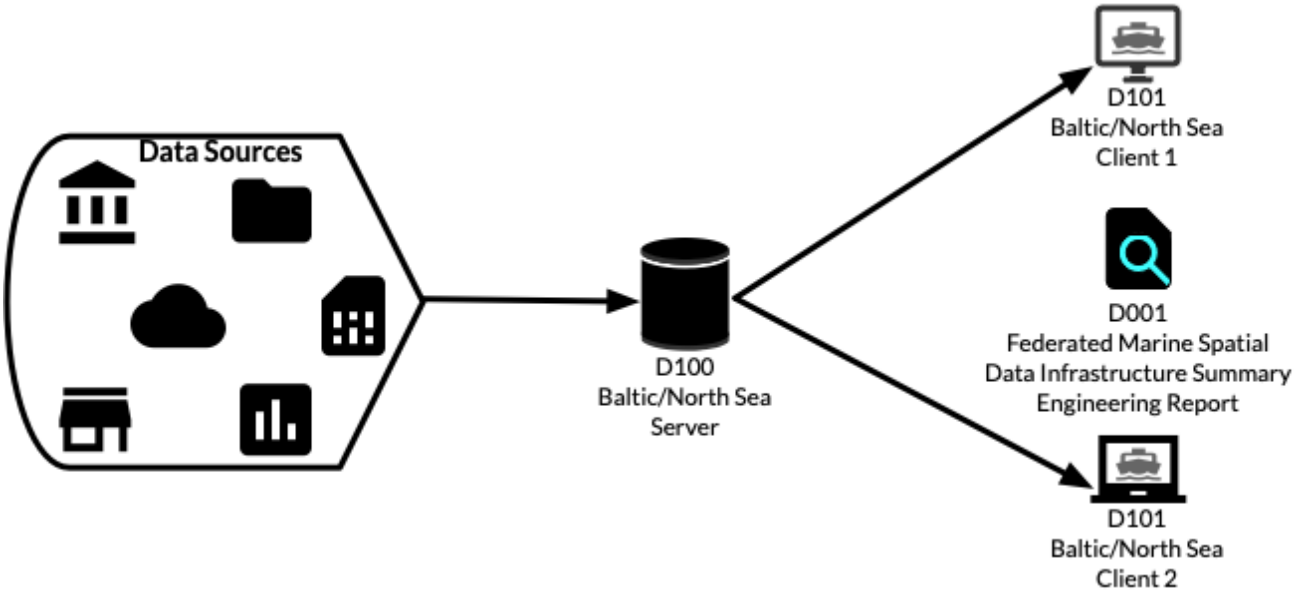
This second phase of the Federated Marine Spatial Data Infrastructure Pilot is organized in three stages:

1. Federated Marine Protected Area Data Stage, which looks into available marine protected data sets and explores their FAIR (Findable, Accessible, Interoperable, and Reusable) levels
2. Land and Sea Data Fidelity, Mobility, and Versatility Stage, which will broaden the scenario to include additional data sets such as terrestrial data, meteorological data, earth observation data, etc.
3. IGIF-MSDI Maturity Roadmap Stage, which will develop the Integrated Geospatial Information Framework (IGIF) Marine Spatial Data Infrastructure (MSDI) maturity model

3.1. Federated Marine Protected Area Data

The Federated Marine Protected Area Data stage will focus on the Baltic Sea / North Sea and will demonstrate improved access to Marine Protected Area (MPA) data for a wider variety of end users outside of the traditional MSDI domain. These users may include fishers, resource extractors, utilities, tourists, recreational boaters, etc. This will be accomplished using open standards and employing the FAIR principals; make data Findable, Accessible, Interoperable, and Reusable.

This stage of the initiative will focus on the development of the following deliverables:



- **D100 Baltic/North Sea Server**: One processing server, this will ingest the data from various sources of the Baltic Sea / North Sea providers.
    - These MPA data will be brought into the server and transcribed into the IHO S-122 Marine Protected Area standard. This processing could be accomplished through OCG API Processing.

- **D101 & D102 Baltic/North Sea Client**: Two client services. These client services should demonstrate different viewpoints and methods for digesting the data from the server and standardized data. The scenarios below, could potentially be performed through OGC API Environmental Data Retrieval.
    - A well connected, online service that someone may use to analyze the scenario from afar in an office.
    - A less connected (Disconnected, Disrupted, Intermittent, Low-Bandwidth) service, someone on Baltic / North Sea on an older vessel that may have limited technology.
    - An entity on a newer vessel with more recent technology that could be actively committing additional data to the input data.
- **D001 Federated Marine Spatial Data Infrastructure Summary Engineering Report**: An engineering report which should document:
    - Stages the data goes through from MPA to S-122, the format, metadata, etc.
    - What steps were taken in the server development to standardize the various data into an S-122 data set.
    - Which OGC APIs were leveraged to perform these transformations to the data.
    - How they were processed by the client and what views were used.
    - Recommendations and/or amendments for OGC APIs and IHO Standards.
    - Future works to consider enhancing and further the development of OGC APIs and IHO Standards.

Additionally, the components developed in this stage will be packaged into a series of Docker containers to be utilized by the sponsor for up to a 3-year period.

3.1.1. Baltic Sea / North Sea Scenario

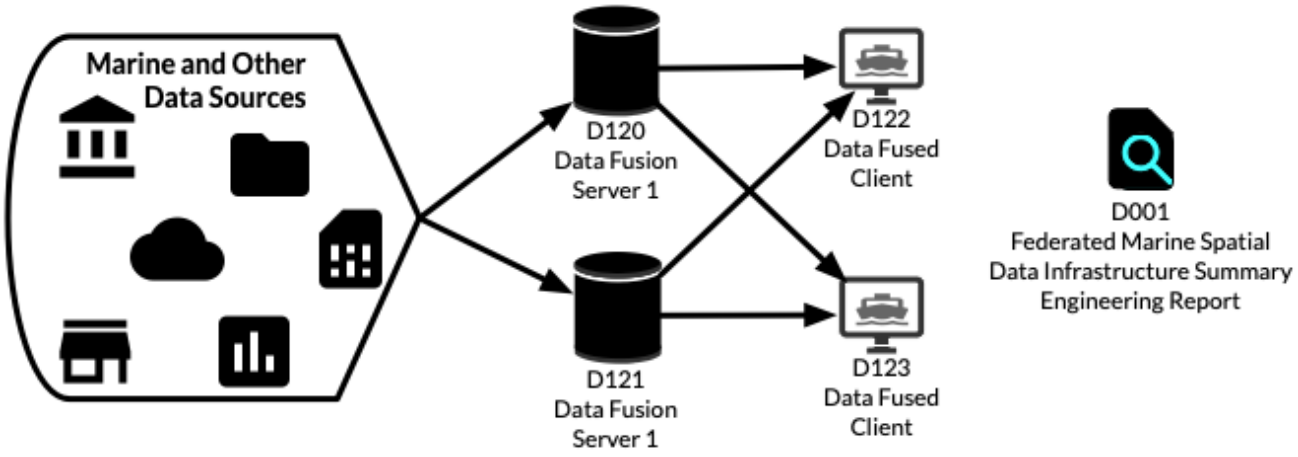
The Baltic/North Sea use case is looking at utilizing numerous Marine Protected Area data and related data to identify Marine Protected Areas within the Baltic/North Sea. To accomplish this, a federation of MPA data would need to be created from the various countries that have an interest in the Baltic/North Sea region. However, the current breadth of S-122 data is minimal, therefore it will be necessary to bring different data together from a single source or multiple sources in order to produce data to resemble the S-122 Standard.

3.2. Land and Sea Data Fidelity, Mobility, and Versatility

This is the second stage and will identify, examine, and expand upon existing data sets to give them greater fidelity, mobility, and versatility. This will go beyond marine protected areas and open the examination to a broader set of data and standards. These include other data sets and standards that could be utilized to develop a firmer more holistic view of a region, such as

terrestrial data, meteorological data, earth observation data, etc.

This stage of the initiative will focus on the development of the following deliverables:



- **D120 & D121 Data Fusion Server**: These servers will ingest and digest the various data inputs. These data could span a number of different formats so the usage of OGC APIs is encouraged, OGC API-Processes could assist in digesting the data.
- **D122 & D123 Data Fusion Client**: The clients will ingest the outputs from the servers and display the data to analyze a solution for the below possible scenarios, this ingestion and display of data could leverage OGC API Environmental Data Retrieval, additional usage of OGC API Features and/or Coverages could also be applicable.
- **D001 Federated Marine Spatial Data Infrastructure Summary Engineering Report**: An engineering report which should document:
    - Stages the data goes through from the format, metadata, etc.
    - What steps were taken in the server development to synthesize the data and create digestible data for the client.
    - Which OGC APIs were leveraged to perform these transformations to the data.
    - How they were processed by the client and what views were used.
    - Recommendations and/or amendments for OGC APIs and the various Standards.
    - Future works to consider enhancing and further the development of OGC APIs and IHO Standards.

The data being utilized will be examined for cross-domain connection points and a methodology will be developed for how to connect existing data standards and outside marine domain standards. This methodology could be through usage of various OGC API building blocks, ingestion using OGC API – Processes, digestion using OGC API – Environmental Data Retrieval, or other accessory data connection models. A demonstration for these combined data structure could be one of several different scenarios:

- Developing a wind farm in a designated region, accounting for ship routes, marine protected

areas, etc.

- Disaster response, man-made (oil spill, tanker stuck/sinking, etc.) or natural (hurricane response along storm path, tsunami response, etc.), rerouting shipping and leisure travel, impact reporting on the land/sea boundary, etc.
- Goods delivery from distribution center to port to ship to destination port

3.3. IGIF-MSDI Maturity Roadmap

This third stage will run in parallel to the entirety of the initiative and focus on the development of the IGIF-MSDI Maturity Roadmap, plus supporting principles and guidelines where appropriate. The roadmap will provide a strategic or top-level, fully comprehensive roadmap of the different stages and effective level of maturity an MSDI goes through from initial creation, to fully developed, and and the potential areas to explore and enhance an existing MSDI. It will seek to complement and not duplicate the existing ecosystem of UN-GGIM and IHO resources, but will synergize and leverage them, via a straightforward guidebook for simplifying early steps in the joint IGIF-MSDI space. Much of the initial analysis and construction could be developed through question, answer, and examination of the sponsors' MSDI and what considerations the sponsor is taking to expand their MSDI. An additional data gathering effort of MSDI providers may be needed to fully form the maturity roadmap. Anonymization of responses is available via OGC if institutional privacy is desired for participation, such as limiting identification to geographic region and generalized level of MSDI development. In appreciation for fulsome engagement by responders, basic insights may be requested in writing regarding their state of MSDI maturity with respect to their geographical region (or more broadly if not possible). All insights are anonymized and regionalized (where sufficient responses have been received), with any verbal insights subject to reasonable endeavors in the contect of meeting the project milestones.

Additional inspection will need to occur of existing roadmap models, such as IHO C17, as well as investigation on how the various MSDIs have been constructed and what an appropriate and efficient order of operation for MSDI construction would be, this should also consider any governance, technological, and public impacts involved. A benchmarking test should occur with a non-sponsor or a sponsor intentionally removed in development of the maturity score. Ideally this benchmarking would occur with multiple organizations; a well tenured MSDI, a middling tenured MSDI, and a newer MSDI.

This stage only has one deliverable **D004 IGIF-OGC FMSDI Maturity Roadmap Engineering Report** which summarizes the findings. This will outline the Roadmap and the various references and other source materials that could be utilized to inform the development of a Marine Spatial Data Infrastructure. This deliverable will be authored by a dedicated resource from the sponsoring organization.

Chapter 4. Guidelines and Cost-share

4.1. Submission Guidelines

- Proposals must be submitted by **December 10, 2021, by 11:59pm EDT** in accordance with the Master Schedule.
- Proposals from non-members or individual members will be considered provided OGC Membership (or a letter of intent) is provided with *Proposal Submission*
- Each selected proposing organization will be required to enter into a Participant Agreement (PA) contract with OGC, regardless of receipt of cost-share funds
- Proposals should be submitted in PDF format and should contain an overview of planned implementations, desired cost-share, and in-kind contributions (if any)
- It should be clear how each planned deliverable relates to the core scope

4.2. Cost-share

- Cost-share of funds are to be negotiated upon receipt of the proposal if the proposal is chosen
- Funding is determined based upon the work outlined in the proposal
- Complexity of the deliverable and what is outlined within the proposal are taken into account when determining funding

4.3. How to Submit

Email Rollin Phillips <rphillips@ogc.org> the PDF Proposal prior to **December 10, 2021**

Chapter 5. FMSDI Pilot Phases

The Federated Marine Spatial Data Infrastructure (FMSDI) Pilot is an OGC Innovation Program initiative organized in three phases. This Call for Participation initiates phase two.

The first, already completed phase, included the Marine Data Availability and Accessibility Study (MDAAS). MDAAS started with the release of a Request for Information (RFI) to help determine data availability and accessibility of Marine Protected Areas (MPA, IHO S-122) and other marine data in the North Sea and Baltic Sea. The MDAAS further helped assess interoperability, availability and usability of data, geospatial Web services, and tools across different regions and uses of marine spatial data. MDAAS also provided identification of gaps and helped define reference use-cases and scenarios for use in future FMSDI Pilot activities.

FMSDI Pilot phases two and three focus on developing a federation of S-122 Standard Marine Protected Area (MPA) data sets, exploring data fidelity, mobility, and versatility of S-100 Product Specification as well as other marine standards and data.

The second phase, which is addressed in this Call for Participation, will further on design a Marine Spatial Data Infrastructure (MSDI) maturity model, which provides a roadmap for MSDI development. The maturity model will be derived from the United Nations Global Geospatial Information Management (UN-GGIM) Integrated Geospatial Information Framework (IGIF, or UNGGIM-IGIF).

The third phase, which will start with an additional Call for Participation in 2022, will primarily extend the use cases developed in this second phase and add the Arctic region as a new location to the demonstration scenarios.

The following table summarizes the different focus areas and timelines of the three phases.

Phase	Focus	Date
1	A Request for Information to start resource collection with a primary focus on Marine Protected Area (MPA); who has that data, how is it stored, where can it be accessed, etc.	Sep - Nov 2021
2	Digging into all the various data services and begin building out the S-122 demonstration model, including the exploration of the S-100 data specifications and how other data potential data (terrestrial, meteorological, Earth observation, etc.) can mingle to create a more holistic view of the region of focus. In addition, develop the IGIF-MSDI maturity roadmap, exploring how various MSDIs are composed and what were the stages and implementations that made them what they are today.	Nov 2021 - Mar 2022

Phase	Focus	Date
3	Extending the FMSDI land/sea scenarios to include the Arctic region and applying lessons learned to existing and emerging OGC Standard; test relevant S-100 based IHO Standards to accelerate their adoption and implementation process worldwide.	Mar - Sep 2022

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