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MEMORANDUM

To: D. Painter, Federal Geographic Data Committee
From: R. Chen, CIESIN, Columbia University
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Date: 3 February 2006
Subject: Final Report, USGS Award No. 04HQAG0174

We are pleased to provide this final report for USGS Award No. 04HQAG0174, Web Feature Service for Government Units and Population of the Northeast U.S.

Organization: CIESIN, Columbia University, 61 Route 9W, Palisades NY 10965,
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Collaborating Organization: IONIC Enterprise, Dr. Christopher Tucker, PO Box 2635,
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Project Narrative: Under this award, CIESIN collaborated with IONIC Enterprise in establishing a Web Feature Service (WFS) to serve Government Unit (GU) Framework data and selected data from the U.S. Census of Population for 8 northeastern States: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, New Jersey, and New York. This corresponds to the geographic area of the Northeast Information Node (NIN) of the National Biological Information Infrastructure (NBII). In particular, the WFS provides access to GU Framework data for states, counties, and census tracts derived from the Census Bureau's Topologically Integrated Geographic Encoding and Referencing (TIGER) system, specifically the 108th Congressional District Census 2000 TIGER/Line files. These boundary data were linked with the Demographic Profile data available for states, counties, and census tracts, which include nearly 100 variables on population and housing, including age structure, race, household composition, and housing occupancy and tenure.

G. Yetman and M. Becker of CIESIN and R. Feters of IONIC attended the kickoff session in Denver CO on 28-29 September 2004 (expenses shared with CIESIN's NBII project). Since then, G. Yetman has participated in regular Category 5 telecons led by D. Nebert.

After the formal award, CIESIN issued a subcontract to IONIC Enterprise in conformance with the original proposed budget and Statement of Work. As part of the agreement, IONIC

has provided a perpetual license to RedSpider and waived the first year of maintenance, which constituted a matching contribution of more than \$23,000.

CIESIN acquired all the relevant GU framework data from the U.S. Bureau of the Census along with the corresponding Census 2000 Summary Tape File 3 data. CIESIN ordered, received, and installed the Sun server as part of the NBII NIN. 150 gigabytes of storage has been made available to the project on a Storage Area Network (SAN) unit donated by the Open Geospatial Consortium (OGC).

IONIC Enterprise led the development of an Oracle-based database schema compliant with the draft INCITS-L1 standard for Government Unit Boundaries. Unfortunately, the draft standard did change significantly during the course of the project (from gubs.xsd developed by Paul Daisey to the final framework schema GovernmentalUnits_GML3L0r11.xsd). As a result, CIESIN requested and received a no-cost extension of the project to 15 November 2005. At that point, the standard had stabilized, but CIESIN and IONIC had limited time in which to conduct final implementation and testing of the WFS itself.

Status of the Data Management Activities

CIESIN and IONIC have implemented a WFS for the northeast U.S. that offers the following layers:

Capabilities for Northeast boundaries as simple feature classes	WFS Capabilities	XML
Capabilities for Northeast boundaries rendered in a WMS	WMS Capabilities	XML
Capabilities for Northeast States using FGDC Governmental Units Schema	WFS Capabilities	XML
Capabilities for Northeast Counties using FGDC Governmental Units Schema	WFS Capabilities	XML
Capabilities for Northeast Census Tracts using FGDC Governmental Units Schema	WFS Capabilities	XML
Capabilities for Northeast Block Groups using FGDC Governmental Units Schema	WFS Capabilities	XML

These services are listed in an index page located at:
<http://nbii-nin.ciesin.columbia.edu/mapserver/en/index.html>

IONIC has also established a service URL at:
<http://demo.ionicenterprise.com/ionicweb/wfs/GOVTUNITS>

At present, the total volume of framework data being managed for service is 332 megabytes in 42,845 features. In addition, this service offers access to 162 megabytes of census data as 78 attributes.

The NBII NIN now hosts this service, which draws on source data from the U.S. Bureau of the Census. The service operates on a Sun SunFire V240 using IONIC RedSpider Enterprise version 3.3, supporting WMS version 1.1.1 and WFS version 1.1.0.

Status of Framework Web Feature Service

The schema has been validated using an on line GML3L0 validation tool. The service has been tested against several clients, including the IONIC RedSpider client and GAIA. An example of access to the service via GAIA is shown in Figure 1. Service URLs have been provided to other CAP5 grantees for Technical Integration Experiments, and the service has recently been registered with geodata.gov. It is anticipated that the service will be used by a wide range of NBII users, especially those in the northeast U.S.

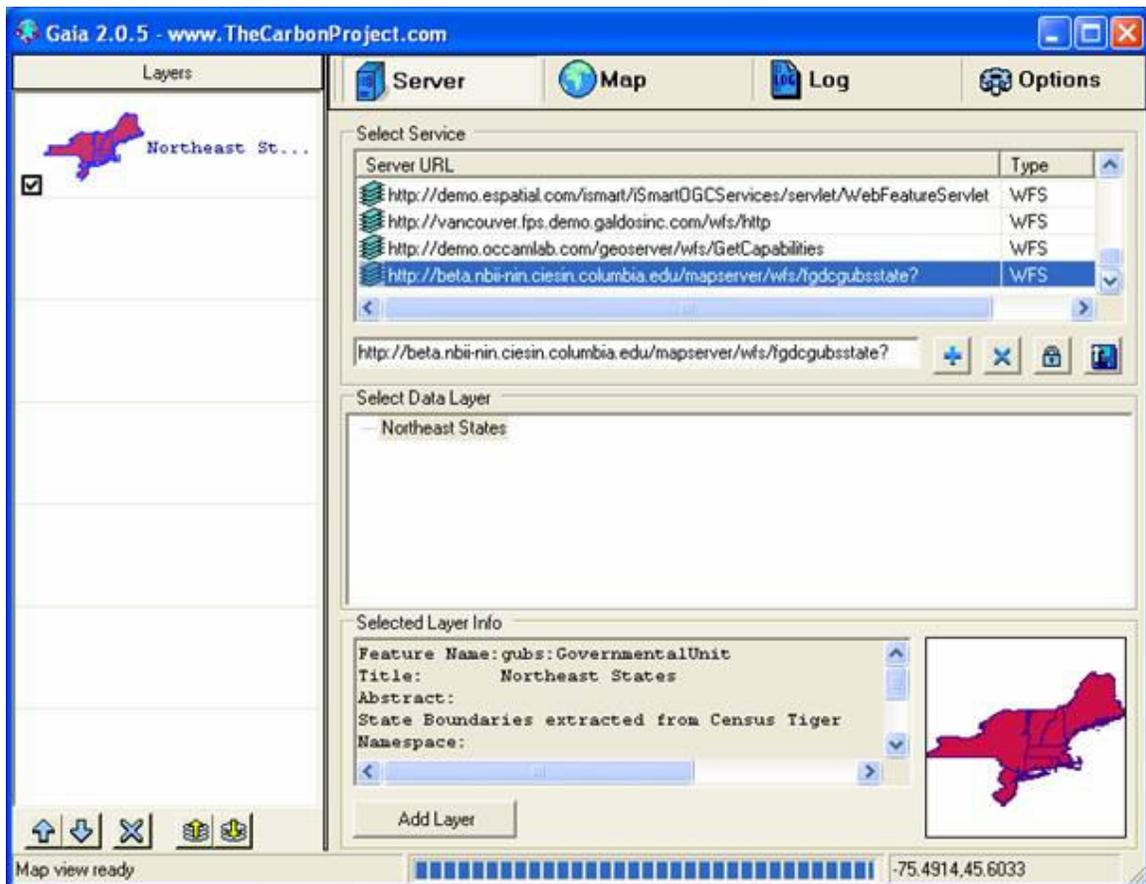


Figure 1. Gaia WMS/WFS client displaying CIESIN Government Units WFS.

Project Management

As noted previously, this WFS is now hosted by the NBII NIN operated by CIESIN. The NIN is expected to continue operations for at least the next several years under the auspices of the NBII. Responsibility for the service has been transferred to M. Becker, who leads the NIN activity at CIESIN. A new maintenance agreement with IONIC Enterprise has been established that will provide for continued use of RedSpider Enterprise by the NIN and a limited amount of technical support.

CIESIN and IONIC have identified two areas for additional work. First, the schema (GovernmentalUnits_GML3L0r11.xsd) does not support separate feature types. For example, Census Tracts and Block Groups are represented as a single feature type: StatisticalUnit. In a desktop GIS, or for the majority of mapping applications, these features are normally treated as separate entities for analysis. We assume that the schema lumps logical units (block group, census tract, census block group, i.e., statistical units) and that the intention is that the WFS user would apply a filter to extract the units of interest. The proposed solution is to create a separate service for each governmental unit, i.e., a service for each feature type. Second, UnitType dictionaries were not available so the following assumptions were made to implement UnitType: GovernmentalUnits are designated as State and County; and StatisticalUnits are Census Tract, Block Group, and Block. Given that many clients cannot read GML 3 and the INCITS schema for Governmental Units, an additional WFS service that does not support the schema but does allow access to the 4 levels of geography via GML 2.1 was set up to allow access by more clients.

Feedback on Cooperative Agreements Program

The Cooperative Agreement Program (CAP) continues to support useful and innovative activities to develop the National Spatial Data Infrastructure. This particular category encouraged a close collaboration between an academic organization and a commercial software provider that drew on their relative strengths.

The project did fall behind schedule due to circumstances beyond its control, namely the changes in the draft INCITS standard for government unit boundaries. However, project participants were as a result able to provide inputs regarding the draft standard based on hands-on experience.

The CAP cost-matching requirements do impose a constraint on organizations like CIESIN that have high reliance on other Federal funding for their activities. Although CIESIN is able to provide significant infrastructure support from its other Federal projects, this type of in kind support cannot be used to meet cost-sharing requirements.

Please feel free to contact me if you have any questions or comments about this report.

cc: D. Nebert, FGDC
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