NGA.mil
NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY

Request for Information on Marine SDI Concept Development Study

Architecture, Data, Services, Requirements & Constraints

RFI Issuance Date: November 15, 2018
Response Due Date: January 17, 2019

1. Abstract

This Request for Information (RFI) is part of an OGC Innovation Program Project “Marine SDI Concept Development Study (MSDI-CDS)”. Sponsored by the National Geospatial-Intelligence Agency (NGA). The goal of the MSDI-CDS is to demonstrate to stakeholders the diversity, richness and value of a Spatial Data Infrastructure (SDI) – specifically data, analysis and associated IT services including web services - in addressing needs of the Marine domain.

The motivation for issuing this RFI is to gather additional information to better support governments, agencies, non-governmental organizations and citizens to unlock the full societal and economic potential of the wealth of marine data and observations at national, regional or local levels. The RFI results will provide information on the current state of the Marine Spatial Data infrastructure(s) (MSDI). In addition, analysis of results to assess interoperability, availability and usability of geospatial Web services and tools across different types marine spatial data uses along with identification of gaps, and definition of core components of SDI will be used to define reference use-cases and scenarios for use in future pilot activities.

Results of the RFI responses will be analyzed and documented in a report that will serve as the basis for improvement of SDIs’ to support the Marine domain. RFI responses will also be discussed with potential sponsoring organizations that would provide funding opportunities for possible Marine SDI Pilot(s) initiatives proposed for later this, and in subsequent, years. All RFI responses will contribute to Marine SDI considerations moving forward.

Responses to the RFI are requested by **January 17, 2019**. This RFI includes instructions on how organizations can respond to and submit questions about the RFI.

2. Table of Contents

3. Background

Ocean and marine data are recognized as valuable resources that tend to have a high cost of acquisition. Large quantities of this data are collected and stored all over the world for a wide variety of purposes and by a variety of public and private entities. Due to its importance and value this data should be well managed and made as widely available to end users as possible for a variety of uses including planning, policy and decision making; marine management; scientific research, and economic activities.

The collection, protection and sharing of marine data provides huge societal benefits. Data and information on the state and variability of the marine environment is crucial for understanding changes that may result from human activity, including the effects of human-induced climate change and ocean acidification.

In addition there is an urgent need to develop and provide improved emergency planning and response in the world's sea space. This has been highlighted by several high profile events in recent years including:

- BP oil spill in Gulf of Mexico;
- the earthquake and tsunami that hit Japan;
- the ferry disaster in Korea and
- the loss of Malaysia Airlines flight MH370.

Reaction to each of these, and numerous other events, requires a multi-disciplinary approach including emergency response, environmental protection and longer term regional planning.

Currently Government Agencies, research institutions, and the private sector provides a considerable investment in marine monitoring and observation, data sharing and assembly, as well as downstream services. As a result, significant progress has been made to collect, aggregate and make publicly available the data and information derived from monitoring and observing our Marine environment.

However, data-sharing initiatives still face common challenges in their efforts to unlock the full societal and economic potential of the wealth of marine data and observations at national, regional or local levels. The landscape remains highly fragmented and complex and the need for a better integrated, end-to-end and sustained Marine SDI remains high.

The ability to effectively share, use, and re-use geospatial information and applications across and between governments and Non-Government Organizations (NGOs) is dependent upon having an effective SDI already in-place.

The following figure illustrates some key aspects of Spatial Data Infrastructures (SDIs). It applies to all SDIs and is used in slightly modified versions for the various types of SDIs from local to regional to global.

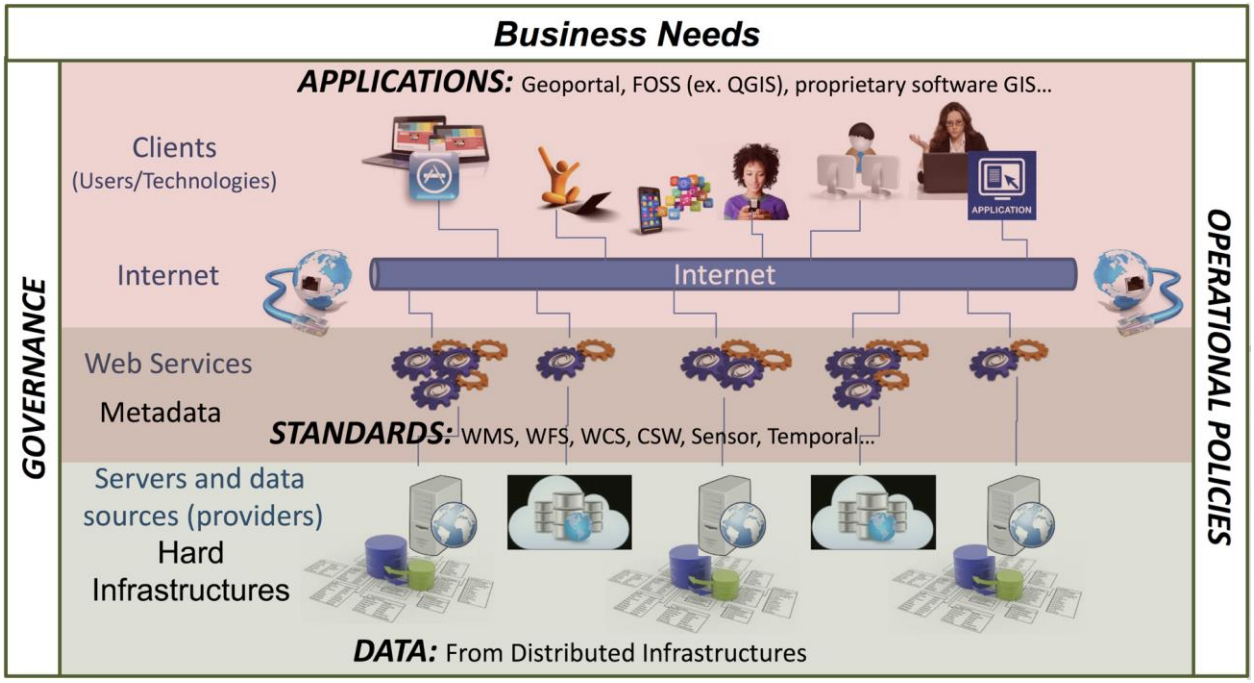

Figure 1. Aspects of an SDI *(Source: Natural Resources Canada)*

What is a Marine SDI?

A definition by the International Hydrographic Office provides a succinct interpretation:

> A Marine SDI is the component of an SDI that encompasses marine and coastal geographic and business information in its widest sense and would typically include information on seabed bathymetry (elevation), geology, infrastructure (e.g. wrecks, offshore installations, pipelines, cables); administrative and legal boundaries, areas of conservation and marine habitats and oceanography.[1]

The four basic components of a Marine SDI are shown in the following diagram:

[1] IHO MSDI Working Group

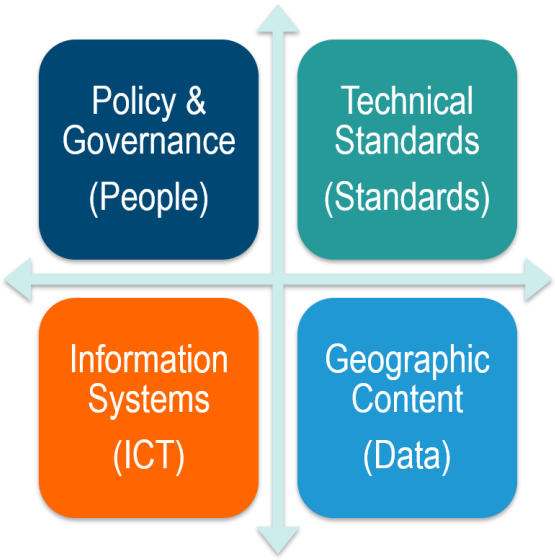

Figure 2. Four Pillars of an MSDI *(Source: IHO Publication C-17, Spatial Data Infrastructures: "The Marine Dimension")*

These pillars are defined as follows:

1. **Data and Metadata** - comprise the marine data and information to be made accessible
2. **Information System/Technology** - encompasses the hardware, software and system component.
3. **Standards** - which emphasizes the "unlocking" of geospatial data. This is usually accomplished through enablers.
4. **Policy and Governance** - which dictates the structural relationships of all those involved.

Several challenges in engaging a Marine SDI:

- Lack of an integrated policy and operational framework to facilitate rapid acceptance, qualification, ingest and use of relevant geospatial information from a range of government, commercial providers and citizens.
- The current focus on products supporting a single customer group
- Inability with existing metadata approaches to quickly discover and understand which information sources are most useful in the context of a user's need.
- Inability to properly fuse and synthesize multiple data sources.
- The need for a persistent platform to organize and manage marine information and tools necessary for collaborating organizations fully utilize the variety of marine data.

4. Marine SDI Concept Development Study

The OGC's Marine SDI Concept Development Study will assess the current state of data and product exchange practices and technologies as used in marine data management. The information gained in the CDS will aid in developing a series of future pilots that will in turn advance the state of SDIs that support effective marine data usage across the globe. The overall Marine SDI project may be executed in **two phases**:

Phase one: OGC Concept Development Study (CDS) will bring together diverse stakeholders from the global marine community to assess the current state of SDI components. The study will document data exchange technologies, develop an inventory of available geospatial Web services across different marine domains, define the core components of a SDI architecture, and define use-cases and scenarios for future marine SDI pilot(s) as part of phase two. This request for information (RFI) is part of phase one, used to gather the knowledge from marine domain stakeholders and contributors.

Phase two (if activated): Pilot(s) will be an OGC initiative with active involvement by several OGC member organizations. The goal of Phase 2 is to articulate the value of interoperability and to demonstrate the benefits of standards through piot(s) and demonstrations. This will be done by piloting a recommended SDI architecture to support a Marine SDI and developing demonstrations.

The Pilot(s) will support future SDI enhancements by:

- Gathering requirements on different portions of a common SDI architecture to support the marine domain.
- Explaining an SDI architecture concept, technology and its application to support marine domain stakeholders.
- Making more data available.
- Analyzing consistent and long term retainability practices for marine domain material.
- Complementing it with clients, tools, and applications that allow efficient use of Marine SDI data, processing resources and long-term storage capabilities.

5. RFI Response Outline

Stakeholders interested in responding to this RFI should respond to the following questions as applicable to your role or experience. You may also submit any documents you feel are applicable to this RFI:

5.1. Stakeholders

5.1.1. What is your name, position and contact information?

5.1.2. What organization are you affiliated with and what is your role in the marine domain? (e.g. transportation, marine biology, oceanography.)

5.1.3. Are you a data provider/owner (e.g. data, tools, applications, services)?

5.1.4. Are you primarily a marine data user (e.g., science, research)?

5.1.5. Are you a data enabler (e.g., help provide access to the data, software company, data standards organization, app developer)?

5.1.6. Who are the key stakeholders you interact from local to international levels?

5.1.7. How would you propose getting more stakeholders involved?

5.2. Architecture and Data Governance Models

5.2.1. How well does the SDI for your location meet your needs?

5.2.2. What do you think should be the key technology components (e.g., standards, networks, clients, web services, data storage) of a SDI to support marine data?

5.2.3. What do you think is the best way to support an international SDI architecture for marine data?

5.2.4. Does your organization have a marine data management system? If so, please briefly describe the system's capability.

5.2.5. Do you currently use geospatial standards to access data and services? If so, what are the key geospatial standards you use?

5.3. Data

5.3.1. What data sets, available to you, should become part of a SDI to support the marine environment?

5.3.2. What data sets do you provide that should become part of a National SDI architecture for the marine domain?

5.3.3. What data is currently missing that is needed and should be made available or developed?

5.3.4. Are there any global, regional, national or local datasets that you rely on for marine domain?

5.3.5. Is the data you require "analysis ready" or "fit for use"? Available in the formats you require? Are the datasets updated in the time interval that meets your needs?

5.3.6. Are there adequate tools for your analysis of data?

5.3.7. Are the tools or data you have only accessible to limited, experienced people or general populations?

5.3.8. Do you use models, and if so, how?

5.4. Requirements

5.4.1. What requirements, (including constraints) do you experience that should be considered for future design and development of an international marine spatial data infrastructure architecture?

5.4.2. Are there sufficient tools available to help you meet your requirements? Please describe any performance issues you may experience? If so what are the issues?

5.5. Scenarios and Use Cases

5.5.1. What scenarios and use cases would you like to recommend as part of future Pilot Activities?

5.5.2. Do you have any information on the benefits or successes (e.g. societal or economic benefits) of establishing a SDI for marine purposes?

5.6. Operation & Organization

5.6.1. What policy, organizational, and administrative challenges do you have that must be addressed to improve a marine SDI architecture internationally?

5.6.2. Are there unique needs that need to be considered at various levels of marine operations (local, state, regional, national, international levels, and by various players (government, commercial, NGO, academia/research)?

5.7. Technologies & Applications

5.7.1. Are there other national, regional or topical portals that can be used to support the marine domain that are currently available and serve your needs? How might they be improved?

5.7.2. What other type of applications, tools, and services do you believe should be developed or integrated as part of the marine international SDI architecture?

5.8. Other Factors

5.8.1. What other success factors or considerations do you see as needed for a successful marine international SDI architecture?

Readers of this RFI are encouraged to respond with recommendations for the aspects listed above or any additional procedures, technology, data, borderline conditions, or open standards issue that you think should be considered for an international SDI architecture for the marine domain.

6. Organizations issuing this RFI

The National Geospatial-Intelligence Agency (NGA) delivers world-class geospatial intelligence that provides a decisive advantage to policymakers, warfighters, intelligence professionals and first responders. Anyone who sails a U.S. ship, flies a U.S. aircraft, makes national policy decisions, fights wars, locates targets, responds to natural disasters, or even navigates with a cellphone relies on NGA. NGA enables all of these critical actions and shapes decisions that impact our world through the indispensable discipline of geospatial intelligence (GEOINT).

NGA is a unique combination of intelligence agency and combat support agency. It is the world leader in timely, relevant, accurate and actionable GEOINT. NGA enables the U.S. intelligence community and the Department of Defense (DOD) to fulfill the president's national security priorities to protect the nation. NGA also anticipates its partners' future needs and advances the GEOINT discipline to meet them.

NGA is the lead federal agency for GEOINT and manages a global consortium of more than 400 commercial and government relationships. The director of NGA serves as the functional manager for GEOINT, the head of the National System for Geospatial Intelligence (NSG) and the coordinator of the global Allied System for Geospatial Intelligence (ASG). In its multiple roles, NGA receives guidance and oversight from DOD, the Director of National Intelligence (DNI) and Congress.

NGA is headquartered in Springfield, Va. and has two major locations in St. Louis and Arnold, Mo. Hundreds of NGA employees serve on support teams at U.S. military, diplomatic and allied locations around the world.

The Open Geospatial Consortium (OGC) is an international consortium of more than 500 companies, government agencies, research organizations, and universities participating in a consensus process to develop publicly available geospatial standards. OGC standards support interoperable solutions that "geo-enable" the Web, wireless and location-based services, and mainstream IT. OGC standards empower technology developers to make geospatial information

and services accessible and useful with any application that needs to be geospatially enabled. OGC has planned and completed over 100 initiatives – testbeds, pilots, and experiments – designed to join the public and private sectors in hands on collaborative development, testing, prototyping and demonstration of enhanced or new interoperable, standards-based approaches. Recommendations from these initiatives become new or revised open standards and best practices which help to improve decision making, reduce the time and cost in mobilizing new capabilities, and to save lives and minimize the impact to property and the environment.

7. Responding to this RFI

7.1. General terms and conditions

Responses to this RFI are due by January 17, 2019 as listed in the Master Schedule (see Section 8). Responses will be distributed to members of the organizations listed in section 1. Submissions will remain in the control of this group and will be used for the purposes identified in this RFI. A summary of the RFI Responses may be made public. If you wish to submit proprietary information, contact (techdesk@opengeospatial.org) in advance of sending the response.

7.2. How to transmit a response

Send your response in electronic version to the OGC Technology Desk (techdesk@opengeospatial.org) by the submission deadline. Microsoft® Word format is preferred, however, Rich Text Format, or Adobe Portable Document Format® (PDF) are acceptable.

7.3. RFI response outline

A response to this RFI shall respond to as many applicable aspects defined in section 5 as possible. No particular format is required, but any response should be structured in a way that allows understanding of the respondents' position on key aspects as listed in Section 6: stakeholders, architecture, data, scenarios & use cases, requirements & constraints, operation & organization, and applications & technologies. Respondents are free to add any additional topic as they think appropriate.

7.4. Questions and clarifications

Questions and requests for clarification should be sent to: techdesk@opengeospatial.org.

Questions received as well as clarifications from the RFI developers will be posted publicly at the Marine CDS web site: https://www.opengeospatial.org/projects/initiatives/msdi-cds-2018

7.5. Reimbursements

The organizations issuing this RFI will not reimburse submitters for any costs incurred in connection with preparing responses to this RFI. Cost share opportunities should arise from the Request for Quotation described in the abstract of this document, during the follow-on Pilot activity.

8. Master Schedule

The following table details the major events associated with this RFI and the follow-on Pilot.

Activity/Milestone	Date
1st Workshop	October 23 2018
RFI issued	November 15, 2018
RFI responses due	January 17, 2019
2nd Planned Workshop	February 2019
RFI result publication	February 2019

9. Glossary

CDS: Concept Development Study

MSDI: Marine Spatial Data Infrastructure

NGA: National Geospatial-Intelligence Agency

NSDI: National Spatial Data Infrastructure

OGC: Open Geospatial Consortium

RFI: Request for Information

RFQ: Request for Quotation

SDI: Spatial Data Infrastructure

10. Reference Documents and Resources

Spatial Data Infrastructures "The Marine Dimension"; Guidance for Hydrographic Offices; International Hydrographic Organization	https://www.iho.int/iho_pubs/draft_pubs/C_17/C-17_draft_Ed2.0.0.pdf