ADVANCE CONTRACT AWARD NOTICE (ACAN)

1. Title

Open Geospatial Consortium (OGC) Testbed 13

2. Definition

An Advance Contract Award Notice (ACAN) allows departments and agencies to post a notice, for no less than fifteen (15) calendar days, indicating to the supplier community that it intends to award a good, service or construction contract to a pre-identified contractor. If no other supplier submits, on or before the closing date, a Statement of Capabilities that meets the requirements set out in the ACAN, the competitive requirements of the government's contracting policy have been met. Following notification to suppliers not successful in demonstrating that their Statement of Capabilities meets the requirements set out in the ACAN, the contract may then be awarded using the Treasury Board's electronic bidding authorities.

If other potential suppliers submit Statement of Capabilities during the fifteen calendar day posting period, and meet the requirements set out in the ACAN, the department or agency must proceed to a full tendering process on either the government's electronic tendering service or through traditional means, in order to award the contract.

3. Background

The GeoConnections Program of the Canada Centre for Mapping and Earth Observation, Natural Resources Canada is responsible for leading national geospatial information management standards for Canada. The development and adoption of standards is based on consultation and complex technical discussions on the global stage via a variety of mechanisms. The Open Geospatial Consortium Interoperability Program includes a Testbed Program to kick-start and evolve nascent standards technologies. This contract brings together requirements from the Canadian Forestry Service and Canada Centre for Mapping and Earth Observation to further two emerging technology streams with global consultation and engineering. MapML is intended to simplify complex map services into a browser environment for adoption by major browswers (e.g. FireFox, Chrome, etc). The Cloud computing envrionment for Earth Observation Data assesses massive processing environments within a standards context and lessons learned are co-ordinated with other Government of Canada Cloud initiatives.

The solution developed for NRCan via this contract shall be open geospatial standards based. The solution development shall be carried out in a multi-vendor, co-development, international open standards consortium environment, such that NRCan can leverage the requirements and solutions for other OGC members and the solution may be adopted by others in geomatics communities in Canada and internationally. The solution development for NRCan should also inform future open geospatial standards developments and implementations.

3.1 MapML

The MapML format was created by Natural Resources Canada, and is managed in an open, collaborative process by the Maps for HTML Community Group (refer to References 1 and 2 below).

HTML is the most successful hypermedia document format and has forged a slow evolutionary path as the core format of the World Wide Web. The success of the Web as an information sharing ecosystem can be at least partly attributed to the shared nature of the specification. Its shared nature allows it to slowly change through a process that focuses on “not breaking the Web”, brokered by the makers of the software which brings the Web to life, the browser. This pattern of support is at the heart of the success of the Web, and it is the pattern which the Maps for HTML Community Group have adopted for the Map Markup Language specification.

HTML defines a standard object model implemented by browsers, which supports scripting with JavaScript and styling with Cascading Style Sheets (CSS). This trio of standards forms the heart of the modern Web.

The objective of the Maps4HTML Community Group, enabled by MapML and Web Components, is to upgrade the HTML vocabulary to

a) allow HTML authors of all skill levels to create dynamic, robust Web maps based on the core Web standards, and
b) to allow Web cartographers / map authors to use the same standards and technologies in the dissemination of their own products.

As a secondary goal of the Maps4HTML Community Group, the integration of modern Web maps into the HTML vocabulary will bring the full interest and efforts of the geospatial standards community to bear on the broader goals of the Web standards community, where there is much in common as far as interoperability is concerned. Such a shared goal is believed to be in the best interests of both communities, and is at the core of the Extensible Web [Refer to Reference 3 below[3]] / Web Incubator Community Groups' [Refer to reference 4 and 5 below] agenda.

The Maps4HTML Community Group has authored several documents which are relevant, including: Use Cases and Requirements [Refer to Reference 6 below], the Map Markup Language specification [Refer to Reference 7 below] as well as the proposed extended HTML <map> element specification [Refer to Reference 8 below].
These specifications are living documents, and are updated to reflect the current state of development of open source components which implement those specifications, including the MapML Servlet [Refer to Reference 9 below] and the Customised Built-in <map> Element [Refer to Reference 10 below].

Although there are not a lot of MapML sources available on the current Web, Natural Resources Canada has made available several Web service endpoints via the GeoGratis open data hub, documented by metadata [Refer to Reference 11 below] and other related information [Refer to Reference 12 below]. It is not reasonable to expect that existing geospatial information content will suddenly adapt to new technology – there is simply too huge an installed base. This is precisely analogous to the situation which existed at the invention of HTML [Refer to Reference 13 below]. There were several existing internet protocols which had been implemented across the internet, by which existing content was being served (e.g. FTP, gopher, WAIS) [Refer to Reference 14 below]. HTML was able to leverage those protocols to refer to existing content. Similarly MapML is able to simply refer to existing content by virtue of its hypermedia nature.

3.2 Cloud computing environment for Earth Observation Data (big data) integrated with OGC Web Services

The Canadian Forest Service (CFS) has been working with radar remote sensing forest applications for years. We are proposing a scenario using a combination of OGC Web services, Cloud and Big Data (radar and optical remote sensing data) for the OGC testbed.

Our focus is on extracting forest features or biophysical parameters from spaceborne Synthetic Aperture Radar (SAR) and optical data products while using the synergistic combination of Earth Observation (EO) missions to estimate forest biomass in Canada. A test case will be presented with this SOW.

4. Requirement

The GeoConnections Program, as part of the Canada Centre for Mapping and Earth Observation Branch (CCMEO) of Natural Resources Canada, has requirements

- To validate, test and extend existing Maps For HTML Community Group specifications, software and content, and in so doing:
    - To broaden engagement and adoption the geospatial information community
    - To demonstrate Map Markup Language (MapML) adoption to the broader Web community by means of a standards-track internet media type registration by December 1st 2017.
    - To publish support for MapML in one open source browser code ready as a public pull request by December 1st 2018.
- To develop a cloud computing environment for hosting earth observation (EO) data processing tools and developing an operation model for such cloud computing environment which would supports processing high volume of EO data and providing new information products for forestry community.

5. Scope

Testbed-13 will deliver the requirements defined below in the form of Engineering Reports and software components as illustrated in the figures below. Requirements are shaded in orange, software components in blue, Engineering Reports in green.

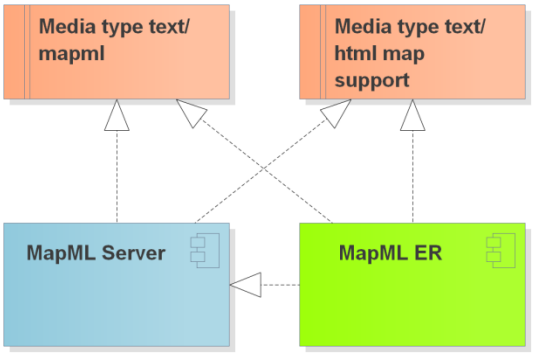

Figure 1 MapML work items

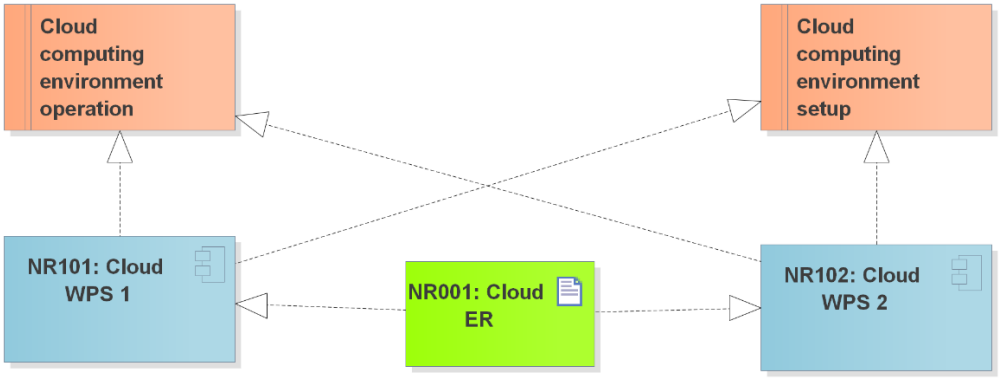

Figure 2 Cloud Environment work items

5.1 MapML

1. Specify [Refer to Reference 15 below] [15]and implement [Refer to Reference 16 below] a media type "text/mapml" which interoperably encapsulates the semantics of maps to support the stateless client-server requirements of Web browsers. This could be accomplished using specific configurations wrapping existing OGC service (WMS, WFS, WMTS) implementations as back-end services. [Refer to Reference 17 below]
2. Identify a list of designated personnel who shall be members of both OGC and the Maps For HTML Community Group for github pull requests support. For patent/licensing considerations, such designated personnel are required.

3. Collect OGC community feedback in the form of github pull requests to the appropriate github:Maps4HTML/repository name from designated personnel identified in the previous step. Topics to be addressed by such pull requests include, but are not limited to new normative and non-normative sections or updates to existing sections about:
   a. Tiled Coordinate Reference System (TCRS) definitions
   b. Image georeferencing markup
   c. TCRS/projection negotiation
   d. Language negotiation
   e. Security considerations
   f. Hyperlinking within and between map services
   g. Accessibility considerations for map feature markup
   h. Microdata / microformat semantic markup recommendations
   i. Feature creation / update / deletion sections via PUT, POST, DELETE considerations
   j. Caching discussion
   k. Extent processing discussion / algorithm
   l. Feature styling with Cascading Style Sheets
4. Potential JavaScript API for map documents which are accessed as the primary resource in the manner of SVG documents so accessed. i.e a MapMLDocument
5. Specify [Refer to Reference 18 below] and implement [Refer to Reference 19 below] an extension to the text/html media type which implements the core functions of Web maps as they are understood today. Such an extension could take different forms. 'Native' browser code, browser plugin or Custom Element. [Refer to Reference 20 below]

5.2 Cloud computing environment for Earth Observation Data (big data) integrated with OGC Web Services

1. Develop a cloud computing environment for earth observation data processing tools hosting. The cloud computing environment shall support
   a. Software toolbox deployment, configuration and maintenance
   b. Receiving job request through OGC WPS;
   c. Allocating resources dynamically based on demand;
   d. Performing job splitting/ scheduling/ Processing/ tracking;
   e. Allocating required scratch storage for intermediate and final product
   f. Supporting batch processing multiple Radarsat-2 or other SAR/optical images (a generic big /high volume data processing);
   g. Capable to integrate or exchange data from different sources hosted in a cloud environment (and/or traditional computing network);
   h. Gathering output elements into final products;
   i. Disseminating final products through OGC Web services such as WCS and WMS;
   j. Providing cloud usage statistics and user notification.

2. Develop an operation model for such cloud computing environment which would supports high volume of earth observation data.

This preprocessing is envisioned to be handled in the Cloud where processing power and storage can be elastic. In the Cloud, processors and storage can be increased or decreased when needed. Resources are only used when necessary thus reducing overhead costs of maintaining expensive servers or computing power.

Requirements for the operational Cloud model would include:

   a. The ability to leveraging large pools of computing resources (storage, networking and computing capacity/processors) from Public, Private, Hybrid Cloud and traditional dedicated servers. (example use of OpenStack) As ownership of data may be a concern to some agencies, the location of the storage of the datasets may require a Hybrid Cloud solution with the use of traditional dedicated servers.

b. The ability to easily create or expand number of Instances/VMs when needed and not need to reconfigure how WPS services are advertised.
c. The ability to control access and authentication of users of the Web services and instances/VMs
d. The ability to log usage and jobs being performed
e. Must allow for the integration of WPS 2.0 Interface standards including constructs for service discovery, service capabilities, job control, execution and data transmission of inputs and outputs in a chain.
f. Will have a Web-enabled dashboard of current usage and capacity of computing resource of the Cloud infrastructure. Ideally this dashboard can be integrated into the WPS dashboard that monitors the execution requests, responses etc.
g. Must be able to publish and consume OGC services like WMS, WCS, and WFS
h. The operational Cloud model must be easily reproducible and documented.
i. The operational cloud model should be general enough to support any type of EO data processing supported by Radarsat-2 Toolbox.

3. The following test case will need to be satisfied by the established environment for the environment setup and operation.

a. For cloud computing environment setup:
    i. Deploy and configure software RADARSAT-2 Toolbox (RSTB) from Array Systems Computing (Array) on the cloud.
    ii. The vendor will successfully demonstrate the WPS 2.0 functionality by using an Integrated Development Environment –ETL Extract Transform Load package (like Pentaho/GeoKettle) to process RADAR data through the Cloud enabled RSTB

b. For cloud computing environment operation:
    i. Receive job request via OGC WPS;
    ii. Allocating resources based on the number of input Radarsat-2 SQW images;
    iii. Split the job, perform scheduling, and start tracking;
    iv. Start batch processing;
    v. Fetch each Radarsat-2 SQW data from a cloud source or a specified network as a zipped file; Read in Radarsat-2 SQWdata in Single Look Complex (SLC) format from the fetched zip file; Perform Compact Polarimetry (Compact-pol) simulation from SQW data for simulated RCM (Radarsat Constellation Mission) Compact-pol products;
    vi. Generate required compact-pol Stokes parameters;
    vii. Perform compact-pol decomposition and generate decomposition parameters;
    viii. Perform terrain correction on both decomposition and Stokes parameters; Output all geo-corrected compact-pol parameters to specified storage; collect and mosaic output elements and organize final products; disseminate output products through OGC Web services such as WCS and WMS;
    ix. Provide cloud usage statistics and send user notification.

References

[1] https://www.w3.org/community/maps4html/
[2] https://github.com/Maps4HTML
[3] https://www.w3.org/community/nextweb/
[4] https://www.w3.org/community/wicg/
[5] https://discourse.wicg.io/
[6] http://maps4html.github.io/HTML-Map-Element-UseCases-Requirements/
[7] http://maps4html.github.io/MapML/spec/

[8] http://maps4html.github.io/HTML-Map-Element/spec/
[9] https://github.com/Maps4HTML/MapMLServer
[10] https://github.com/Maps4HTML/Web-Map-Custom-Element
[11] http://geogratis.gc.ca/api/beta/en/nrcan-rncan/ess-sst/-/(urn:iso:format)map-markup-language?sort-field=relevance
[12] http://www.nrcan.gc.ca/earth-sciences/geography/topographic-information/free-data-geogratis/geogratis-web-services/17216#g6
[13] https://www.amazon.ca/Weaving-Web-Original-Ultimate-Destiny/dp/006251587X
[14] https://www.w3.org/DesignIssues/Principles.html
[15] http://maps4html.github.io/MapML/spec/
[16] https://github.com/Maps4HTML/MapMLServer
[17] http://geogratis.gc.ca/api/en/nrcan-rncan/ess-sst/-/(urn:iso:format)map-markup-language?sort-field=relevance
[18] http://maps4html.github.io/HTML-Map-Element/spec/
[19] http://maps4html.github.io/Web-Map-Custom-Element/
[20] https://www.w3.org/TR/custom-elements/#custom-elements-customized-builtin-example

6. Project Requirements

6.1 Deliverables

Deliverables - MapML	Date Completed
Deliverable 1 – Kick-off meeting	April 4, 2017
Deliverable 2 –A list of designated personnel for pull requests support is prepared (specified in section 3.1.2)	June 30, 2017
Deliverable 3 - MapML pull request candidate prepared (specified in section 3.1.1)	June 30, 2017
Deliverable 4 –OGC community feedback collected and documented	**September 30, 2017**
Deliverable 5 – MapML Server is demonstrated to NRCan	December 30, 2017
Deliverable 6– Engineering report Draft	December 30, 2017
Deliverable 7 – One Engineering Report to describe in detail the usage, comments, issues in the implementation. Specifically, this Engineering report includes standards track IETF RFC draft describing Map Media Type (text/mapml) syntax and semantics incorporating all relevant pull requests demonstrated	**December 30, 2017**

Deliverables - Cloud computing environment for EO	Date Completed
Deliverable 1 – Kick-off meeting	**April 4, 2017**
Deliverable 2 –Stakeholders Meetings with Government of Canada/GeoConnections/NRCan and vendors	As required from May 31, 2017
Deliverable 3 – Requirements documentation developed	May 31, 2017
Deliverable 4 – Systems and Architecture design documentation	June 30. 2017
Deliverable 5 – Cloud instance procured or developed in conjunction with NRCan	May 31, 2017
Deliverable 6 – WPS integration with RSTB	September 30, 2017
Deliverable 7 – WMS, WCS interfaces for RSTB	September 30, 2017
Deliverable 8 – Integration testing on cloud	September 30, 2017
Deliverable 9 – Testing of Cloud WPS 1 with NRCan	**September 30, 2017**
Deliverable 10 – Demonstration of WPS RSTB with WMS WCS on elastic	October 30, 2017

cloud	
Deliverable 11 - Testing of Cloud WPS 2 with NRCan	December 30, 2017
Deliverable 13 – Engineering report Draft	December 30, 2017
Deliverable 14 – Engineering report Final to describe in detail the usage, comments, issues in the implementation of the two Cloud WPS instances**.**	**December 30, 2017**

6.2 Milestones and Payment Schedule

Milestones/Deliverables – project management	Date Completed	Payment
Milestone 1 RFQ release and assessment concluded	March 15, 2017	$30,000 CAD
Milestone 2 –Deliverable #4 for MapML –Deliverable #9 for Cloud computing environment for EO	September 30, 2017	$60,000 CAD
Milestone 3 – Final engineering report for both streams of work	December 30, 2017	$60,000 CAD

6.3 Mandatory Criteria to be Met in Order to Submit Statement of Capabilities

The provider must meet the following criteria:

- Must be a geomatics standards association that develops open standards which are tested and implemented by a wide variety of public and private agencies, including all major players in the business of geomatics;
- Must be able to validate, test and extend Maps for HTML (MapML) nascent standard championed by NRCan;
- Must be able to solicit solutions for Earth observation data (big data) analytical standards based processing in Cloud computing environments for biomass calculations for the Canadian Forestry Service, NRCan;
- Must be able to develop the Engineering Reports for NRCan in a multi-vendor, co-development, international open standards environment, with governance linkages to the broader standards and Web communities (ISO and W3C); and
- Must be an international geospatial standards development and testing organization with at least 350 members

7. Estimated Cost

The estimated maximum value of the contract is $169,500.00, including all applicable taxes.

8. Trade Agreements

Applicable Limited Tendering Provision under NAFTA (Article 1016.2)
1016.2(b) - where, for works of art, or for reasons connected with the protection of patents, copyrights or other exclusive rights, or proprietary information or where there is an absence of competition for technical reasons, the goods or services can be supplied only by a particular supplier and no reasonable alternative or substitute exists;

Applicable Limited Tendering Provision under Canada-Chile (Article Kbis-09)
Kbis-09 (b) - where, for works of art, or for reasons connected with the protection of patents, copyrights or other exclusive rights, or proprietary information or where there is an absence of competition for technical reasons, the goods or services can be supplied only by a particular supplier and no reasonable alternative or substitute exists;

Applicable Limited Tendering Provision under Canada-Peru / Canada-Colombia (Article 1409)
1409 (b) where the goods or services can be supplied only by a particular supplier and no reasonable alternative or substitute goods or services exist for any of the following reasons:
(i) the requirement is for a work of art,
(ii) the protection of patents, copyrights or other exclusive rights, or
(iii) due to an absence of competition for technical reasons

Applicable Limited Tendering Provision under Canada-Honduras (Article 17.11)
17.11 (b) a good or service being procured can be supplied only by a particular supplier and a reasonable alternative or substitute does not exist because:

- (i) the good or service is a work of art,
- (ii) the good or service is protected by a patent, copyright or other exclusive intellectual property right, or
- (iii) there is an absence of competition for technical reasons;

Applicable Limited Tendering Provision under AIT (Article 506.12)
506.12(b) – where there is an absence of competition for technical reasons and the goods or services can be supplied only by a particular supplier and no alternative or substitute exists;

9. Exception to the Government Contracts Regulations and applicable trade agreements

Sole Source Justification - Exception of the Government Contract Regulations (GCR):

(d) Only one person or firm is capable of performing the contract

The selected supplier is the only company able to meet Section 6.1 – 6.3 above

10. Name and Address of the Proposed Contractor

Open Geospatial Consortium
#5 – 35 Main Street
Wayland, MA
01778
USA

11. Inquiries on Submission of Statement of Capabilities

Suppliers who consider themselves fully qualified and available to provide the services/goods described herein, may submit a Statement of Capabilities in writing, preferably by e-mail, to the contact person identified in this Notice on or before the closing date and time of this Notice. The Statement of Capabilities must clearly demonstrate how the supplier meets the advertised requirements.

12. Closing Date

Closing Date: 06 January 2017
Closing Time: 2:00 p.m. EST

13. Contract Authority

Valerie Holmes
Procurement Specialist
Natural Resources Canada
580 Booth Street, 5th Floor.
Ottawa, ON
K1A 0E4
Telephone: (343) 292-8371
Fax: (613) 947-5477
E-mail : Valerie.holmes@canada.ca