



SERVICE PROVIDER VACANCY

FOR

THE DEVELOPMENT OF A HANDBOOK FOR REA DATA HUB

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SERVICE PROVIDER VACANCY FOR THE DEVELOPMENT OF A HANDBOOK FOR A REA DATA HUB

You are kindly invited to apply to the NATO Maritime Geospatial Meteorological and Oceanographic Centre of Excellence (Maritime GEOMETOC CoE) open vacancy of service provider for the development of a Handbook for a Rapid Environmental Assessment (REA) Data Hub.

Please direct any questions regarding this application process to info@mgeometoccoe.org. You should not contact other NATO Maritime GEOMETOC CoE personnel unless directed to do so.

We look forward to your reply.

Yours sincerely,
The Maritime GEOMETOC CoE staff



1 NATO Maritime GEOMETOC CoE Background

The vision of the NATO Maritime GEOMETOC CoE is to be a globally recognized hub of expertise, focused on improving Maritime GEOMETOC capabilities. Its mission is to support NATO's transformation efforts in Maritime GEOMETOC for the benefit of the Alliance. The CoE concept involves analyzing the maritime battlefield environment to improve the use of sensors, weapons, targeting, logistics, equipment, and personnel.

The CoE promotes collaboration between NATO, academia, industry, and international organizations, fostering partnerships to advance GEOMETOC support to maritime operations. It also focuses on continuous improvement by conducting research, studies, experiments, analysis, education, and training, while applying lessons learned and best practices.

2 Scope of REA Data Hub

With the wide range of NATO's current military objectives (crisis response, peace support and humanitarian operations, as well as traditional and not so traditional warfare), the nature of military environmental support requirements has changed, as such operations may occur at short notice and in highly variable, poorly monitored and possibly hostile physical environments (Allied Tactical Publication ATP-32 – NATO military oceanographic and REA support procedures, Ed. E, Version 2, page 3-1). Dynamic and responsive processes are therefore required to provide operational GEOMETOC data beyond the established day-to-day METOC and geospatial support architectures within NATO.

As defined in MC 0594/2 (Military Committee Policy on Meteorological and Oceanographic Support to NATO Forces, 31 July 2018), REA contributes to a common understanding of the operational environment by collecting, processing and disseminating meteorological, oceanographic and geospatial data and products to forces to improve operational effectiveness through enhanced situational awareness and decision making.

REA should not overlap with existing GEOMETOC processes within the Alliance but should use them, together with REA specific abilities, to enhance situational awareness.

Wherever there is a lack of available data, essential to plan and run NATO missions, REA process should be applied with its four overlapping stages: Direction, Data Collection, Processing and Dissemination, carried out in a continuous cycle.

To integrate all data, information, products and communication aspects of such a cycle, a robust infrastructure should be in place, more specifically a dedicated Data Infrastructure.

Could a Spatial Data Infrastructure (SDI), or an REA adaptation of it, be the answer to such a challenge?

Taking advantage of the experience and knowledge of the International Hydrographic Organisation (IHO), we can skip the first steps of thinking about its basic structure and relationships and proceed to the necessary adaptations to our specific REA process.

IHO Publication C-17, Second Edition, Version 2.0.0 - January 2017 "Spatial Data Infrastructures - The Marine Dimension" describes how a Hydrographic Office should promote, support and participate in SDI. It is not definitive in nature but rather provides guidance on how best to achieve this through practical advice, simple step-by-step processes, useful links to reference material and examples of best practice.

Bearing in mind that an SDI is the relevant basic collection of technologies, policies and institutional arrangements that facilitate the availability of and access to spatial data ([SDI COOKBOOK](#)), we will attempt to extrapolate a similar backbone organisation to a GEOMETOC/REA environment.

If we relate the four pillars of an SDI (see Figure 1 below) to our REA process, we can see that many elements already exist within NATO, even if not specifically for this purpose.

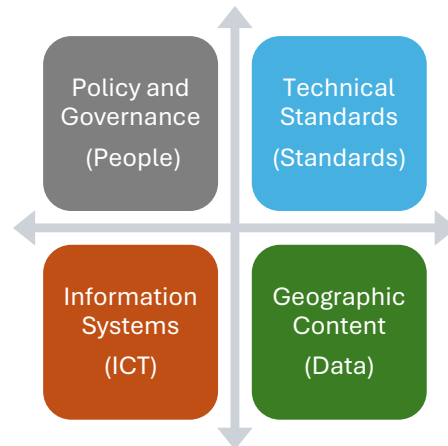


Figure 1 - The four pillars of MSDI, from IHO publication C-17 “Spatial Data Infrastructures - The Marine dimension”.

GEOMETOC Policy and Governance (people) is well established within NATO through the panels and working groups of the Geospatial and METOC communities (top left bullet in Figure 1).

REA is now getting a life of its own with the revision of ATP-32, separating REA from Military Oceanographic Support, and becoming a REA procedures publication. This will be a good opportunity to review and update the “operational” governance side of the issue and clarify REA organization and procedures (top right bullet in figure 1).

The bottom right bullet in Figure 1, Geographical Content (Data), when it comes to REA, needs to be complemented with meteorological, oceanographic and space weather data.

This 3D or, more accurately, 4D data, since we have to take into account the temporal variation of data, must be supported by the so-called SDI enablers, which are the essential building blocks that provide the framework for the acquisition, management, updating and dissemination of the data (IHO Publication C-17, Second Edition, Version 2.0.0, paragraph 2.1.3):

- **Standards**, particularly in the areas of data content modelling, data transport and web services, are critical to the development of a robust SDI approach, together with **Metadata**, which is essential for managing and discovering information and how data is used.
- Likewise, a **Technical Infrastructure** (software and hardware) will enable the input of data and all the services to allow visualization, sharing, transformation and delivery of data and products.
- Finally, the most difficult and ambitious enabler for these different types of GEOMETOC data would be a **REA Data Model**, similar in some way to the IHO S-100 Universal Hydrographic Data Model ([S-100 Universal Hydrographic Data Model](#)).

As a geospatial infrastructure in itself, S-100 can be used as a concept that can be adapted to other types of data, with the challenge of adapting a 2D, sometimes 3D world to a 4D universe, with time moving at different paces depending on data type.

An example of this is the next generation of Additional Military Layers (AML) - the S-500 series, which can contain REA information.

A REA Spatial Infrastructure/REA HUB development should incorporate such a concept, in the feasible part, together with the other components mentioned above.

A REA version of Figure 1, with its four pillars, might well look something like Figure 2.

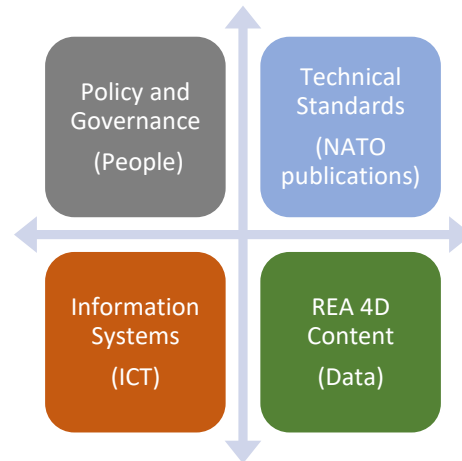


Figure 2 – REA adaptation to the four pillars of an SDI.

2.1 Policy and Governance

In NATO, policy is defined as the agreed principles, approach and general objectives set out in a document to guide the achievement of specific outcomes. Similarly, governance is the structures and processes for decision making, accountability, control and behavior within the organisation.

REA Data Hub solutions should meet the requirements expressed in NATO tactical procedures (namely ATP-32 and NATO FMN GEOMETOC Service Procedures) and be aligned with, but not limited to, NATO policy and doctrine:

- a. MC 0594 Military Committee Policy on Meteorological and Oceanographic Support to NATO Forces,
- b. MC 296 NATO Geospatial Policy,
- c. AJP-11 Allied Joint Doctrine for METOC Support,
- d. AJP-3.17 Allied Joint Doctrine for Geospatial Support,
- e. AJP-2.7 Allied Doctrine for Joint Intelligence, Surveillance and Reconnaissance,
- f. ATP-32 Nato Military Oceanographic and REA Support Procedures,
- g. ATP-06 Naval Mine countermeasure operations planning and execution,
- h. ATP-08 Doctrine on Amphibious Operations,
- i. ATP-28 Anti-Submarine Warfare Manual.

2.2 Technical Standards

In NATO terminology, a standard is a document, established by consensus and approved by a recognized body, which provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at achieving the optimum degree of arrangement in each context.

Such standards should be based on the consolidated results of science, technological progress and experience, and should be aimed at promoting the optimum benefit to the community.

The full range of NATO Standardization Agreements (STANAG) on data formats, data sharing, protocols, formats, procedures and communications as part of the Alliance's standing processes easily ensures that the standardization pillar of an SDI is the least of our problems.

REA Data Hub solutions should comply with data/information exchange formats standardized by the NATO FMN Services Instruction Roadmap.

2.3 REA 4D Content

REA/GEOMETOC data includes many data sets of a variety of sizes and shapes. Some data can be predicted centuries in advance and others can change almost randomly in a matter of minutes.

On the other hand, some can be saved in a simple string of ASCII, and others have multiple datagrams compiled in binary formats that can reach gigabytes or terabytes of disk space.

The I/O component is also of paramount importance because of the large amounts of data generated, stored and distributed at all stages of REA.

It is not easy to find a way to efficiently store all these "zeros and ones" in a manageable way to be able to extract information in the short term and at a later stage.

Furthermore, REA data is normally unclassified and can be released to anyone, but if we are producing information to contribute to the Recognized Environmental Picture (REP) and the common understanding of the operational environment to improve situational awareness, decision making and operational effectiveness (ATP-32, 3.2 paragraph 5), it may be advisable to classify such information to preserve its value, with all that it implies.

2.4 Information and Communication Systems

An information and communication infrastructure, as a pillar of a SDI, is the glue that binds and materializes all the other pillars. Such an infrastructure should be a system of systems, with its relationships and hierarchy, composed of layers of components, each with its specific functions within the overall arrangement.

The main components / layers required are as follows:

- a **Data Modelling layer** where numerical models run endlessly to provide data to create information,
- a **Data Storage layer** where large amounts of data are stored and made available for use,
- a **Data Transformation layer** where information is produced,
- an **Interoperability layer** that brings together all the formats and standards into a workable environment,

- a **Publication layer**, which provides and manages all network services,
- a **Visualization and Analysis layer**, which is essentially the user interface,

It also requires a complete stand-alone infrastructure, with all its software, libraries, relationships, etc., operating securely in a separate environment with only the minimum of external data input (GEOMETOC data). Every application/component, nowadays and because of exponential advances in technology and the Internet, has some attributes, functions, libraries, updates or other symbiotic (or parasitic) relationships with others elsewhere on the web. In an open environment, this is the usual setup.

In a segregated military environment, such is not possible, and the system will need to have all its components inside a secure network and receive only specific data from the "outside world".

3 REA Data HUB Handbook

How does a nation, within NATO Force Structure, implement a REA Data HUB? Or how can an existing SDI or similar structure be adapted/fitted to perform as a REA Data HUB?

The NATO Maritime GEOMETOC CoE addresses such questions in the form of a Handbook, with guidelines, best practices and recommendations for each step and level of development required to build such an enterprise.

The development of this Handbook will be conducted by the appointed IT service provider selected for the present vacancy.

It is expected that the IT infrastructure outlined be tested and its capabilities and functionalities demonstrated as the REA Data HUB for the next Robotic Experimentation and Prototyping with Maritime Unmanned Systems (REPMUS) Exercise which will take place in September 2025. Upon validation in REPMUS 25, the REA Data HUB Handbook is planned to be presented to the Alliance by early 2026.

3.1 Requirements

In the REA Data HUB Handbook all the following layers shall be addressed, each with detailed instructions in the form of a **descriptive memory and technical specifications** on how to set up, implement, maintain, troubleshoot and with at least one example of successful implementation with its components and resources:

- Visualization and Analysis layer,
- Publication layer,
- Interoperability layer,
- Data Transformation layer,
- Data Storage layer,
- Data Modelling layer.

The REA Data HUB must be able to operate in federated/segreated military networks, with the ability to receive only GEOMETOC data from external sources. Its physical infrastructure should be deployable.

The proposed IT architecture, software, hardware, products, services and data (GEOMETOC and others) shall comply with NATO standards and guidelines.

To save time and effort, Evolutionary Prototyping is the required Software Development Life Cycle (SDLC) method, as it allows partial implementations to be made before or during the analysis phase, allowing customers to see the product early in the life cycle.

The use of Unified Modelling Language (UML) 2.0 is the general-purpose modelling language required for all system specifications and documentation as it provides a standard way of visualizing the system design through all its layers.

Business Process Model and Notation (BPMN) 2.0 is the open standard notation for the visual language required to specify business analysis and business process workflows.

3.2 Deliverables

Bearing in mind the previous requirements, the following deliverables must be presented and will ensure that all aspects of the REA Data HUB are thoroughly documented and compliant with the necessary standards:

1. **Descriptive Memory and Technical Specifications** with detailed documentation for each layer, with instructions on setup, implementation, maintenance, and troubleshooting:
 - Visualization and Analysis,
 - Publication, Interoperability,
 - Data Transformation,
 - Data Storage,
 - Data Modelling.
 - Examples of successful implementation with components and resources.
2. **Compliance Documentation:**
 - Demonstrate compliance with NATO standards and guidelines for IT architecture, software, hardware, products, services and data (GEOMETOC and others).
3. **Deployment Plan:**
 - Detailed plan for deploying physical infrastructure in federated/segreated military networks.
 - Instructions for receiving GEOMETOC Data from external sources.
4. **Performance and Security Testing:**
 - Results of performance testing in federated/segreated military networks.
 - Security testing results to ensure compliance with NATO standards.

4 Eligibility Criteria, Security and Privacy Requirements

Applicants must meet the following criteria:

- Be a citizen of one of the NATO Allies,
- Be fluent in English, both spoken and written.

Essential Qualifications / Experience:

- University degree in computer sciences and completed higher vocational training in library, information science, management information systems, computer science or a related discipline leading to a formal technical or professional certification and 3 years of functional experience; or Secondary education and completed advanced vocational training in the same discipline leading to a professional qualification or professional accreditation and 5 years' post-qualification experience,
- Strong technical background in areas such as software development, networking, and systems integration,
- Proficient in programming languages, middleware technologies, and API design,
- Analysis of military requirements/capabilities, including familiarity and recent expertise in military components/domains,
- Ability to work and communicate effectively with military staff,
- Proven track record of successfully delivering similar projects.

Desirable Qualifications / Experience:

- Experience working in and/or with international/multinational organizations,
- Experience in working closely with Industry.

The selected candidate will be required to hold a security clearance from her/his national authorities. Until the necessary security clearance has been obtained, the service provider will work outside the premises of the CoE in a suitable space made available by the COE. The selected candidate will be required to sign a confidentiality agreement with the NATO Maritime GEOMETOC CoE.

5 Contract Details

- Expected duration: 8 months.
- Payment: 5,000.00 EUR, paid for in two instalments. All taxes and social contributions are the responsibility of the selected candidate.
- Work location: The selected candidate will have the possibility to work in a space made available by the NATO Maritime GEOMETOC CoE and at home (hybrid setup).
- The service will only be carried out by the selected candidate, who may not engage or employ any other person to carry out the service.
- This process is not intended to create an employer-employee relationship, and the selected candidate will be an independent contractor at all times. The selected candidate may provide services to others during the term of the contract.
- The selected candidate will be required to carry his/her own health, injury and professional liability insurance.



6 Application and Selection Procedure

Applicants should submit a Curriculum Vitae (CV) and a letter of motivation. The evaluation will consider the CV and professional interview of the candidates who meet the requirements of the vacancy.

Applications must be submitted between the 17th of February and the 10th of March 2025.

Applications received after the date mentioned will not be considered.

The evaluation of the applications received will be done by the end of March 2025.

7 Feedback for Unsuccessful Applicants

NATO Maritime GEOMETOC CoE intends to provide feedback to any candidate who submits an unsuccessful application.

The CoE reserves the right to control the format and content of any such briefing and to limit it in any way it deems appropriate (including, in exceptional circumstances, the right to refuse a briefing without providing justification).