

The following questions and answers were collected by email and telecon as of 6-December-2010. Please send any corrections or additional questions to techdesk@opengeospatial.org by 15 December 2010.

Revision log:

2010-11-22	David Arctur	Template updated
2010-12-06	David Arctur	Notes added before & during the Bidders Conference.
2010-12-07	David Arctur	WCPS analysis profile discussion, NSG & DGIWG refs
2010-12-11	David Arctur	Clarification of SWE 2.0 ref's; evolution of event-related services
2010-12-16	David Arctur	(a) Which sponsors support which threads, see [Q3-2]. (b) Added [Q2b-5] question & answer from Bidders Conference, about an alternative scenario for identifying and tracking moving objects. (Should have been included in 2010-12-06 version of this doc.) (c) Updated draft (2010-12-15) for DGIWG profiles of ISO 19107 and GML Realizations, see [A2d-1]. (d) NGA sponsor comments on [Q2b-2] on WCS reference implementation supporting SOAP; [Q2b-3] on high priority WCPS analysis processes; [Q3a-1] on supporting revisions to ISO 19123 – Abstract Spec for Coverages. (e) Staff note added to [A3a-3] about use of SensorML 1.x with the latest SWE Common data model. (f) Staff responses on several aviation questions regarding Digital NOTAM spec, see [Q3b-2].

1. Sponsor-provided additions and corrections related to Annex B

a. Section 4.2.3.1 - Regarding the building of **moving-object tracks and bookmarks**: (1) Solutions such as WPS should not combine different resources (GMTI, VMTI) to build tracks. (2) The bookmark developed or reused should handle both resource types.

b. Section 4.2.8.6 - Regarding **coverage data sources for WCS 2.0**

(1): Footnote 2 for the Land Processes Distributed Active Archive Center (LP DAAC) website is incorrect. It should be: <https://lpdaac.usgs.gov/lpdaac/products> (instead of <http://edcdaac.usgs.gov/dataproducts.asp>)

(2): A number of coverage products are listed in this section with no prioritization of utility for OWS-8. The following have been now identified as being of particular interest.

- MODIS/Terra Vegetation Indices Monthly L3 Global 0.05Deg CMG (MOD13C2)
https://lpdaac.usgs.gov/lpdaac/products/modis_products_table/vegetation_indices/monthly_l3_global_0_05deg_cmg/mod13c2

This MODIS product is currently available via a prototype WMS/WCS interface.

- Thermal Anomalies - Fires and Biomass Burning (MOD14)
http://modis.gsfc.nasa.gov/data/dataproduct/dataproducts.php?MOD_NUMBER=14

- Thermal Anomalies & Fire 5-Min L2 Swath 1km (MYD14)
https://lpdaac.usgs.gov/lpdaac/products/modis_products_table/thermal_anomalies_fire/5

[min_l2_swath_1km/myd14](#)

- *Land Surface Temperature and Emissivity Daily L3 Global 1 km Grid SIN (MOD11A1)*
https://lpdaac.usgs.gov/lpdaac/products/modis_products_table/land_surface_temperature_emissivity/daily_l3_global_1km/mod11a1
- *Leaf Area Index - Fraction of Photosynthetically Active Radiation 8-Day L4 Global 1km (MOD15A2)*
https://lpdaac.usgs.gov/lpdaac/products/modis_products_table/leaf_area_index_fraction_of_photosynthetically_active_radiation/8_day_l4_global_1km/mod15a2
- *Surface Reflectance Daily L2G Global 1km and 500m (MOD09GA)*
https://lpdaac.usgs.gov/lpdaac/products/modis_products_table/surface_reflectance/daily_l2_g_global_1km_and_500m/mod09ga
- *Land Surface Temperature & Emissivity 8-Day L3 Global 1km (MOD11A2)*
https://lpdaac.usgs.gov/lpdaac/products/modis_products_table/land_surface_temperature_emissivity/8_day_l3_global_1km/mod11a2

2. Questions received before or during Bidder's Conference on 6 December 2010

[Q2-1] How late can potential participants submit further questions via email?

[A2-1] Until 15 December 2010, to techdesk@opengeospatial.org

[Q2-2] Is the **Bidders Conference being recorded**?

[A2-2] The webex session has been recorded; a link for the downloadable video (mp4, 35mb) is posted on the RFQ public page in the Bidders Conference section at bottom:
http://portal.opengeospatial.org/files/?artifact_id=42018

[Q2-3] If **more than one bidder proposes** to a given item, with not enough funding for both, how is this handled?

[A2-3] The OWS-8 project staff try to ensure that all sponsor requirements are met by one or more bidder proposals. We also try to ensure that all bidder organizations sending proposals will have a part in OWS-8. Some requirements may not be addressed by any proposals, while other requirements may get more proposals than needed. When too many proposals are received for a given requirement, we choose the one(s) that seems most qualified, informed, and likely to succeed with the given tasks (so we recommend discussing your background and approach for each task). If an organization wishes to fulfill one or more requirements on an unfunded basis, that may be accepted depending on the nature of the task(s). When no proposals are received for a given task, we will go back to the most qualified bidders (based on their proposals for other tasks, or on past experience with them) and ask if they would consider meeting these requirements. These negotiations will take place in the two weeks following the RFQ response due date, January 14-28 in this case.

2a. [Observation Fusion – *Moving Objects Tracking* subthread]

[Q2a-1] Section 4.2.3.1 - Is this doc available:

- *NATO Study 4676*: NATO ISR Tracking Standard (NITS), URL TBD.

[A2a-1] This is in draft; not ready for use. There will be a UML model available by end of December. It's not clear when this reference will be available.

2b. [Observation Fusion – Coverages subthread]

[Q2b-1] Is another *reference implementation of WCS 2.0* acceptable?

[A2b-1] Yes.

[Q2b-2] Would the reference implementation *need to implement SOAP bindings*? WCS core specifies conformance classes (SOAP, KVP, POST/XML), so would it be enough for a RI to state which conformance classes it supports?

[A2b-2] *Added 2010-12-15 by NGA Sponsor*: RI should be able to support all three conformance classes in order for it to be used by any service implementation even if that service implementation only supports one or more of the protocol bindings. US Dept of Defense requires SOAP binding support.

[Q2b-3] For *WCPS: is there a list of special analysis processes*?

[A2b-3] *We need sponsor input – bidders may suggest use cases and processes. (see also next question & response)* *Added 2010-12-15 by NGA Sponsor*: We have not stated a specific requirement for WCPS but would be willing to consider bidders use case / process suggestions.

In any case, bidders are encouraged to propose a profile of WPS / WCPS that addresses a category of mathematical algorithms applicable to earth observation coverages. This is consistent with the OGC guidance to develop thematic profiles of algorithms for WPS, such as the WPS Feature and Statistical Analysis Profile begun in OWS-7. There are a number of existing commercial libraries of mathematical routines which could be applied to earth observation coverages. A WPS Coverage Processing Profile might include reference to specific well-known commercial libraries, thus needing only the math library name and algorithm name to define a given operation. The profile would also be expected to provide a means of declaring more of the algorithm signature and metadata in cases of lesser-known or independent libraries and algorithms.

Note that Earth Observations includes in situ, satellite, and other kinds of sensors.

[Q2b-4] Regarding the reference to Fusion Study Phase 2: where does it suggest WCPS analysis processes?

[A2b-4] Section 9.3.4 of the *Fusion Study Phase 2 final report* (OGC doc 10-184) describes a discrete global grid system (DGGs) proposed by PYXIS (<http://pyxisinnovation.com/>). From page 49 of the Fusion Study Phase 2 final report:

Tessellations of the Earth surface are considered in an annex to the OGC Abstract Specification, Topic 6 – Coverages. The topic is included in that document for discussion with discrete coverages. Topic 6 lists several methods for discrete coverages. The specific **discrete global grid ISEA3H (Icosahedral Snyder Equal Area aperture 3 Hexagon Grid)** advocated by PYXIS could be added to Topic 6 (also known as ISO 19123).

Using DGGS and in particular ISEA3H for discrete coverages would enable coverage processing that employs the ISEA3H structure for efficient processing. Specific profiles of WCS, WPS and WCPS using ISEA3H could be defined. PYXIS has internally developed a similar approach.

The ISEA3H grid is especially useful in applications involving projections spanning polar regions and the dateline. For more details on PYXIS ISEA3H and related technology, their responses to the Fusion Standards Study are available to the public here:

Fusion RFI-1 PYXIS response (3.1mb pdf)

http://portal.opengeospatial.org/files/?artifact_id=35162

Fusion RFI-2 PYXIS response (840kb pdf)

http://portal.opengeospatial.org/files/?artifact_id=39995

Section 10.3.1 of the Fusion Study Phase 2 report also mentions WCPS, see page 55:

The **Web Coverage Processing Service (WCPS) Interface Standard** allows ad-hoc filtering, processing, extraction, and analysis of multi-dimensional raster coverages. A protocol-neutral language is defined which can be embedded into both WCS and WPS. This language allows to filter and **process sensor, image, and statistics coverages** like

- 1-D in-situ sensor time series
- 2-D ortho images
- 3-D image time series (x/y/t) and geological data (x/y/z)
- 4-D climate and ocean data (x/y/z/t)
- “abstract coverages” which additionally have non-spatiotemporal axes.

Heterogeneous coverages can be combined in one request, enabling **multi-sensor fusion**. The language is **safe** in that no non-terminating requests can be sent, thereby preventing a class of denial-of-service attacks.

The following example shows the principle: *"From MODIS scenes M1, M2, and M3, the absolute of the difference between red and nir, in HDF-EOS, but only those where nir exceeds 127 somewhere inside region R":*

```
for $c in ( M1, M2, M3 ),
  $r in ( R )
where
  some( $c.nir > 127 and $r )
return
  encode( abs( $c.red - $c.nir ), "hdf" )
```

Section 10.4.1 has further recommendations, see page 59:

It is recommended to assess **multi-coverage fusion capabilities involving both WCS**

and WCPS in a scenario with different, heterogeneous raster types, for example 1-D sensor time series, 2-D hyperspectral remote sensing data and bathymetry/elevation data, 3-D EO time series, 4-D climate data. Server-side processing needs to include sufficiently complex queries, taken from real-life examples, to make them convincing to domain experts. All coverages delivered must be encoded following the GML Application Schema for Coverages (09-164r1) in combination with the (currently drafted) coverage formats like GeoTIFF, NetCDF, and JPEG2000. To this end, the WCPS specification should be updated to make use of this new standard.

It is recommended to establish proof-of-concept **services for non-raster coverages**. A whole new set of coverage types has been gained by aligning with GML, but little is known about serving non-grid coverages in an OGC environment. Emphasis should not be on "yes, we can serve these data too" (this would repeat GALEON IE and recent Ocean activities, ending up in serving format X with so-so WCS conformance), but an offering of representative data strictly adherent to the WCS 2.0 model.

It is recommended to conduct an **experiment on the integration of workflow, processing, and data access service**s. Initial work has been performed by NASA on WCPS as a value-adding ground/space interface, which may serve as a role model and/or basis for continuation. For example, a (simulated) on-board WCPS might deliver some derived data, which are fed, via WCS-T, into a ground-based WCS. WCPS Change Requests submitted NASA and other users should be considered for incorporation in the standard.

It is recommended to complete the **WPS Application Profile fusing coverages, via WCPS**, into WPS. As this very much depends on progress with the WPS 2.0 specification, this needs to be performed in close contact with the WPS.SWG. The concept of offering the coverage request language through different protocols, which fosters harmonization between WCS and WPS, should be evaluated and demonstrated.

It is recommended to **develop WCS extensions** which do not have assignments for now, among them EPSG coordinate handling, scaling & interpolation, and range subsetting ("band selection"). Existing WCS 1.1 extensions (WCS-T, WCPS) need to be carried over to WCS 2.0.

[Q2b-5] (Question asked & answered during Bidder's Conference, **added to clarifications 2010-12-16**) Regarding **the Moving Object tracking and bookmarking** requirements, these seem to only involve a single (or small number of) mobile sensors capturing video streams. Another possible scenario and set of use cases could be based on trying to track a moving object through a field of stationary sensors, such as a campus with numerous surveillance cameras. Would there be interest in solutions to the problem of predicting which next camera field a moving object would be likely to enter? In other words, to facilitate following a particular person in motion across the campus?

[A2b-5] NGA sponsor agrees that would be an interesting scenario, and would consider such proposals.

2c. **Cross-Community Interoperability - Semantics subthread**

[Q2c-1] Section 4.4.2.1 - CCI data model references below required login:

- NSG TDS Content Spec V2.0: <https://nsgreg.nga.mil/as/view?i=82011> <- do not use
- NSG TDS Content Spec V3.0: <https://nsgreg.nga.mil/as/view?i=82045> <- see public link below

[A2c-1] The reference to **NSG TDS Content Spec** v2.0 is obsolete and should not be used. TDS version 3.0 is now available for public download here:
http://portal.opengeospatial.org/files/?artifact_id=42030 (zip, 200kb)

2d. [Gsync thread]

[Q2d-1] Section 4.3.2 – is the DGIWG profile of ISO 19107 available?

- ISO 19107
http://www.iso.org/iso/catalogue_detail.htm?csnumber=26012
- DGIWG profile of ISO 19107 – ref?

[A2d-1] The “**DGIWG profiles of ISO 19107 and GML Realizations**” document is available in near-final-draft (only minor edits remaining) and is posted here for access by bidders:

(Just updated 2010-12-16: latest version of draft document)

http://portal.opengeospatial.org/files/?artifact_id=42169 (Word, 6mb)

3. Questions received after the Bidder’s Conference

[Q3-1] Please make the **Fusion Standards Study, Phase 2 Engineering Report**, OGC Doc 10-184, 2010-11-11, available for download by non-OGC members.

[A3-1] Certainly, that can be downloaded here:
http://portal.opengeospatial.org/files/?artifact_id=41094 (Word, 9mb)
http://portal.opengeospatial.org/files/?artifact_id=41978 (PDF, 2.3mb)

[Q3-2] (added 2010-12-16) would be it possible to know **which sponsors are involved in which thread?**

[A3-2] Aviation: FAA, Eurocontrol, NOAA, NASA
Observation Fusion: NGA, NASA, ESA
Gsync: NGA, Army Geospatial Center, Lockheed Martin
CCI: NGA, USGS, UK Defence Science and Technology Laboratory

3a. [Observation Fusion]

[Q3a-1] **ISO 19123 (OGC Abstract Spec for Coverages) needs to be revamped**, as we painfully had to realize during WCS 2.0 design. Actually, we had to interpret 19123 somewhat (eg, "continuous coverages" issue). ISO is aware that there are issues and has released a call for a New Work Item Proposal (NWIP) already in 2009. OWS-8 support would be a valuable boost for helping ISO coverages to catch up with the technological state of the art, easing OGC's work in delivering specs which are up-to-date and still ISO conformant. **Could it be funded under OWS-8 to provide an OGC position on changes to ISO 19123 (effectively updating OGC Abstract Specification - Topic 6)?** (Issues

with ISO 19123 are posted on the OGC WCS2x0swg wiki (SWG membership or Observer status required for access):

<https://portal.opengeospatial.org/twiki/bin/view/WCS2x0swg/ChangesTo19123IsoTc211>)

[A3a-1] We are checking with the sponsors for high priority use cases and scenarios.

Added 2010-12-15 by NGA Sponsor: I have reviewed the text found on the WCS TWIKI and am still unsure of the reason, usefulness or need to provide modification guidance on updating ISO 19123. I need a better understanding of summarizability (?), a better understanding of what modifications to the standards are being recommended (not really interested in making any changes to WCS 2.0 at this time).

(Following was added by OGC staff before receiving last comment from NGA sponsor) Also see [Q2b-4] on p.3 for another reference to modifying the Coverages Abstract Spec (ISO 19123): to include the discrete global grid ISEA3H (Icosahedral Snyder Equal Area aperture 3 Hexagon Grid). The ISEA3H grid is especially useful in applications involving projections spanning polar regions and the dateline. (references cited with text).

Added 2010-12-15 by NGA Sponsor: Not interested in sponsoring this as part of OWS-8.

[Q3a-2] Section 4.2.3.2.9, p.22, refers to "WCS 2.0 ECP-AP" -- should this be WCS 2.0 EO-AP?

[A3a-2] Yes, that's a typo.

[Q3a-3] Section 4.2.2.2, p.24 – Moving Object Bookmark task scope requests consideration of enhancements to SWE 2.0, but this term is not defined. This appears again in Table 4-1, p.30, Deliverable 2 (SWE CR's). What is the **content and current status of SWE 2.0?**

[A3a-3] SWE 2.0 refers to the following standards, which are in varying states of adoption:

- Observations and Measurements XML (OMXML) 2.0 [10-025r1] (vote for adoption is open until 2011-01-29, so far 14 yes votes, zero no votes, and zero comments received)
 - http://portal.opengeospatial.org/files/?artifact_id=41510
- SWE Service Model [09-001] (vote for adoption is open until 2010-12-15, so far 40 yes votes, zero no votes, 2 comments received)
 - http://portal.opengeospatial.org/files/?artifact_id=38476
- SPS 2.0 [09-000] (vote for adoption is open until 2010-12-12, so far 41 yes votes, zero no votes, 2 comments received)
 - http://portal.opengeospatial.org/files/?artifact_id=38478
- SWE Common Data Model Implementation Standard [08-094r1] (vote closed 2010-11-27 – APPROVED)
 - http://portal.opengeospatial.org/files/?artifact_id=40408
- O&M 2.0 Abstract Spec [10-004r2 / ISO 19156] (vote closed 2010-08-29 – APPROVED)
 - http://portal.opengeospatial.org/files/?artifact_id=39201
- SOS 2.0 is in development, responding to recent RFC comments [10-208, 10-209]; estimated time for readiness to move for adoption is likely 6 months (June 2011).
 - RFC package: http://portal.opengeospatial.org/files/?artifact_id=40623
 - It is recommended to work with draft SOS 2.0 specifications in OWS-8, to advance implementation and testing of the RFC and comments being considered. Responders to tasks involving SOS 2.0 should take into account current work on the SOS 2.0 SWG twiki: <https://portal.opengeospatial.org/twiki/bin/view/SOS2x0swg/>
OGC members not already in this SWG can obtain read-access by clicking through the appropriate Observer Agreement linked on this page:
<http://portal.opengeospatial.org/?m=public&orderby=default&tab=7>

This exemplifies the policy of the OGC Interoperability Program to use latest specs, unless a very good reason exists for doing otherwise. Since Table 4-1 requests SWE 2.0, we would expect proposals to do so.

[added 2010-12-16 by OGC staff] There should not be a problem **using SensorML 1.0** with the latest SWE Common Data Model

Given these states of adoption and development, the following additional clarifications are appropriate for other text in the RFQ Annex B:

p. 43, clause 4.2.6.2 describes O&M 1.0, though 2.0 is approved (at least the model) and the XML implementation is in vote, with adoption in current form expected in January 2011.

p. 49, clause 4.2.7 describes SOS 1.0, not 2.0. Bidders are requested to apply SOS 2.0 (see notes in last bullet above).

p. 52 describes SAS, which has not been developed in a long time. Bidders should consider the following Public Engineering Reports, which show the **evolution of the various event-related services (SAS, WNS, Event Service, event enabling OWS services)**, which increasingly align with broader IT standards:

- o OWS-7 Event Architecture Engineering Report, OGC 10-060r1, http://portal.opengeospatial.org/files/?artifact_id=39509
- o OWS-7 Dynamic Sensor Notification Engineering Report, OGC 10-061r1, http://portal.opengeospatial.org/files/?artifact_id=39513
- o OWS-7 Aviation Architecture Engineering Report, OGC 10-079r3, http://portal.opengeospatial.org/files/?artifact_id=40133

p. 54, figure 4-13 shows typical SWE 1.0 interaction, not 2.0, as SPS 2.0 does not require WNS. SPS 2.0 vote closes in December 2010, with expected approval in current form posted.

3b. [Aviation thread]

[Q3b-1] Section 4.5.2.2.2 - Could the **RTCA documents** referenced in the OWS-8 RFQ aviation section be made available to participants without cost?

[A3b-1] The documents in question are the intellectual property of RTCA so cannot be released to those who do not already have access to it (through membership or by purchase).

[Q3b-2] Added 2010-12-16> We have some questions regarding the work on the **Digital NOTAM Event Specification**:

Q1: Is the development of the validation rules/scripts part of the report deliverable (item 5 in table 4-8) and/or is it part of the AIXM handling > components/tools (item 8 in table 4-9)?

A1: The development of the rules and scripts is part of the AIXM handling components and tools (Item 8 in table 4-9)

Q2: Are only those scenarios that are elaborated in the current Digital NOTAM Event

Specification to be covered in the testbed, or would scenarios that are currently marked in the specification as work in progress also need to be covered if they were elaborated in detail during the testbed?

A2: The elaboration on new scenarios that are currently not detailed in the Digital NOTAM Event Specification is out of scope for OWS-8. OWS-8 participants shall focus on implementing and validating only the existing scenarios by creating and exchanging the corresponding AIXM 5.1 datasets, implementing the corresponding business rules and identifying, if any, some missing rules or information.

Q3: Which parts of the Digital NOTAM Event Specification are to be covered > with executable validation rules? It looks like the sections titled "Automatic data validation rules" contain the rules that shall be realized. Are other parts of the specification also to be validated?

A3: The Digital NOTAM Event specification defines a series of business rules for each scenario. Those rules must be respected when the corresponding digital NOTAM is issued. The OWS-8 requirement is to implement those rules and to complement them with any additional rules or practical recommendations that could emerge during the testbed.

Q4: May validation only be performed using schematron rules or can there be other validation means, for example using RelaxNG or some XQuery scripts?

A4: While it's not a requirement, Schematron would be favored because it has been used so far to provide proof-of-concept implementation of AIXM business rules. Proposers are encouraged to reuse, to the extent possible, the work performed in the previous testbed (OWS-7) that produced a tool performing schema and Schematron validation on data returned by a WFS server (based on the DuckHawk project).

3c. [Gsync and CCI threads]

[Q3c-1] Gsync sections 4.3.2.1 and 4.3.5.2, and CCI section 4.4.2.1 – Public links are needed for the following references (cannot follow these links):

- *NSG Metadata Foundation (NMF) - Part 1 (v2.0.0)*
https://www.gwg.nga.mil/protected/focus_groups/mfg/documents/NMF_%20v1.5.pdf
- *NSG Metadata Implementation Specification (NMIS) - Part 2 (v2.0.0)*
https://www.gwg.nga.mil/protected/focus_groups/asfe/documents/NMIS_Part_2_v1.5.0_draft.pdf

[A3c-1] The **public links for NSG Metadata specs** are:

- *NSG Metadata Foundation (NMF) - Part 1 (v2.0.0)*
http://portal.opengeospatial.org/files/?artifact_id=42028 (Word, 2mb)
- *NSG Metadata Implementation Specification (NMIS) - Part 2 (v1.5.0 draft)*
http://portal.opengeospatial.org/files/?artifact_id=42029 (zip, 500kb)