ISO/TC 211 Geographic information / Geomatics
Newsletter No 7 April 2005

Dear Colleagues,

This ISO/TC 211 Newsletter is intended for the members of ISO/TC 211 and its Class A Liaison organizations.

As this Newsletter, a service provided by the ISO/TC 211 Advisory Group on Outreach, develops and evolves, we hope it will also become informative to the global geographic community and eventually to the public at large.

Our mission is to provide information on the standardization of geographic information and related activities.

This issue of the Newsletter refers to articles from the OGC, GeoWorld, GeoPlace website and the Directions Magazine website and INSPIRE and related reports.

Sincerely,

Henry Tom, Editor
ISO/TC 211 Newsletter.

George Percivall

Sensor Web Enablement

The Sensor Web Enablement (SWE) objectives encompass specifications for interfaces, protocols and encodings that enable discovery, tasking and access of sensors, acquisition of sensor data, and discovery and access of sensor-processing services. The work of the SWE group in OGC addresses self-describing in-situ sensors and imaging devices, remote-sensing devices, stored data and live sensor feeds, and simulated models that use sensor data.

Sensor Web Enablement

The ultimate goal of SWE is to provide for the processing of raw sensor data into value-added information with semantic descriptions and link sensors

to the network and network-resident processing services. This will make sensor measurements accessible to the spatial data infrastructure for use by professional decision makers as well as, in a controlled fashion, the public at large.

The technical foundation of SWE must be flexible enough to accommodate any kind of sensor or sensor data as well as any kind of platform, including orbiting platforms with idiosyncratic parameters used in remote-sensing and photogrammetric processing of raw sensor data. Members of OGC's Technical Committee are close to agreement on key standard XML encodings for information models and metadata schemas for sensors and observations.

The Sensor Model Language and Web Notification Service discussion papers and the Observations and Measurements recommendation paper are available for review on OGC's Web site at *www.opengeospatial.org/specs*. The SWE specifications are built on the baseline OGC Web Service specifications: Web Map Service, Web Feature Service, Web Coverage Service and Catalog Service….

Imagine that the same Web technology standard for describing the sensors, outputs, platforms, locations and control parameters is in use throughout a metropolitan region and, in fact, throughout all the regions in a country and its neighboring countries. This enables the interoperability necessary for cross-jurisdictional activities such as homeland security, and it provides a large market for product developers and solution providers who will compete for business, resulting in lower costs and better, more diverse choices for customers.

This is the vision driving industry, government and academic Open Geospatial Consortium (OGC) members who are developing the geospatial standards that will make the "open sensor web" vision a reality.

Full article in Appendix A

Nuke Goldstein

Hands-on on an OGC API & Common Pitfalls When Analyzing WMS/WFS Capabilities

Both these articles were published on the **Directions Magazine** website on March 11, 2005
http://www.directionsmag.com/article.php?article_id=781
October 29, 2004
http://www.directionsmag.com/article.php?article_id=686

"In my last article (Common Pitfalls When Analyzing WMS/WFS Capabilities, Oct. 29 2004) I described some of the complexities a developer may encounter when approaching Open Geospatial Consortium (OGC) web services. By examining the web service capabilities, that article illustrated not only difficulties developers who are already involved with the GIS community face, but also how hard it is to introduce newcomers to interoperable open-geospatial solutions. Many highly talented software engineers and project managers have only a vague idea of what GIS is. Some will respond with "gesundheit" if you say "geospatial" to them. However, if you are one of those folks and made it this far, I have some good news for you. There are now tools that can handle open-geospatial specifications by OGC and others. CarbonTools, a free software toolkit for .NET developers, makes open-geospatial interoperability programming a very manageable task, even for developers who are not GIS-savvy.

Unlike the previous article which shied away from source-code examples, this and future ones will use samples based on the free and available CarbonTools 2. This toolkit is designed to provide .NET developers with an open-geospatial Application Program Interface (API) suitable to experts as well as beginners. With this open geospatial development toolkit it is now possible to move past specifications and multi-vendor interoperability issues and approach more complex topics, such as Geography Markup Language (GML) handling, in a hands-on way."

Peter Batty

So Many Standards to Choose From

This article is from the GeoPlace website:
http://www.geoplace.com/uploads/FeatureArticle/0503tt.asp

"According to an old joke, "the nice thing about standards is that there are so many to choose from." This is truer for geospatial data than many people realize.

There are interesting and complex dynamics involved in what becomes accepted as a standard and what doesn't. In some cases, something developed by a single vendor emerges as a "de facto" standard (e.g., Microsoft Office). In other cases, formal standards developed by a consensus process involving many parties emerge as a standard (e.g., the Web defined by the World Wide Web Consortium)."

JPEG 2000 Heralds New Era in GIS Image Compression

Carsten Heiermann

Carsten Heiermann is co-founder and CEO of LuraTech Inc.; e-mail: *c.heiermann@luratech.com*

This article appeared in GeoWorld, January 2005

http://www.geoplace.com/uploads/featurearticle/0501tt.asp

When it comes to imaging, there's a major industry shift happening among GIS vendors and users in the form of an open International Organi-zation for Standardization (ISO) standard for compressing images: JPEG 2000. The standard was developed by the Joint Photographic Experts Group (*www.jpeg.org*) and issued by ISO (*www.iso.ch*) and the International Telecommunications Union (*www.itu.int*). I believe JPEG 2000 will be the global standard for geo-imaging professionals."

The following excerpt is from the OGC Newsletter, February 2005 by Mark Reichardt, President and Carl Reed, CTO Open Geospatial Consortium

"Below is an overview of our key working relationships with other standards development organizations (SDOs).

1. ISO Technical Committee 211 - Our oldest relationship is with ISO. OGC has a Class A liaison agreement with ISO TC 211. A Joint Advisory Group (JAG) facilitates and manages the relationship. Our agreement with TC 211 allows OGC to advance ISO standards consistent with OGC documents. There are a number of OGC Abstract Specification Topic Volumes that are actually ISO documents, such as Metadata, Services, Spatial Referencing and Feature Geometry. This important arrangement also allows OGC to submit new Work Item Proposals (NWIPs) to ISO. NWIPS tend to be either: 1) suggested changes to an existing ISO TC 211 document or 2) OGC adopted implementation specifications submitted for consideration as ISO standards. The work on Coordinate Reference Systems (CRS) is an example of the former case and the work on Simple Features, Web Map Service, and Geography Markup Language are examples of the latter. An NWIP for Web Feature Service and Catalog will be submitted to ISO in the next couple of months.

2. Organization for the Advancement of Structured Information Standards (OASIS) is a not-for-profit, international consortium that drives the development, convergence, and adoption of e-business standards. OGC work intersects OASIS work at several levels. OGC (the organization) is a voting member of OASIS. OASIS is organized into many Technical Committees, and several OGC members and staff are actively involved in OASIS groups covering topics such as the electronic business resource information model (ebRIM), E-Government, and Emergency Services. The OASIS Common Alert Protocol (CAP) standard has elements that are being harmonized with OGC work. Future change proposals to CAP will hopefully integrate components of existing OGC specifications as normative. The OGC spec work is now utilizing a number of OASIS standards, including UDDI, BPEL, ebRIM, and ebXML. We have also provided "lessons learned" documents back to various OASIS Technical Committees.

3. World Wide Web Consortium (W3C) - We interact with the W3C as necessary to discuss items of mutual interest. On behalf of OGC membership, we follow W3C closely and look forward to pursuing a more formal relationship between our organizations in the future. It should be noted that OGC programs leverage work products of the W3C including SVG, XML, XSLT, SOAP, WSDL, and soon more on RDF (Resource Description Framework) and OWL (Web Ontology Language).

4. The Internet Engineering Task Force (IETF) is a large, open,
international community of network designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet. It is open to any interested individual. It is not membership based; all participants are volunteers. OGC staff represent OGC interests in the GeoPRIV Working Group, whose primary task is to assess the authorization, integrity and privacy requirements that must be met in order to transfer such information, or authorize the release or representation of such information through an agent. Also, the draft Internet standard Request for Comment (RFC) titled "A Presence-based GEOPRIV Location Object Format" uses GML 3.1 and references other OGC work. Finally, we have recently submitted our own (OGC) RFC for consideration as an Internet standard. This is the OGC Universal Resource Name (URN) document titled, "A URN namespace for the Open Geospatial Consortium (OGC)."

Two very important new relationships are being formalized with IEEE 1451 for collaborative advancement of the Sensor Web, and with the National Institute of Building Sciences (NIBS) North American Chapter of the International Alliance for Interoperability (IAI-NA) Council,to address interoperability between the architecture / engineering / construction (AEC) and geospatial environments. A Memorandum of Understanding was signed by OGC and NIBS on January 28, 2005 and a similar agreement is being put in place with IEEE 1451.

There are other relationships, too. OGC participates in the Object Management Group (OMG) and in a number of standards coordination meetings that have been organized by groups such as the International Telecommunication Union (ITU) and The Open Group. A number of OGC members are working with staff to more closely coordinate with ISO TC 204 (navigation, intelligent transport, etc) and with Intelligent Vehicle Systems (IVS). There is a newly revitalized relationship with the European Committee for Standardization (CEN). OGC and its members also follow the work of WS-I, EAI, and a number of other consortia that live in the Web Services and Enterprise Integration standards world. In 2003, OMG, OGC, Simulation Interoperability Standards Organization (SISO), and Web3D Consortium agreed to collaborate on open standards for Modeling

and Simulation (M&S) and related technologies, forming the WebSim Partnership.

For more information about OGC's work with other standards organizations, contact Carl Reed [mailto:creed@opengeospatial.org], Sam Bacharach

[mailto:sbacharach@opengeospatial.org] or George Percivall [mailto:gpercivall@opengeospatial.org].

It's hard to imagine that there has ever been another time when so many standards organizations have worked together so closely on such a multifaceted task. As we in the profession know, the critically important standards development performed by our community goes largely unnoticed by most people. But we gain comfort in knowing that in the future, people worldwide will be working with and benefiting greatly from what we are collaboratively creating."

Web Mapping with SVG

By Roger Harwell
(Nov 05, 2004)

This article appeared in the Directions Magazine

http://www.directionsmag.com/article.php?article_id=693

"Scalable Vector Graphics (SVG), the industry standard vector graphics recommendation developed by the World Wide Web Consortium (W3C), is becoming a popular choice for rendering maps. This is especially true in the geospatial web software applications area, because SVG, an Extensible Markup Language (XML) encoding or grammar, is designed to work effectively across platforms, output resolutions, color spaces, and a range of available bandwidths.

SVG is well positioned to create a major impact on interactive web mapping because it is a rich modern graphics format providing the ability for better map display, and because it leverages many of the useful features of XML. Developed to describe rich, stylable, two-dimensional graphics, SVG includes advanced graphical features such as transparency, arbitrary geometry, filter effects (shadows, lighting effects, etc.), scripting, and animation (See "Scalable Vector Graphics (SVG): XML Graphics for the Web." Also, see the SVG specification at Apache.org.) "

5 th African Association of Remote Sensing of the Environment (AARSE) Conference, Nairobi, Kenya, October 17 – 22, 2004

"The 5 th African Association of Remote Sensing of the Environment (AARSE) Conference included five pre-conference workshops, held at the offices of the Regional Centre for Mapping of Resources for Development (RCMRD), in Nairobi, Kenya, on Sunday 17 October 2004. All five workshops were well attended, with about 80 participating on the workshop on standards, including a good cross section of leaders in geo-spatial information from across Africa."

This report in Appendix B was prepared by Antony Cooper.

INSPIRE: INfrastructure for Spatial InfoRmation in Europe

" This document identifies the main issues to be addressed in the Preparatory Phase of INSPIRE in order to prepare the future implementation. It summarise the INSPIRE requirements, addresses the broader context and presents actions, procedures and cross references. It proposes an organisational structure and an overall process."

This 78 page document is in Appendix C.

Appendix A

SENSOR WEBS

Enabling Decision Support and Enterprise Architectures

BY GEORGE PERCIVAL

Imagine hundreds of Internet- or radio-accessible ground-based, stationary or mobile weather sensors providing real-time measurements of current wind and temperature conditions in support of plume modeling to estimate the progress of chemical or radiological contaminants. Such an application would involve a collection of Web-based services that maintain a registry of available sensors and their characteristics. The application can request information and assemble such information into one or more geospatial data layers.

Imagine a set of Internet-accessible imagery sources, some dynamic and some archived, that can be used together in a sequence of processing steps to create an information product suitable for a specific decision-making context, such as hurricane evacuation planning. Imagine that these processing steps use Web Services marshaled together by a remote-sensing expert as a chain of image-processing services for automated reuse by operational decision makers.

Consider an airport or harbor with hundreds of online webcams and other sensors--some stationary and some mounted on vehicles. The airport or harbor security agency and the police and fire departments all have Internet access to the same set of sensing devices. However, they can easily tailor access to suit their departments' missions and specific operations. All the devices are geo-located and easily presented to users through convenient map-based interfaces.

Imagine that the same Web technology standard for describing the sensors, outputs, platforms, locations and control parameters is in use throughout a metropolitan region and, in fact, throughout all the regions in a country and its neighboring countries. This enables the interoperability necessary for cross-jurisdictional activities such as homeland security, and it provides a large market for product developers and solution providers who will compete for business, resulting in lower costs and better, more diverse choices for customers.

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The ultimate goal of SWE is to provide for the processing of raw sensor data into value-added information with semantic descriptions and link sensors to the network and network-resident processing services. This will make sensor measurements accessible to the spatial data infrastructure for use by professional decision

makers as well as, in a controlled fashion, the public at large.

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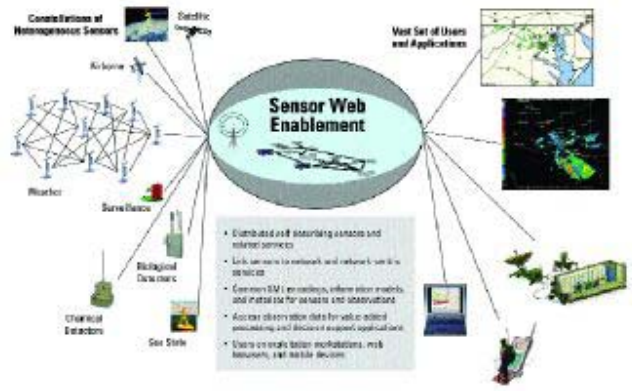
Across Enterprise Architectures

OGC currently is planning OGC Web Services 3 (OWS-3), the consortium's next major Web services interoperability initiative, and SWE is a major component of OWS-3. Like earlier OWS initiatives, OWS-3 advances a vendor-neutral, evolutionary interoperability framework for Web-based discovery, access, integration, analysis, exploitation and visualization of multiple online geospatial content sources, sensor-derived information, location services and geoprocessing capabilities. Much of the work involves the OGC members reaching consensus on the best ways for distributed geoprocessing systems to communicate with each other across the Web using technologies such as http, XML, WSDL and SOAP.



Sensor webs put real-time information into the enterprise information environment.

OGC members have defined an interoperability architecture based on open Web services to make geospatial data ubiquitous in enterprise architectures. By making sensors an integral part of this geospatial interoperability architecture, OGC members are making it possible for measurements at known locations to be used in decision making throughout enterprises.

To grasp the significance of such effort, keep in mind the web's scale. The builders of standards for sensor webs are thinking about constellations of geo-located sensors and sensor data repositories selected automatically from a much larger number of sensors and repositories, including sensors whose outputs will, in many cases, be aggregated into spatial data layers. This network of sensors and sensor data will serve many users and applications.

A key aspect is to define the information derived from sensor data as measurements of geographic features; either as discrete objects or continuous physical phenomena (e.g., wind velocity). Such a semantic approach enables the sensor information to be accessed in a seamless fashion using the OGC Web Services that define an interoperable spatial data infrastructure.

Testbeds Accelerate Standards Development

The OWS-3 Testbed will advance the enterprise architecture aspect of SWE, and additional standards work is necessary to make sensor measurements optimally usable in enterprise applications. This is largely a matter of checking the correspondences among SWE specifications and all the OGC Web Services specifications that make it possible to dynamically connect diverse resources to accomplish complex geoprocessing and information-exploitation tasks. In addition, several non-OGC specifications under development in the sensor community will be tested for compatibility.

Three proposed OGC Interoperability Experiments (IEs) aim to produce results that can be used in OWS-3, and proposals for the IEs are being sent to the OGC Review Board. IEs are short-term, focused efforts to test and advance particular approved or pending OpenGIS Specifications, and they're managed and operated by OGC member organizations.

Through a series of sponsor meetings, OGC has been formalizing requirements for OWS-3 activities that will commence in early 2005. OGC will release an industry-wide OWS-3 Request for Quotation in January 2005.

Sensor Web Activities

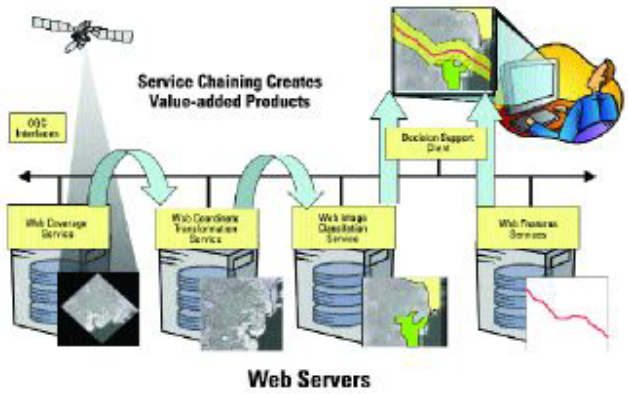


Image handling for decision support can involve live or stored data of many types.

OWS-3 is coming together in the context of several activities that relate to the integration of sensor webs into enterprise information systems:

- The U.S. Department of Energy's Oak Ridge National Laboratory (ORNL) and strategic partners, including the National Oceanic and Atmospheric Administration and the private sector, are designing and developing SensorNet, a comprehensive nationwide system for real-time detection, identification and assessment of chemical, biological, radiological, nuclear and explosive hazards. The SensorNet team is creating a modular and open system architecture that allows for a choice of commercial off-the-shelf products and seamless system upgrades.

Also, adherence to an open architecture will result in competitive development of new technologies that will improve SensorNet and find other uses such as environmental monitoring. ORNL seeks to advance OGC's SWE specifications as an important part of its open architecture strategy. Radio frequency identification devices and a transducer markup language are other topics that may be considered in OWS-3.

- "Image Handling for Decision Support" was an OGC theme in 2004. Programs such as the Global Earth Observation System of Systems seek to benefit from the refinement of OGC and related standards that "chain" image-handling processes. Some issues mentioned by potential sponsors of OWS-3 include remote sensing from a moving platform (with associated processing for georectification and radiometric corrections), image processing coordinated with specific analysis requests, grid computing of imagery using a Web Service Resource Framework, and modeling and simulation.
- Services for sensor alerts, notifications and subscriptions have just begun to be addressed in OGC. The proposed Sensor Alert Interoperability Experiment, an OGC initiative that's a precursor to OWS-3, will test different Sensor Alert Services approaches. Sensor Alert defines a service for notifying interested parties when a sensor has detected an event of interest.

  SWE will provide standard ways to communicate an "alert" condition (sensor reading exceeds a threshold) and a "notification" condition (sensor has completed a task). Participants will consider how to employ existing industry standards, including Java Message Services, the OASIS Common Alert Protocol and the Web Services Notification work in OASIS.

- The proposed GML-in-JPEG 2000 Interoperability Experiment will implement and refine a draft implementation specification for using GML in the image-encoding format JPEG 2000 (ISO/IEC 15444). The specification defines GML encoding of image metadata, geometry and radiometry, annotations, and coordinate reference systems within the header of a JPEG 2000 dataset. It's anticipated that GML-in-JPEG 2000 will be used in the imagery portion of SWE.

SWE as Information Source

SWE will be part of the overall effort in OWS-3, and it will interact with components deployed in other portions of OWS-3. Each thread is developed independently, focusing on a specific engineering problem. Also, interaction among threads enables demonstration of broader enterprise capabilities. For example, it's anticipated that the SWE components will provide information for decision support utilizing service chaining.

OWS-3 will build on the success of OWS-2 in automated workflow using Business Process Execution Language, which is under development in OASIS. In OWS-2, the workflow was focused on image-processing services.

In OWS-3, service chaining will be extended to geoprocessing services in general. In advance of OWS-3, a proposed Geoprocessing Services Interoperability Experiment will test out an OGC discussion paper that defines a general interface usable for invoking a large class of geoprocessing services with a single, simple interface.

Sensor discovery will advance through the work that OGC members are calling OWS-3 Spatial Data Infrastructure (SDI) maturation, which will provide the ability to "publish, find and bind" using OGC catalogs. The key specifications already are mature enough for use in SDI implementations, but it's necessary

to refine and implement best practices. OGC's recently released Geospatial Portal Reference Architecture Guide indicates how to design a standards-based, geospatially enabled portal.

Interoperability and Common Architectures

Related to SDI maturation is the issue of "information interoperability," which applies technical solutions to the integration of datasets that have similar but not identical data models. OWS-3 will build on previous OGC initiatives that yielded application schema tools and lessons regarding dictionaries, GML schemas for framework themes and W3C Semantic Web technologies such as the OWL Web Ontology Language.

In addition to "translating" data schemas, OGC members have addressed "translating" map symbols or representing data with different symbol sets for different sets of users. This may have utility in some sensor web applications.

A theme continuing in OWS-3 is "common architecture," which includes refinements of specifications and best practices to make all OGC Web Services work with W3C's Simple Object Access Protocol and Web Service Definition Language. This has implications for SWE with respect to addressing, messaging, etc.

OWS-3 will exercise and extend OGC location services. Interfaces for some core location service functions (directory, gateway, etc.) will be part of some sensor web applications, and OWS-3 may provide opportunities for exploring the requirements of such applications.

Also, OGC members are planning experiments and related activities to validate the capability of standards-based technologies to address the geospatial web services environment.

OGC's OWS-3 Interoperability Testbed and Interoperability Experiments will rapidly advance the open standards that are essential to realizing the potential of Web-based sensor networks. Organizations that join these initiatives are shaping the standards that will make geo-located sensors and sensor data just another kind of geospatial information, making geospatial information of all kinds integral with the enterprise information infrastructure. Enterprise information systems then can provide decision-support applications with an unprecedented real-time window on the real world.

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Appendix B

AARSE Standards Workshop Report

APPENDIX C

INSPIRE
Work Programme Preparatory Phase 2005 - 2006