Look for the OpenGIS Certification Mark!

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The Open GIS Consortium (OGC) now provides online compliance testing for organizations to test whether their software products and/or applications comply with the Web Map Service and Web Feature Service OpenGIS® Specifications. If a product or application passes the required test suite and the test result is certified by OGC staff, the developer may brand the product with the OGC brand, or "certification mark" (see sidebar) for that particular specification.

To date, OGC's Conformance and Interoperability Test and Evaluation Initiative (CITE) has developed compliance tests for the OpenGIS Web Map Service Specification (WMS) 1.1.1 (simple maps) and the OpenGIS Web Feature Service Specification (WFS) 1.0 (vector feature data). The CITE team has also produced a validation capability for Geography Mark-up Language (GML) 2.1.2, Reference Implementations (open source sample programs) for WMS and WFS, and a portal for OGC's compliance testing program, accessible from http://www.opengis.org.

The development of the OGC compliance test infrastructure began last year. OGC commissioned a planning study about compliance testing from The Open Group. The Open Group, an organization with a 20 year history of testing for the information technology community, provided key guidance for the CITE initiative. The WMS and WFS compliance test development teams were led by Northrop Grumman Information Technology and Galdos Systems respectively.

CITE relied on the OGC consensus process to build and put the compliance tests through their paces. Research indicates that automated conformance tests developed via consensus tend to be far more successful than those developed by a single organization and later accredited by an outside firm. The CITE portal was developed by Sinclair Knight Merz and Social Change Online (SCO), both from Australia, using SCO's AIMS content management system. The portal includes access to the two conformance tests along with other resources for software developers. Other CITE team members included National Center for Atmospheric Research (NCAR), The Open Planning Project (US), University of Leeds (UK), and Lat/Lon (Germany).

The number of OpenGIS Specifications has jumped in the past few years. "There was no automated method established to test compliance to OGC Web Services," explains Jen Marcus, CITE Initiative Manager, "so OGC called upon our members with compliance testing experience to put forward their

considerable expertise to address the challenge. OGC members 'tested the tests' via four separate beta trials, which led us to the robust tests we offer today."

What does compliance testing and branding mean for users and buyers of geospatial technology? An OGC Compliance Brand certifies that a given product or application properly implements a particular version of an OpenGIS Specification. That is, anyone buying an OGC Branded Product is guaranteed that:

-- The product complies to the identified OpenGIS Specification. The product complies with all the mandatory interface options and complies with any special conditions identified in the OpenGIS Interface Specification.

-- The product will continue to comply. The product is guaranteed to remain compliant throughout fixes, functional enhancements, and performance improvements. If it does not continue to comply, and the non-compliance is not corrected by the vendor, then the vendor will lose the Product Registration and the right to use the brand.

The compliance tests are freely available via the CITE Portal and open to any developer who wants to test their implementation of the WMS or WFS interface specifications. However, only organizations that submit compliance test fees and completed paperwork can claim compliance in their sales and marketing literature.

As data providers and service providers make their data and services available online through OpenGIS WMS and WFS compliant servers, users can employ any vendor's OpenGIS Specification compliant client software to

-- (WMS) - Access and display maps as simple, rather inflexible images, usually .png or .jpeg

-- (WFS) - Access and use the actual vector feature data from different sources on the Web.

We now have a Spatial Web. It's as if we Web users previously had httx, htty and httz, and they didn't work together, but now we have http -- it works, and everybody uses it. The Web depends on compliance with open specifications[1] for interfaces and encodings like http, html, XML and (for the Internet) TCP/IP, which enable computers on the network to communicate in the ways we know. The Spatial Web depends on compliance with OpenGIS Specifications for interfaces and encodings that enable computers to communicate in ways that support spatial data and geoprocessing functions.

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[1] The Web's standard specifications come from the World Wide Web Consortium (W3C), the Internet Engineering Task Force (IETF) and other organizations.

Geoprocessing software is complex and using the Web to transfer commands between diverse software systems is still quite new, so compliance testing will not ensure interoperability of software products. However, most compliant implementations work together well, and as the specifications and products mature, the assurance of interoperability increases. Also, OGC plans to investigate methods of <u>interoperability testing</u>, which will verify whether a product implementation of an OpenGIS Specification interoperates 1) with other specific product implementations of the same OpenGIS Specification, 2) with different but related specifications, or 3) within a particular computing environment.

Compliance testing is a major step forward, because it gives software buyers confidence. All the stakeholder groups in OGC -- software vendors, users, integrators, researchers, data providers, platform providers -- have a stake now in "uptake." That is, they want to see widespread purchase and use -- by readers of this magazine -- of products that implement these specifications. Readers of this magazine can provide the critical mass that causes the value of the Spatial Web to materialize for everyone.

[BEGIN SIDEBAR 1]

Standard Interfaces and Encodings

OpenGIS Implementation[2] Specifications are standard programming specifications for <u>interfaces</u> and <u>encodings</u>.

Interfaces: Consider how the OpenGIS Web Map Service Specification (WMS) standardizes an interface. It defines 1) the way in which maps (portrayals of geographic information as digital image files suitable for display) are requested by clients and 2) the way that servers describe their data holdings.

Consider one of the three operations defined by WMS: GetMap, an interface to obtain a map. A standard Web browser can ask any vendor's OpenGIS compliant Web Map Service to provide a map simply by submitting a request in the form of a Uniform Resource Locator (URL, a W3C standard). Here is a GetMap request for a particular NOAA AVHRR image:

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http://a-map-co.com/mapserver.cgi?VERSION=1.2.0&REQUEST=GetMap&
CRS=CRS:4326&BBOX=-97.105,24.913,-78.794,36.358&
WIDTH=560&HEIGHT=350&LAYERS=AVHRR-09-27&STYLES=&
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[2] All the OpenGIS Specifications that provide concrete, specific programming guidelines for software developers are "implementation specifications." OGC also develops "abstract specifications" that are independent of a particular distributed computing platform such as the Web, CORBA, or COM/OLE.

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FORMAT=image/png&EXCEPTIONS=INIMAGE
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The WMS specification tells the world's programmers that "BBOX" means "bounding box" and that it must be followed by "=" and then by a pair of coordinates and WIDTH and HEIGHT. What's the order of the coordinate pair? Are those miles or kilometers? Will integers work or must they be floating point numbers? The specification "captures consensus" on such questions. In what coordinate reference system (CRS) shall the image be provided? The specification establishes that GetMap requests shall use EPSG index numbers. EPSG number 4326, as in this case, refers to "WGS 84 geographic longitude and latitude expressed in decimal degrees." And so forth. The world's interested geospatial software experts agreed in OGC's consensus process that this is how a map request should work.

Note that what the server provides is a "Web service," and note that the name of the specification is "OpenGIS Web Map <u>Service</u> Specification." Now, imagine Web services for coordinate transformation, feature editing, proximity analysis, etc. Ultimately, all the things that GISs and other geoprocessing systems do will be requestable as Web services hosted by Web servers, accessible from any browser through a standard interface. This is OGC's agenda.

Encodings: OGC does not currently provide a forum for standardizing data models or data content. Such work is undertaken by (in OGC's terminology) "Information Communities," that is, groups who need common definitions for feature types such as roads, wetlands, voting districts etc. If they coordinate in their data production efforts, they can share data much more easily. Information Communities also need to coordinate in developing software-readable metadata to enable Web-based discovery and assessment of data collections. In the US, the Federal Geographic Data Committee has led a federal and national data coordination effort, but this work also proceeds locally and in every country.

OGC does, in its consensus process, address how data models, data and metadata are to be encoded so that they work interoperably on the Web or in other computing environments. OGC's main encoding specification is the Geography Markup Language (GML), which provides a standard way of encoding spatial data in the Web's machine-readable and human-readable eXtensible Markup Language (XML). (A short summary of GML is available in a recent white paper, "The Importance of Going Open" (http://www.opengis.org/press/?page=papers . Complete information is available in the GML specification.) Compliance with GML brings many benefits. Among these is the opportunity to develop tools that make data coordination both easier and, in some cases, less necessary.

OGC members work toward consensus on other encodings besides GML. For example, the second function of WMS, as described in the first paragraph of this sidebar, is to define the way that servers describe their data holdings. That is

essentially an encoding specification.

[END SIDEBAR 1]

[BEGIN SIDEBAR 2]

Products that "Implement" and "Comply with" OpenGIS Specifications

If a software product includes an interface (or if a data product is based on an encoding) that implements a specific OpenGIS Specification, but the product has not passed a compliance test (perhaps because no test is yet available), the product's vendor can label the product as "implementing" a specific OpenGIS Specification. For example:

"This product implements the OpenGIS Geometry Markup Language (GML) Specification, version 2.1."

The vendor may also say:

"This product will be submitted to OGC for compliance testing."

OpenGIS Certification Mark and OpenGIS Specification Logos

The following "OpenGIS Compliant" certification mark is to be used only with products that have been tested and approved by OGC as "Compliant" to one or more OpenGIS Implementation Specifications. The OGC certification mark

[SHOW CERTIFICATION MARK HERE]

must be used in conjunction with one or more of the individual OpenGIS Specification logos listed below.

For products that are compliant to one or more OpenGIS Implementation Specifications, the appropriate specification logos or the full text description of the specification should be used with the Certification Mark. In no case should any of the specification logos, like those below, be used separately from the Certification Mark. These are the specification logos for the OpenGIS Specifications that are most relevant to Web-based applications. (Other OpenGIS Specifications address SQL, CORBA, and OLE/COM.):

[SHOW CAT 1.0 SPECIFICATION LOGO HERE] CAT 1.0   OpenGIS® Catalog Services Implementation Specification, Version 1.0

[SHOW CT 1.0 SPECIFICATION LOGO HERE] CT 1.0   OpenGIS® Coordinate Transformation Services Implementation Specification, Version 1.0

[SHOW GC 1.0 SPECIFICATION LOGO HERE] GC 1.0   OpenGIS® Gridded Coverages Implementation Specification, Version 1.0

[SHOW WFS 1.0 SPECIFICATION LOGO HERE] WFS 1.0   OpenGIS® Web Feature Service Implementation Specification, Version 1.0

[SHOW WMS 1.1.1 SPECIFICATION LOGO HERE] WMS 1.1.1   OpenGIS® Web Map Service Implementation Specification, Version 1.1.1

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