GEOSPATIAL INTEROPERABILITY: THE OGC PERSPECTIVE

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Summary

The Open Geospatial Consortium, Inc. (OGC) is a non-profit, international, voluntary consensus standards organization that is leading the development of standards for geospatial and location based services. Through our member-driven consensus programs, the OGC works with government, private industry, and academia to create open and extensible interface and encoding standards that enable interoperability and

the integration of geospatial content and services into enterprise applications and mainstream IT infrastructures. The OGC vision is of a world in which everyone benefits from geographic information and services made available across any network, application, or platform. Founded in 1994, the OGC has grown steadily, and today (2006) includes more than 310 members.

The consensus OGC standards development process and resulting interface and encoding specifications are changing how geospatial information is shared globally by commercial and government organizations, researchers, decision makers, and, perhaps most importantly, the public. The interfaces allow software/application developers, individuals, and enterprises to seamlessly access mapping and spatial information and services, addressing topics ranging from environmental assessment to transportation planning and land use. This key underpinning to our global information highway can only increase everyone's ability to gather the correct information to make informed decisions.

This document describes the status of the OGC, its specifications, and vision. Since new standards are continually being defined and existing ones revised, the most current information is available at several OGC web pages:

Home Page – gateway to all our documents and resources
http://www.opengeospatial.org/

Specification Main Page – details of our current specifications and links to downloadable versions (free) http://www.opengeospatial.org/specs/?page=specs

OGC Network – information on OGC-compatible software, services, and information models
http://www.ogcnetwork.net/

OGC User – stories and links about implementations that use OGC specifications
http://www.opengeospatial.org/press/?page=ogcuser

1. Introduction

If all the different geographic information systems (GIS), Web-based mapping, and location services automatically shared information and services with each other, there would be little need for standards and interoperability specifications, or for the Open Geospatial Consortium (OGC). But they don't.

Within the OGC specification development process, expert geospatial technology users work with GIS software vendors, earth imaging vendors, database software vendors, integrators, computer vendors, data vendors, and other technology providers to reach agreement on the technical details of open interface specifications that allow disparate and often distributed systems to work together. Common software interfaces, a kind of digital "common language," offer a way to overlay and combine complex and essentially different kinds of geographic information automatically using some distributed computing environment, such as the Internet. Software developers and

integrators who either provide geoprocessing software or who seek to integrate these capabilities into general purpose information systems are adding these open interfaces to their software. As this happens, users benefit from a dramatic improvement in more seamless and efficient access to geospatial content and services. Initially, large government users became involved because of their critical strategic interest in being able to effectively share geographic data. More recently, major "user" corporations, including those in communications and transportation, are beginning to participate in the OGC. Eventually, all users will realize increased benefit and value as interoperable geospatial products are deployed and become accessible via the Web and local networks.

Therefore, the mission of the OGC is to enable consumers, citizens, large and small businesses, and governments to make the fullest possible use of the world's spatial data and spatial processing resources.

Hundreds of OGC member organizations work together to solve the problem of geospatial interoperability. This paper explains how the OGC works and how the use of OGC specifications is laying the groundwork for society to truly capitalize on the effective use of geographic information. The documents and initiatives cited herein reflect progress through the summer of 2006. For the most up-to-date information visit www.opengeospatial.org.

2. OGC Process

The OGC standards process is based on two key operational programs: the Specification Program and the Interoperability Program. The majority of the work in the Specification Program is performed within the framework of the OGC Technical Committee.

2.1. Specification Program

The OGC Technical Committee has developed a comprehensive model architecture called the OpenGIS Abstract Specification. The Abstract Specification guides the development—in the OGC Technical Committee and in the OGC test beds—of OpenGIS specifications. These specifications provide specific programming rules and advice for implementing OGC interfaces.

There are several levels of interface specifications:

- Approved OGC implementation specifications are described below in more detail.
- Candidate implementation specifications are those that are moving through the OGC approval process, but have not yet been formally adopted.
- Planned implementation specifications are those being discussed, but have not yet been addressed in the formal OGC specification development process.

Using a consensus-based committee paradigm, the Specification Program takes input from industry, government, and the OGC Interoperability Program to define, formally develop, and adopt interface and encoding standards. Much of the work in the Specification Program is done in Working Groups. A Working Group (WG) focuses on

a particular issue for geospatial interoperability, such as geocoding. After a Working Group's thorough consideration of a specific interoperability or candidate specification document, the WG may recommend to the full technical committee that:

- The document be issued as a Discussion Paper for review;
- The document be issue a Best Practices paper;
- The candidate specification be issued as a Request for Comments (RFC) for public review and comment;

Regardless of the approach, the OGC membership reviews and may approve the candidate specification as a full-fledged implementation specification.

2.2. Interoperability Program

The OGC Interoperability Program addresses the need to define and test open interfaces in a way that keeps pace with the rapidly-changing technology environment. This program takes a hands-on approach to developing requirements, and rapidly delivers proven candidate specifications for consideration in the OGC Specification Program. The Interoperability Program can be thought of as a "feeder" for the Specification Program.

OGC interoperability initiatives involve sponsors and participants. Sponsors, usually federal agencies or major corporations, provide funding (and perhaps other resources) and a set of requirements and objectives related to geoprocessing interoperability. Participants, usually vendors and integrators, are partially compensated (from the sponsors' pooled funds) for the contributions of time and technology they make during the fast-paced effort to meet the sponsors' objectives. Interoperability initiatives have many benefits for both sponsors and participants, but a key objective of interoperability initiatives is to produce—as quickly as possible in a hands-on engineering environment—new candidate OpenGIS specifications and "reference implementations" for the world community.

The Interoperability Program uses two techniques—testbeds and pilot projects—to advance the OGC's consensus-derived specifications. The goal is to perform hands-on research, development, testing, fielding, and validation of potential and existing interoperable geoprocessing technologies. The initiatives organize groups of geoprocessing technology users and providers in brief, intensive cooperative activities that advance OpenGIS technology and benefit everyone involved. Some of these activities are "pre-specification," designed to contribute to the development of new OpenGIS specifications. Others are "post-specification," designed to exercise existing specifications in more operational settings and promote their wider use.

The Interoperability Program has been very successful in fast-tracking candidate specifications. Several OGC key specifications, such as the OpenGIS® Web Map Service Implementation Specification and OpenGIS® Geography Markup Language Encoding Specification, were implemented in commercial products just months after their development in OGC testbeds.

3. Interoperability Initiatives

To date, more than 25 interoperability initiatives have been successfully completed and several others are in progress. More are in the planning stages. Below are examples of work completed or in progress (for other initiatives see *GIS Interoperability, from Problems to Solutions,* and *Using Ontologies for Geographic Information Integration*).

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