

Federal Geographic Data Committee - National Spatial Data Infrastructure
2003 Coop. Agreements Program - Program Announcement Number 03HQPA0006
Category 4: Clearinghouse Integration with OpenGIS Services

Project Leader: Ted Koch, State Cartographer

Organization Name: Wisconsin State Cartographer's Office

Project Narrative:

(a). Project Application:

Wisconsin spatial data discovery and cataloging, University spatial data services provision, local data interoperability & integration for emerging applications

Our application of visualization of OGC-compliant spatial web services is three-fold. First, the most basic and immediate of applications is improved spatial data discovery and exploration through the Wisconsin Land Information Clearinghouse (WISCLINC), our current NSDI Clearinghouse node. The ability to re-direct spatial data consumers from WISCLINC's textual clearinghouse search interface to a visualization of data and services represented in the Clearinghouse promises increased end-user use and success in navigating to geospatial data and service access through metadata. In parallel, it provides an impetus for Wisconsin agencies to update and bolster their metadata holdings on WISCLINC.

The State Cartographer's Office is currently the de-facto custodian of WISCLINC and will shepherd this core effort. Institutionally, this effort runs in parallel with the prototyping and development of an "enterprise" state agency-oriented Wisconsin Land Information System (WLIS) node at the Wisconsin DNR built on an ESRI ArcSDE and ArcIMS infrastructure. The early availability of visualization interfaces for open spatial web services will help encourage interoperability efforts in WLIS development enabling visualization of many county-level spatial data layers represented on WISCLINC in the context of enterprise state agency spatial data.

Second, the State Cartographer's Office was in early 2002 assigned the task of coordinating spatial information and research efforts across the UW-Madison campus through the Spatial Data and Analysis Consortium (SIAC). Discussions have begun toward a distributed spatial data library across campus that would potentially provide spatial data and services to GIScience courses, research, and application interface development. Such an effort would encompass efficient networking and distribution of data and services from a variety of departments and disciplines. Examples of departments already implementing webmapping include: UW Environmental Remote Sensing Center's (ERSC) remote sensing data and lake water clarity studies, UW Land Information and Computer Graphics Facility's hosting of soils information, and UW Sea Grant Institute's Coastal GIS applications studies. Through demonstration and outreach, we will encourage the adoption of OGC protocols for map service delivery by campus departments to enable maximum interoperability and accessibility by the campus community.

Finally, funding initiated through the Wisconsin Land Information Program over the last 12 years has generated much spatial data at the county and municipal levels. Now, many Wisconsin counties and cities are embarking on first-generation webmapping sites to make their data widely viewable. By contrast, state-level efforts to provide interoperable webmapping across broader geographic areas have lagged. Thus, while counties, cities, and regional planning commissions are launching webmapping sites on commercial and open-source software from a variety of vendors, little, if any, local data visualization across administrative boundaries is possible. There are many emerging applications and e-government services for which local data interoperability and

integration is imperative including comprehensive planning, transportation planning, statewide tax assessment data integration, and coastal management, to name a few prominent ones. Our open geospatial-data-service interface will provide a non-proprietary and shareable example of integration of geospatial data across administrative boundaries and software interoperability barriers.

Approach and Implementation

Application of project funds will go toward the facilitation and construction of a Wisconsin-oriented on-line registry of open spatial data or web-map services and on-line webmapping sites, accessible from within the Wisconsin NSDI Clearinghouse node (WISCLINC.) Accompanying the service/site registry will be an OGC-standards-compliant map service viewer built on MN MapServer software enabling Clearinghouse-integrated viewing of OGC-compliant map service data.

Implementation of this registry will take place in 3 primary phases. The first phase will be to review, make recommendations on, and embed webmapping/service links within 100+ metadata documents, recently produced under a Wisconsin Land Information Program Strategic Initiative grant program to counties. Many of the participating counties have recently launched first-generation webmapping sites but there currently exists no coherent approach to discovering, cataloguing, or integrating across these local government webmapping sites.

The second phase will be to design and populate a database-driven interface through which, at a minimum, metadata containing spatial web service links will be browsable and sortable. The database will hold a relatively small number of metadata fields extracted from the XML metadata documents; and will facilitate advanced browsing of metadata resources as well as potential attributes for a graphical interface to web map services in Wisconsin. Initially and under the current FGDC metadata standard, each metadata document (discrete data set) will be considered the primary indexing unit, however this registry has the potential under ISO standards and evolving practice to evolve to include service-level, server-level, or site-level metadata as well.

The third phase will be to adapt a generic open web service viewing interface from our current and developing webmapping application interfaces through which to pass data view/exploration links from metadata files. The viewer will contain internally some standard Wisconsin cartographic reference layers that may be optionally displayed along with the WMS/WFS service(s) being explored.

The extent of webmapping services established by the project will at a minimum cover standard, accessible statewide data layers that have been available for download from the WISCLINC Clearinghouse site. These include WI Dept. of Administration re-processed Census data layers, the WI DOT's Roads Chain Database, and other federal cartographic reference layers or services (e.g. hillshade layers from USGS DEM, DRGs, etc.) that the SCO will add or stream-in for navigation and context. In addition, we will actively solicit open webmapping service connections from University departments, local government entities with established webmapping, and state and regional agencies. Upon establishing the first model open service connections, we will share initial examples of WMS/WFS implementation to assist the wider community in establishing these standards-based services.

(b). NSDI Related Experience:

The State Cartographer's Office (SCO) has extensive experience in metadata training, FGDC CSDGM metadata verification and editing, and NSDI Clearinghouse and framework development as well as a long history of statewide outreach and coordination efforts with local, regional, tribal, state, and federal GI entities. Within the past 5 years, the SCO has:

1. Provided metadata training throughout the state through 3 different efforts resulting in 13 workshops reaching at least 150 professionals over the last 4 years:
 - 1 SIAC-sponsored, SCO metadata development workshop on UW-Madison campus (March, '03)
 - 8 regionally-located workshops under FGDC-CAP 2001 Metadata Trainer grant (10/01-8/02)
 - 4 regional workshops under FGDC-CAP 1999 Metadata Workshop grant (10/99-7/00)
2. Prototyped an on-line webmap orthophotography catalog (OrthoFinder) providing a spatial exploration interface through which to navigate and query (through metadata tied to footprints) the availability of orthophotography over an area in Wisconsin. (FGDC-CAP 2001 Framework grant)
3. Produced an on-line webmapping/query application, ControlFinder, based on the OrthoFinder model, through which one can navigate, view, query, and save a custom collection of geodetic control point descriptions from within a webmapping display integrating NGS, legacy-USGS 3rd Order vertical, and locally maintained geodetic control. (released April, 2003)
4. Been custodian for update, expansion, and maintenance of the Wisconsin Land Information Clearinghouse (WISCLINC) through support from the SCO and a contract with the Wisconsin Land Information Board (WLIB). Over the last 7 years, WISCLINC:
 - was first created and minimally populated under 1994 FGDC grant;
 - was expanded and enhanced under contract with WI DOA/WLIB (5/99-11/00)
 - grew as a metadata repository from 53 to 364 metadata records;
 - increased on-line statewide data offerings from 23 to 37 data sets;
 - doubled in number of contributing agencies;
 - expanded through a new website design to provide increased access to metadata and clearinghouse functionality and support resources; and
 - provided extensive metadata training resources.
5. Provided “help-desk” style support for Wisconsin agencies embarking upon metadata creation for the first time or looking to improve their process for incorporating this aspect of spatial data creation and maintenance into their workflow. Support has been provided via e-mail, phone, and on-site outreach visits and has covered such topics as tool/utility selection and use (template, tkme, SMMS, mp, cns, etc.), strategies for beginning metadata implementation, and particular aspects of the FGDC Content Standard for Digital Geospatial Metadata.
6. Given many presentations to a variety of audiences regarding metadata, clearinghouse, emerging standards, and our framework efforts.

A.J. Wortley’s work continues to build on the reputation of the State Cartographer’s Office for clearinghouse coordination and metadata education over the last six years. This solid background and participation by the SCO is a vital contribution as Wisconsin embarks on a multi-year effort for creation of a statewide land information system built on well-documented spatial data resources. Thus, funding through the FGDC 2003 CAP program will further build the existing GIS/LIS infrastructure of Wisconsin, and provide useful evidence and knowledge to people in other states, through:

- facilitating ‘best possible’ and CSDGM-compliant metadata inputs to WISCLINC for Internet-based

- statewide land information discovery, access, and application;
- accelerating the learning process for provision of OGC standards-based web map services by local governments in addition to, and as extension of initial provision of proprietary webmapping services.
- demonstrating collection and integration of commercial and non-commercial map services through single standards-compliant open web map service interface; and,
- providing a generic model viewer interface built on open-source software which may be shared directly with local government entities.

(c). Clearinghouse and Metadata Capability:

The Wisconsin Land Information Clearinghouse (WISCLINC) is currently the only NSDI Clearinghouse node for Wisconsin. In addition to metadata search and retrieval, WISCLINC provides URL-based state and county catalogs for land information and a plethora of resources for metadata training. We are the custodians for update, expansion, and maintenance of the site and its associated metadata index. As referenced above, under NSDI Experience, we created WISCLINC, registered the node, populated it, and have provided metadata training for 4 years in support of statewide metadata development.

(d). Web Mapping Service Capability:

Our webmapping service display will be an interface of our own design that enables a direct link into the interface from a metadata document to view geospatial data or service in context; and will allow for addition of additional services for display from the interface. We intend to adapt a webmapping interface from our continuing work on our ControlFinder and OrthoFinder applications, of which ControlFinder is currently accessible publicly at: <http://www.geography.wisc.edu/sco/geocat/>. Our webmapping interfaces and map services are built on MN MapServer technology, which is regularly updated on our servers to incorporate latest features. MapServer 3.7, our current version, supports OGC-compliant WMS 1.0 and WFS 1.0 server and client specifications.

(a). Project Software Integrator:

Lee (AJ) Wortley, Outreach Specialist, will be the project software integrator for this project. AJ has worked at the SCO for over 5 years, joining them with a B.S. in Civil Engineering from UW-Madison. In that time, he has worked on and managed a variety of internal and cooperative projects, many of which are detailed above, that involve web resources, website and application development and supporting server configurations. AJ has experience in building webmapping servers on which installation of Linux, Apache, MySQL, PHP, and MapServer represent most relevant software, including the current server configuration on which the SCO webmapping application, ControlFinder, is run. He currently provides outreach and workshops related to metadata, standards, and geospatial technologies; manages a student team supporting the SCO, SIAC, and WISCLINC websites; as well as providing a technical liaison between the Office and departmental systems and technical infrastructure.

AJ will spend twenty percent of his time managing and working on this project including supervision of project staff, management of work plan and workflow, and networking with other agencies to establish OGC web map service capabilities.