THE SPATIAL WEB: New OGC Standards Benefit Hydrologists

Mark Reichardt – Executive Director, OGC Outreach and Community Adoption Program, Open GIS Consortium (OGC), Inc.

GIS is undergoing a transformation based on new standards from the Open GIS Consortium (OGC), an international industry consortium of more than 250 companies, government agencies, and universities that are participating in a consensus process to develop publicly available interface specifications. Just as open specifications for HTML and HTTP from the World Wide Web Consortium have connected the world's computers into one giant hypertext library, OpenGIS® specifications from OGC are connecting GIS throughout the world for image processing, surveying and mapping, and networked and location-aware sensors into one giant "Spatial Web." Products that implement OpenGIS specifications can "plug and play" with other software products that use the same specifications, regardless of vendor. Interoperability barriers are coming down. Incompatible data formats, proprietary "stovepiped" systems, even semantic differences between data models are yielding to OGC's framework of open specifications for interfaces and encodings.

Before the Internet was widely used, considerable expertise and time were required to download and integrate text and graphics from other computers, but now it is a relatively painless process. Today, those without special training can also easily use the products and services of GIS and other geoprocessing software running on Web-connected servers, if those servers implement OpenGIS specifications. Just as a Web site selling socks can use a remote service to process credit card transactions, a watershed modeling Web site can use remote services to process coordinate system transformations or flood zone calculations.

A Live Example

The Federal Emergency Management Agency (FEMA) Web site, www.hazardmaps.gov/atlas.php, allows you to select and overlay views of many different spatial data sets hosted on different GIS and image processing servers from different vendors. The servers are managed by different agencies, but these agencies have upgraded their systems with the OpenGIS Web Mapping Service (WMS) Interface.

You won't get their data, you'll get automatically overlaid raster (jpg, tiff, etc.) representations of their data.

Hydrology Applications Will be Numerous

Suppose you would like to have professionals who are monitoring water quality in the field be able to access data held in two different GIS platforms from different vendors through a single Web-based client application. If the client application and the GIS servers implement the OpenGIS Web Feature Service (WFS) specification, vendor-neutral access to feature-level data and feature editing is possible. Compliance with the WFS specification can also enable remote users (with permission) to window a region in a GIS dataset and download that feature's data for use in their own GIS applications.

When a GIS server that implements the WFS specification "talks to" another GIS server that implements WFS, the data are encoded in the Geography Markup Language (GML), an OGC-adopted XML encoding for spatial data. XML (eXtensible Markup Language) is an important Web specification for the encoding of structured text. Because current Web browsers can "parse" XML, browser-based applications from any vendor can process and display the output from any other vendor's WFS-implementing GIS. Because XML is an integral part of the Web, it is easy to integrate GML-encoded data into any Web-based application.

Benefits

These and other capabilities enabled by OpenGIS specifications create new opportunities for data sharing and data management. For example:

• Solutions that were previously provided by packaged software running on a single computer can now be built from components running on separate Web servers. This makes it easier for technology providers and users to create special applications that are inexpensive and not locked in to a single vendor. Users can build systems from components located across the Web, or locally on their computer. Vendors can offer Web service
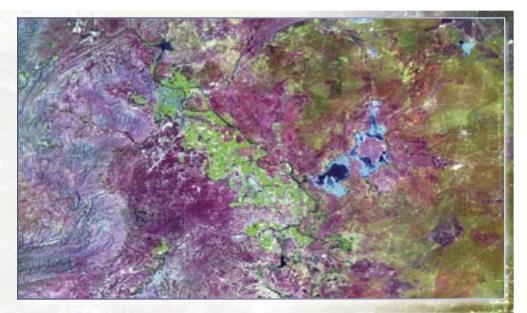
components to meet specific needs.
• It is now much easier to publish maps that any Web user can configure and use without having special software or expertise.
• An application can link to multiple datasets simultaneously to provide different views of the same physical feature.
• Data can be maintained on one server and used by many people. It is no longer necessary for individual users to duplicate and store data that can quickly become outdated.

Why would GIS software vendors collaborate in OGC to create open interface specifications that disrupt their old ways of doing business? Because, just as the Web created vast new markets for software, data, and services in general, the Spatial Web will create new markets for geoprocessing software, geodata, and services.

How Can Users Benefit Today?

To see which products implement (or officially comply with) OpenGIS specifications, go to www.opengis.org/resources/?page=products. You will see that many vendors have implemented the OpenGIS Web Mapping Service specification. This is the place to begin. Setting up a "Web Map Server" that implements the OpenGIS WMS interface specification is uncomplicated. You can download OGC's free OpenGIS WMS Cookbook at www.opengis.org/resources/?page=cookbooks to get step-by-step instructions for working with many commercial and open source Web Map Servers. But normally, it is necessary only to download, install, and configure the necessary plug-in from your GIS vendor's Website. The Cookbook also discusses open source software that programmers can adapt to build custom applications.

The OpenGIS WFS specification is new and many vendors are still in the process of implementing it in their products. WFS setup is almost as straightforward as WMS setup, but applications are more difficult to create because operations on feature data are more complex than operations on simple display images. In spite of that, vendors are beginning to provide WFS applications.

Landsat data used to evaluate irrigated acreages along a western river. (Image provided by David Jordan, INTERA Inc.)

How Can Users Advance Interoperability?

To track progress in this area, subscribe to OGC's free OGC News and OGC User newsletters at www.opengis.org. In addition, read documents on the OGC Web site, talk about OGC with vendors, join OGC, or participate in OGC groups such as the Natural Resources and Environment Special Interest Group. Demand OpenGIS specifications in your future geoprocessing software procurements. To make your data easily sharable, harmonize data models with your data-sharing partners. Finally, to support discovery and sharing of your data, create Federal Geographic Data Committee-compliant metadata using one of several free metadata tools (visit www.fgdc.gov for more information). Stay informed, participate, and insist on interoperability!

Contact Mark Reichardt at mreichardt@opengis.org or phone 301-840-1361.