Language Lessons

NGA Leads International Standards Effort

By Dr. Clifford Kottman

"Est-ce correct? Est-ce correct!? Veuillez pardoner mes fabilesses en anglais!"

Likely, fewer than 2 percent of you know what that means. If we had paid attention to, or better yet retained, Madame Marie's seventh-grade French lessons, we would know I am seeking clarification from you: "Is this correct? Is this correct?" And then I am apologizing for my poor English.

It is impossible to communicate efficiently without a common language understood by both sender and receiver. The same thing is true when the message to be shared is technical in character. International commerce in geospatial information needs to be enabled and facilitated by a single geospatial language. NGA plays a leadership role in the development of just such a language to transmit geospatial intelligence (GEOINT).

Ever seeking efficient ways to provide relevant and accurate data to our customers, NGA has gone beyond our borders to help develop a common, international language for expressing and sharing GEOINT. The Agency, with help from its allies and coalition partners, is leading a massive international movement to establish, sustain and employ a common architecture until it flourishes as a result of its own intrinsic value.

A Language for GEOINT

Sometimes we forget how easy it is to be misunderstood. Misunderstandings stem from breakdowns in the essential, but subtle, layers and complex internal structures of the language carrying the message. Some of the structures of a natural (human) language are phonetics, lexicography, syntax, semantics, linguistics and idiom.

A language that models and transports digital geospatial intelligence (GEOINT) must provide similar elemental structures, for example:

- grids
- imagery
- metadata
- geometry schema
- topology
- dynamic features
- observations
- basic data types
- direction
- topology schema
- class roots and hierarchy
- feature schema
- coordinate reference systems
- temporal constructs
- coverages
- values and units
- graphical styling
- location

The sender and the receiver of digital GEOINT must craft agreements on all these structures and more.

Forming international consensus and implementation-ready specifications and standards for each of the structures listed above is at the heart of the standardization business. This is the environment in which the National Center for Geospatial Intelligence Standards at NGA has contributed. The Center's work is aimed at assuring that emerging international standards support the stringent requirements associated with sharing GEOINT without any information breakdowns.

Geography Markup Language

Since 1994 the International Organization for Standardization (ISO) and Open Geospatial Consortium have worked

together to develop common standards for geographical concepts and specifications that provide access to and manipulation of geographic information. NGA and the Defense Mapping Agency, a predecessor organization, have been involved in these efforts from the start. Canada and the United Kingdom have been particularly helpful and also took on leadership responsibilities in these two organizations.

The work of the ISO and Open Geospatial Consortium has come together in a common, international language for expressing and sharing geospatial information: Geography Markup Language, or GML. In providing a standard for exchanging geographic features, GML uses Extensible Markup Language (XML), which provides a simple, very flexible format adopted by the ISO for a variety of applications.

GML includes an extensive set of XML schemas for expressing geometries like points, lines and polygons. The GML specification includes rules for incorporating these geometries into GML feature types that represent real-world objects. In this way, GML provides the building blocks for representing features, properties and geometries.

While GML includes a set of predefined geometry types, it does not contain specific real-world geographic entities. For example, you will not find a road or runway defined in GML. Instead, GML provides a standard framework that can be used to define a road or runway in a consistent way within a specific user community. By using the GML framework, specific geographic entities like the road and runway can be generically interpreted by any tool that can interpret GML.

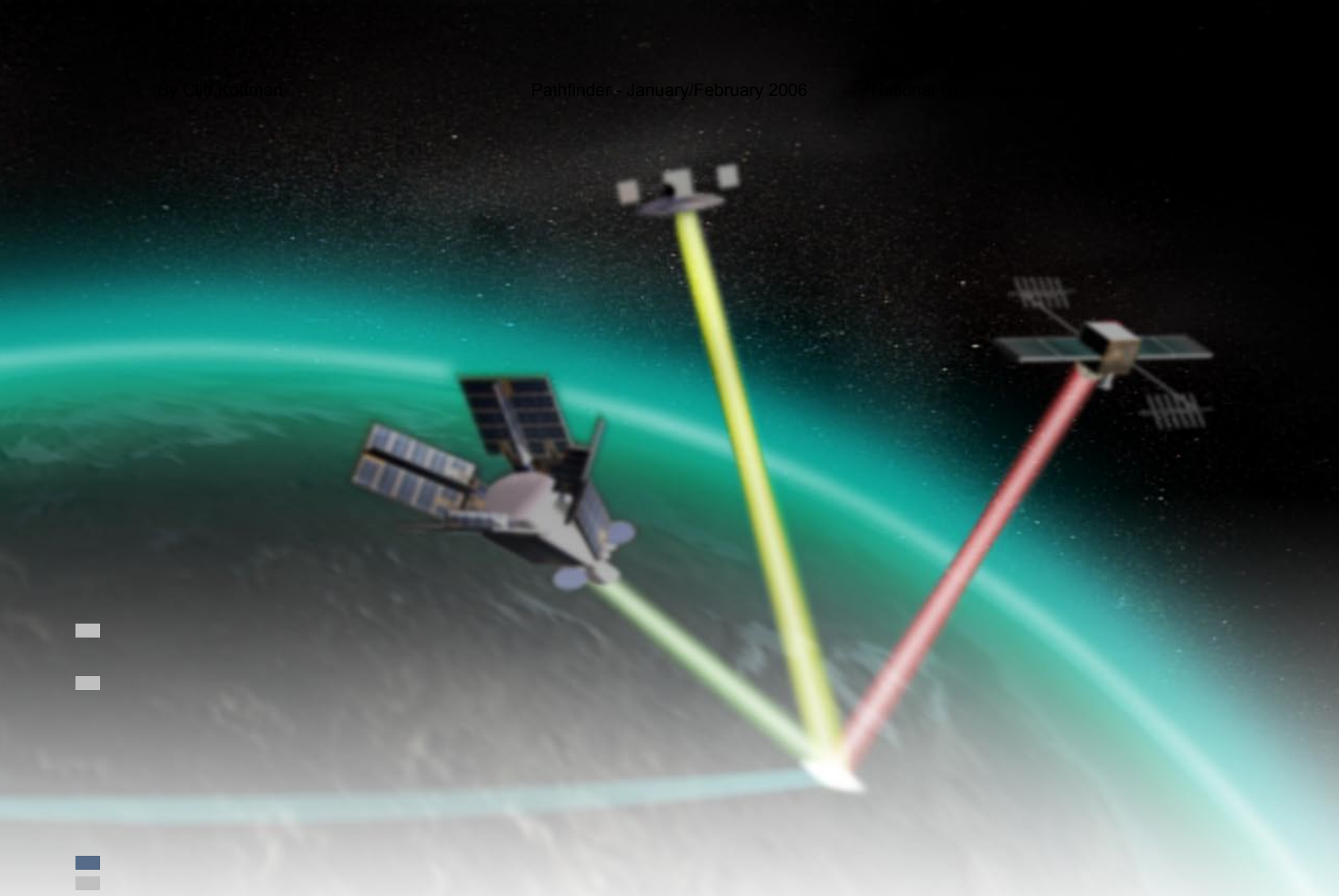
NGA's Leadership Role

Through membership in international organizations and direct funding of special projects, NGA provided timely and substantial leadership in the sequence of events that has led to the creation of GML. Additional leadership has been provided through expert NGA staff members who volunteer to serve (often as chairs of working groups) in the drafting, authoring, reviewing, implementing, testing, rationalizing and improving the GML suite of standards.

In many ways, this leadership has been just in time. Today's marketplace is increasingly global in character, and broad international consensus is a necessary ingredient for any candidate standard to win a share of the market. Internationalization of GML refers to the elements of its design that enable it to be adapted to various languages and regions without engineering changes. The internationalization of GML has satisfied a major NGA requirement.

The first two versions of GML supported the exchange of features with simple geometry, such as points, lines and polygons. With input from NGA, the latest version supports the full variety of geometric representations, while providing for topological structure (explicit definitions of how digital map features are related) and descriptions of coordinate reference systems. This means that complex objects such as "all the legal driving lanes in all the interstate highways in Los Angeles County and all the connections between them" can now be unambiguously modeled and analyzed. Version 3 is now undergoing further development as an international standard, to be published during 2006. The effort involves 28 participating countries, 30 observing nations and dozens of liaisons.

NGA is also sponsoring an effort to harmonize and integrate GML with the Aeronautical Information Exchange Model (AIXM). Based on standards of the International Civil Aviation Organization, AIXM uses the XML format and contains a custom model for representing geographical features.



Satellite imagery is one of the many types of GEOINT NGA has helped standardize.

Multinational Applications

The Digital Geospatial Information Working Group (DGIWG), a multinational body, has jumped on the standards bandwagon. The result is a powerful alliance in which the sharing of GEOINT is enabled. DGIWG is responsible for geospatial standardization in the defense organizations of member nations:

Belgium	Netherlands
Canada	Norway
Czech Republic	Portugal
Denmark	Spain
France	Sweden
Germany	Turkey
Greece	United Kingdom
Italy	United States

The group addresses requirements these nations have for access to compatible geospatial information for joint operations. It supports requirements of NATO and other alliances that member nations participate in, including U.N.-sanctioned peacekeeping. The United States has served as the vice chair and technology leader of DGIWG since the group's establishment in 1983.

For over three decades, NGA and its predecessor organizations have been seeking a language with which to model and transport geospatial information. Thanks to NGA and our foreign partners, that quest is now largely over. And GML is the common, understood language of GEOINT.