Article by David Holland that appeared in the September, 2002 issue of Geoinformatics

Delivering The Digital National Framework in GML

Ordnance Survey, Britain's national mapping agency, is transforming the way it operates in order to realize its new vision. Both traditional customers and new users of geographic data will benefit from the changes, which include a simpler pricing and licensing structure; a commitment to e-business and e-delivery; and a complete restructuring of the Ordnance Survey's core digital data. Two of the key messages from Vanessa Lawrence, Ordnance Survey's Director General, are that Ordnance Survey will be the data provider of choice for location-based services, and that Ordnance Survey will develop as an e-business, readily embracing the products of the information age. The Digital National Framework (DNF), to be released to the public in November 2001, lies at the heart of the vision.

When the DNF was under development it was clear that the current methods of data supply (in NTF, a peculiarly British transfer format, usually on CD) were not in tune with this vision. As members of the OpenGIS Consortium, we were following the development of the Geography Markup Language (GML) with interest. GML is a non-proprietary language, specifically designed to transfer spatial data over the Internet, so it seemed an ideal solution to our requirements. Rather than wait for someone else to champion GML, Ordnance Survey decided to fully embrace GML and use it from the start. This presents some challenges...we will be one of the first major users of a new technology, which is still under development. These, however, are outweighed by the advantages of GML. It is not tied in to any GIS or database vendor's software; it is based on XML, the standard language of the Internet; it is specifically designed for feature-based spatial data; it is endorsed by the OpenGIS Consortium and its many members; and is an open standard which anyone can use. All these made it a perfect choice for DNF.

Initially the DNF data available to users will consist of re-engineered large scale topographic data. Eventually the DNF will encompass many other types of spatial information, such as smaller scale topographic data (ideally derived from the large scale data), imagery, transport networks, address information and height models. During 2000-2001 the large scale data has been transformed from a set of almost 230,000 tiles conforming to a basic, unstructured point and line model; to a single, seamless topologically-structured point, line and polygon database. Represented in the database are buildings, roads and paths, administrative boundaries, railways, water features, and other topographic features. These are collected into themes (such as "buildings" and "roads, tracks and paths"), to allow users to extract data within a particular theme, or group of themes.

Each feature within the DNF is given a unique 16-digit "topographic identifier" (TOID) which may be used by Ordnance Survey or any of our customers to reference any given feature in the database. This will make it much easier for users to associate other information to the spatial feature; to refer unambiguously to a particular feature and therefore to share spatial information with other users. Figure 1 shows an example screen-shot of some DNF data, of a small area in the city of Exeter.

Ordnance Survey is working alongside several software vendors to ensure that their systems will be able to read, manage and process both DNF data and associated datasets, as soon as DNF is launched in November 2001. At that time, users will be able to order data online, choosing the themes they require, for whatever geographic area they wish. Initial supply of data will be on conventional media (CD & DVD) or via an ftp server. After this initial supply, users will be able to query the DNF online, to determine any changes within their area of interest. They will then be able to request all the features which have changed since a given date, which will also be supplied either on CD, DVD or via ftp. A full online supply service will be introduced in 2002.

In summary, the DNF provides a new framework for geospatial data in Great Britain. The restructured DNF data greatly enhances the versatility and usability of large scale topographic data, turning it from merely a "representation of a line map" into a GIS-friendly model of the real world. Using GML for data supply will make it accessible to more software systems, and hence to more users, than would be possible using any other single format.

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GML's Future

GML 2.0 is based on "XML Schema," an advanced XML standard which enables, in GML, the interchange of spatial information and the construction of distributed spatial relationships. GML 3.0, begun at the OGC meetings in Liege, Belgium in April 2001, will retain backwards compatibility with GML 2.0 and will include support for some of the following: new geometry classes, events, histories and feature time stamps, units of measure, metadata, and coverages.

Each professional subset of geodata producers and users uses a particular set of shared semantics. Data coordination – standardization of feature semantics and metadata schemas in text files – proceeds apace around the world. GML provides a universal system for parsing such text, laying the foundation for previously impossible "intelligent" web-based spatial searches and semantic translations.

GML 2.0 is also well suited for efficient delivery of small packets of geodata and display instructions, which is one reason it is likely to find use in location-based services used by owners of location-aware, Internet-connected devices. OGC is working with the Location Interoperability Forum (LIF), Internet Engineering Task Force (IETF) and ISO/TC 204 to establish OpenGIS standards as an integral part of the infrastructure for such services. OGC's upcoming OpenLS Initiative seeks to ensure that the standards these organizations build will be consistent with OGC's OpenGIS Specifications. In that initiative, OGC-organized testbeds and demonstration projects will provide for "rapid prototyping" and testing of the new specifications. Because Europe leads in deployment of wireless technologies, European location-based service providers will strongly influence whether or not simple location services can be well integrated -- through OpenGIS Specifications -- with more complex geodata and geoprocessing resources.

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Figure 1. An example of DNF data. This image was produced using the StruMap DNF viewer, developed by Geodesys. The viewer reads GML, extracts the features and renders them according to their attributes (land in green, buildings in sand, roads in grey, etc).