2007 NSDI Cooperative Agreement Program

Category 5: Geographic Information Integration and Analysis

Cooperative Agreement Program Number: 07HQAG0093

Project title: Ohio OSIP Data Delivery

Final Report

Report Date: April 4, 2008

Project start and end dates: Start - September 1, 2007; End - April 15, 2008

Lead project organization: Ohio Office of Information Technology \ Ohio Geographically Referenced

Information Program (OGRIP)

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Collaborating organizations: (members of the OGRIP Council)

County Auditor's Association of Ohio (CAAO)	Office of Information Technology (OIT)
County Commissioners Association of Ohio (CCAO)	OGRIP Forum Chair
County Engineers Association of Ohio (CEAO)	Ohio Association of Regional Councils (OARC)
Department of Development (ODOD)	Ohio Environmental Protection Agency (OEPA)
Department of Natural Resources (ODNR)	Ohio Municipal League (1 for cities over 100,000) [City of Cleveland]
Department of Transportation (ODOT)	Ohio Municipal League (1 for cities under 100,000) [City of Galion]
Institutions of Higher Learning [Cleveland State University]	Public Utilities [AEP]

Data themes: Imagery and DEMS

The Ohio Geographically Referenced Information Program (OGRIP) serves as the authorized coordinating body for spatial and geographic information initiatives among federal, state, regional and local governments within Ohio. The GIS Support Center (GISSC) functions as the implementing and management arm for OGRIP initiatives.

There are five state agencies, five county government associations, 1 regional government association and 2 at-large representatives on the Governor appointed OGRIP Council. Information on the OGRIP Council members can be found at the following URL: http://ogrip.oit.ohio.gov/Coordination/AboutOGRIP/Council/tabid/100/Default.aspx

OGRIP is officially tasked with coordinating spatial data among all levels of government within Ohio. The organization was organized in 1988 and formally established through Executive Order in 1993. The Executive Order was expanded in 2000 to include a more balanced representation for local government on the Council. Our goals are simple, yet far-reaching. We strive to:

- Provide leadership in the establishment of the collection and dissemination of spatial data;
- coordinate spatial data activities within the state that provide for the efficient collection, management and use of geographically referenced data;
- assist in the communication and coordination of GIS activities through the GIS Forum and to
 encourage access and consistency with other GIS programs and initiatives to the maximum
 extent possible; and
- represent the interests and concerns of all state and local government agencies and regional spatial data initiatives.

OGRIP/GISSC sub-programs include: Enterprise Geocoding; Location Based Response System (LBRS); Ohio Statewide Imagery Program (OSIP); GIServOhio Portal for data discovery, access and distribution; and general GIS Services.

Project Description

The Ohio Statewide Imagery Program (OSIP) is a partnership between State agencies and the federal government to develop high-resolution imagery and elevation data for the entire state to benefit GIS users at all levels of government. Accurate imagery and elevation data serves as the backbone for the development of additional data sets that are currently maintained and accessed by government decision makers and the public.

Through this cooperative agreement OGRIP published Northern Tier OSIP imagery products using OpenGIS® Web Map Services to GIServOhio, The National Map, and the Geospatial One-Stop portal. In addition, OGRIP supplied Northern Tier OSIP imagery and elevation data to the USGS National Geospatial Technical Operations Center (NGTOC) and the USGS Center for LiDAR Information Coordination and Knowledge (CLICK) for inclusion in the seamless server and National Elevation Dataset programs.

Final delivery of Southern Tier imagery and elevation data products have not been received at this time, however, all Southern Tier products will be supplied to USGS and included in the OSIP WMS services upon receipt. Of additional note, during the 2007 data acquisition 5 Southern Tier counties were not acquired due to poor weather conditions. The 5 remaining Southern Tier counties are planned for acquisition during the 2008 spring flying season (weather permitting), and will also be supplied to USGS and included in the OSIP WMS services upon receipt.

The following table provides an outline of the work plan activities undertaken to complete the Ohio OSIP Data Delivery project, summarizes the actions taken, and highlights any remaining actions.

Work Plan Activity	Actions Taken	Actions Remaining	Percent Complete
1.) Define Data Products	Beyond the specified product deliverables, additional products have been identified to provide users greater access to products, specifically the development of countywide DEM mosaics to facilitate analysis on regions larger than a single 5000'x5000' tile. Creating compressed archives of countywide data sets to better facilitate downloading of products.	Based on original project scope this action is complete, however the process for defining derivative products is ongoing based on feedback from the user community.	100
2.) Develop Storage Architecture	A 7 terabyte SAN Partition was created to store OSIP deliverables in a location accessible to all applications on the network. Http and ftp data downloads are also available from this location.	None	100
3.) Metadata Definition	Defined metadata elements for OSIP 1FT Color Orthos, LiDAR, DEMs, SID Mosaics, and Web Map Services. Developed templates to be used in metadata creation.	None	100
4a.) Metadata Creation – OSIP Northern Tier	Developed metadata records for individual files for each of the OSIP data products created for the 51 Northern Tier Counties. Metadata records created for individual tiles, county and statewide mosaics, and map services.	None	100
4b.) Metadata Creation – OSIP Southern Tier	Metadata structure defined. Template metadata records created for individual tiles, county and statewide mosaics, and map services.	Create and load metadata records for remaining 37 Southern Tier Counties following procedures developed through this grant program.	30
5a.) Data Loading – OSIP Northern Tier	All data received by the GIS Support Center has been loaded onto the SAN for access by all applications agency wide. Published metadata records for Countywide 1FT SID mosaics and web services to GIServOhio and GOS.	None	100

5b.) Data Loading – OSIP Southern Tier	File storage structure defined. Storage Area Network hardware has been configured and is operating within existing GIServOhio applications.	Load 37 remaining county deliverables as they are received following procedures developed through this grant program.	30
6.) Create LizardTech Express Server Services	Loaded Sid data onto Express Server Application Server. Created an image catalog from it. Imported the irl files to Arc IMS Application Server. Created an axl file. Created Arc IMS Map Service. Made Service public and available via Metadata Explorer, geospatial one-stop and IMS Web Viewing Application.	None	100
7.) Create SANZ EarthWhere Services	This task has not been completed due to existing software's inability to support the Ohio State Plane NAD83 HARN projection. OGRIP staff have recently been provided a patch release to address this limitation. The patch has been installed and OGRIP staff are working with the software developers to address additional issues with imagery ingestion settings.	Ingest Ortho, CIR, and DEM data upon EarthWhere support of Ohio State Plane NAD83 HARN projection. Imagery ingestion planned for completion by May 2008.	0
8.) Create ArcIMS and OpenGIS Web Map Services	Imported the express server irl files to Arc IMS Application Server. Created an axl file. Created Arc IMS Service. Brought the service into the WMS connector, edited the capabilities file, and made available to the public via Metadata Explorer and geospatial one-stop.	None	100
9.) Formalize National Map Steward Agreement	A Memorandum of Understanding between the USGS and OGRIP for coordination and cooperation pertaining to the Ohio Spatial Data Framework and The National Map was previously executed.	None	100
10.) Project Presentation	Gave a presentation at the 2007 Ohio GIS Conference on the NSDI, CAP Grant program, and OGRIP's participation in The National Map.	None	100

Table 1: CAP Grant Work Activities

A note on the status of work activities:

- Through OGRIP's stewardship role and in accordance with the NSDI Partnership Agreement, OGRIP will complete work activities 4b and 5b upon receipt of the approved imagery and elevation data for the Southern Tier counties. The current OSIP WMS services will also be updated upon receipt of the approved imagery for the Southern Tier counties.
- Work activity 7 (Create SANZ EarthWhere Services) was set back due to an inability of EarthWhere to ingest the Ohio State Plane HARN projection. OGRIP staff worked with

EarthWhere to define the requirements, and EarthWhere recently deployed a patch to support the projection. OGRIP staff have identified additional issues with the imagery ingestion settings and are working with the developers to correct the issues. Upon correction of ingestion issues, activity 7 will proceed with the loading of OSIP imagery into EarthWhere for provisioning and will continue until completion.

In addition to the completion of the Work Plan Activities listed in Table 1, a number other benefits were realized through this project. They include:

- Defined process for the creation of derivative data products, initially consisting of county-wide mosaics of DEM and Color CIR imagery using LizardTech's GeoExpress product.
- Ability to provide portable statewide imagery and elevation data and GIS analysis capability to
 emergency responders at on-site locations in the event of disaster. This same capability doubles
 as a disaster recover plan for the statewide imagery and elevation data in the event of a data
 center loss.
- Creation of a secondary data download capability, in addition to the EarthWhere imagery
 provisioning system still in development. The OSIP Data Download web address, also
 referenced on the OGRIP website's statewide imagery project page, is:
 http://gis3.oit.ohio.gov/geodata/
- Creation of a model by which OGRIP can publish future NSDI framework data to The National Map and the Geospatial One-Stop using OpenGIS® Web Map Services. For example, OGRIP is currently working toward the implementation of a statewide Cadastral Data Integration Program. In Ohio, there are over 5.7 million parcels of land that are managed at the county level. Over 60 of the 88 Ohio counties have this information digitally and integrated with GIS technology. A significant opportunity exists in Ohio to create a parcel repository in conjunction with local government that supports state functions as well as federal and regional initiatives.

Data Themes

Through this cooperative agreement OGRIP published OpenGIS® Web Map Services to GIServOhio, The National Map, and the Geospatial One-Stop portal. The published services include 1-foot pixel resolution color digital imagery and 1-meter color infrared imagery data products for the 51 Northern Tier counties. As noted in the work activities, the final data deliveries for the Southern Tier counties will be supplied to USGS and included in the OGRIP published OpenGIS® Web Map Services upon receipt.

The data obtained through OSIP replaces the circa 1994-98 1M black and white digital ortho quarter quad (DOQQ) imagery that was developed through a partnership with the USGS in 1998 and the USGS 30M Digital Elevation Model (DEM) with higher resolution data.

Standard OSIP products include: 1FT Color Orthophotography in GeoTIFF and MrSID format; 2.5FT DEM in ArcInfo GRID and ASCII grid format; and 2M LiDAR postings in LAS format. Optional OSIP products, available through a Cooperative Purchase Agreement with the State of Ohio, include: 6IN Color Orthophotography; 2FT and 5FT contours; and 1M Color Infrared photography.

The following OGC compliant Web Map Services have been developed for this project and are currently available for consumption, without use restrictions, at the following addresses:

- http://gis1.oit.ohio.gov/wmsconnector/com.esri.wms.Esrimap?ServiceName=osip&REQUEST=G etCapabilities&SERVICE=WMS
- http://gis1.oit.ohio.gov/wmsconnector/com.esri.wms.Esrimap?ServiceName=cir&REQUEST=GetCapabilities&SERVICE=WMS

With respect to user requirements for a national level spatial data infrastructure, it must be recognized that state and local governments develop spatial data to support their respective business requirements. Access to current and accurate statewide spatial data serves to improve location based services to constituents. These data development activities provide the structure on which NSDI partnerships are established and the NSDI is built. The NSDI serves to provide federal government agencies more current and accurate data than is generally developed or required by federal programs. As state and local NSDI partners develop framework data, federal programs stand to realize increased benefits and a measured reduction in spatial data development and maintenance activities. The savings realized by federal agencies through the collaborative efforts of NSDI partnerships should be used as the basis for providing monetary support to the federated group of state and local government partners developing and maintaining spatial data to standards that make it suitable for inclusion in the NSDI.

Operational Capability

The operational capability to maintain and update data is shared between the staff and technical resources of the State of Ohio's GIS Support Center (GISSC). GISSC Staff has completed the migration of metadata services to the state's GIServOhio platform and enabled the Z39.50 capability. We have supplied web service information to The National Map Catalog Support Team, and all metadata records in the state's metadata clearinghouse have been harvested by the Geospatial One Stop, with metadata modifications and additions being harvested weekly.

The availability of our web services has been promoted through presentations at the Ohio GIS Conference, monthly OGRIP Forum meetings, and OGRIP listserv announcements. As you can see from the graphic in figure 1, the ortho imagery WMS service (osip) is being utilized by the GIS community, with over 20,000 image requests over the previous two month period.

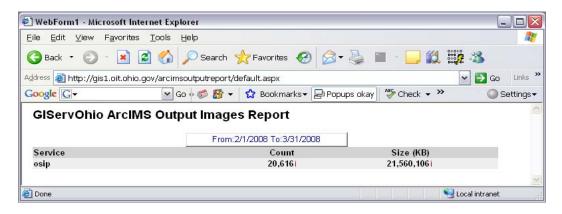


Figure 1: OSIP WMS Service Image Requests

The web mapping services are deployed through a three tier architecture consisting of web, application, and database servers (shown in Figure 2) running the ESRI suite of products including ArcIMS, ArcGIS Server, and ArcSDE running on a SQL Server 2005 clustered database. This system architecture is supported by a similar test environment that can operate as production in the event of a hardware or software outage.

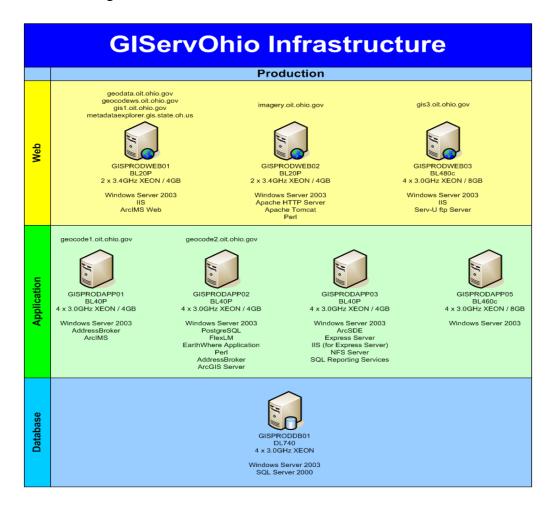


Figure 2: System Architecture for GIServOhio

The applications and data services provided through the GIServOhio platform are monitored 24x7x365 by Microsoft Operations Manager (MOM) automated monitoring software that notifies operations staff via e-mail, pager, and SMS messaging capabilities in the event of an outage. These monitoring services enable staff to quickly assess and rectify operational issues to ensure a high availability for our applications and data services.

USGS Relationship

The GISSC, located within OIT's Enterprise Shared Services Division, intends to continue staffing GIServOhio. No commitments for "mutual" staffing with any outside organizations have been formalized, though oral data stewardship relationships exist with State of Ohio agencies and local government for which certain data sets are critical.

A formal MOU between the U.S. Geological Survey and the Ohio Geographically Referenced Information Program for Coordination and Cooperation pertaining to the Ohio Spatial Data Framework and The National Map is currently in place. This MOU serves as an umbrella agreement that sets forth the general terms and conditions under which USGS and OGRIP will coordinate and cooperate in activities involving The National Map. Activities of mutual interest covered by this MOU include, but are not limited to, the following areas:

- Data and database development
- Data and database maintenance
- Data dissemination and distribution
- Exchange of geospatial and remotely sensed information, data and products

Through this MOU, both OGRIP and USGS will continue to maintain open communications and coordination to facilitate a cooperative working environment to support current agency missions as they relate to The National Map and the Ohio Spatial Data Framework. OGRIP and USGS will provide leadership and program oversight for the cooperative activities conducted under this MOU.

OGRIP plans to develop further derivative products and to improve the service delivery of imagery and elevation data products through ongoing improvements to map server applications focusing on improved performance and ease of use The primary goal will be to improve performance to client applications. This is perceived to be the principle impediment to obtaining a more universal acceptance of internet map services. The secondary goal will be to provide a transparent and seamless statewide interface to replace the current county tiling scheme. This is important to both the ease of use and the aesthetics of regional mapping requirements that demand a seamless product delivery. Both of these goals are becoming increasingly difficult to achieve with the limited funds and resources currently available.