

**The OpenMNND Project**  
A Minnesota - North Dakota Application Development Collaborative



2006 FGDC CAP Grant  
(Category 2 - Framework Client Development Project)

# Final Report

## 05/13/2008

**Agreement #:** 06HQAG0115

**Project Title:** Collaborative Client Software Development for Local Governments

**Organization:**

Richland County, ND  
413 3<sup>rd</sup> AVE N  
Wahpeton, ND

<https://mylocalgov.com/richlandcountynd/WebDept.asp?key=39>

**Project Leader:**

Matthew Syvertson  
701-642-7860

[matthews@co.richland.nd.us](mailto:matthews@co.richland.nd.us)

**Collaborating Organizations:**

Randy Knippel, GIS Manager  
Dakota County, MN  
Western Service Center  
14955 Galaxie Ave.

Apple Valley, MN 55124

[www.co.dakota.mn.us](http://www.co.dakota.mn.us)

Dr. Nancy Read, Technical Services  
Metropolitan Mosquito Control District  
2099 University Ave. W.  
St. Paul, MN 55104

<http://www.mmcd.org/>

David Bitner, GIS Coordinator  
Metropolitan Airports Commission

6040 28<sup>th</sup> Ave S.  
Minneapolis, MN 55450  
<http://www.macnoise.com/>

Bob Nutsch, GIS Coordinator  
State of North Dakota GIS  
600 E. Boulevard Ave, Dept. 112  
Bismarck, ND 58505  
<http://www.nd.gov/gis/>

Bob Basques, GIS Application Developer  
City of St. Paul, MN  
1000 City Hall Annex  
25 West Fourth Street  
St. Paul, MN 55102  
<http://www.ci.stpaul.mn.us/>

Brian Fischer, GIS Project Manger  
Houston Engineering, Inc.  
6901 East Fish Lake Road, Suite 140  
Maple Grove, MN 55369  
[www.houstonengineeringinc.com](http://www.houstonengineeringinc.com)

### **Project Narrative**

Richland County, ND and its collaborators have been awarded a FGDC 06' CAP grant to improve the ability of local government agencies to deliver enhanced public access to GIS data through the development of client applications providing a consistent look and feel across jurisdictions. These development efforts center on providing public users greater access to data from multiple agencies without the need for learning new Graphical User Interfaces (GUI) or presentation techniques. Also contained within the scope of this project is the development of client-side interactive mapping tools delivering operational and functional consistency between multiple sites, making it easier for the general public to understand and use framework data. Further aims of this project include designing and constructing a software architecture that allows for ease of future development and integration of additional specific GIS applications, thereby providing increased use of Framework data. Finally, the scope of this project aims at collaboratively designing and developing client-side code for MapServer to provide local governments a cost-effect method to share cadastral framework data and use WFS data services.

The project has taken the name of OpenMNND to represent collaboration for shared application development between organizations in Minnesota and North Dakota. The project team has created a website ([www.openmnnd.org](http://www.openmnnd.org)) providing basic information about the project. The project team has completed its research on developing client software and has chosen to build upon a client framework started by the City of St. Paul, MN called GeoMOOSE.

GeoMOOSE (<http://www.geomoose.org/moose>), is the official Open Source project that will continue after the FGDC grant funding ends. The GeoMOOSE website is set up to house the infrastructure needed for an Open Source project to grow. The OpenMNND project is currently adding functionality to the GeoMOOSE framework that was identified in our grant and is promoting the shared application development and shared data services amongst local government organizations.

One of the challenges we found up front is the lack of education amongst local governments to understand OGC specifications such as WMS and WFS. Most GIS users have not considered using data services and rely on storing all data locally. Our goal is to change the way local governments think about framework data and demonstrate how they can leverage data services with our client software. There are also very few WFS cadastral data services available for testing within our geographic area.

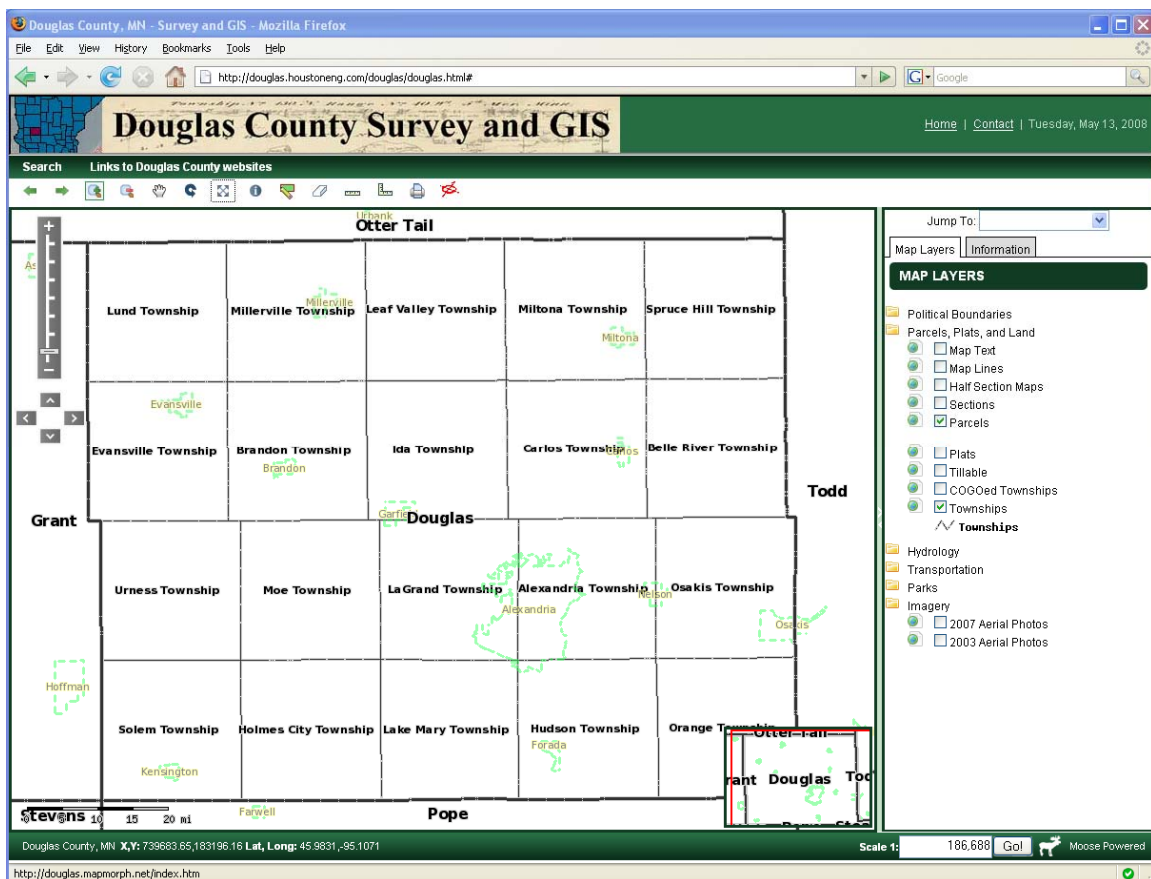


Figure 1. Douglas County, MN using GeoMOOSE 1.4 for their Cadastral Data Viewing.

Over the two year project life the collaborators initiated many outreach functions. These included presentations at both the Minnesota, South Dakota and North Dakota State GIS conferences. Presentations were also conducted at various state organizations including the MN IT conference and assessing officer's conference. Presentations were also given to many local GIS user groups including MetroGIS, Pine to Prairie and SW MN. A presentation was also given at two national conferences including the Free and OpenSource Geospatial conference (FOSS4G) in Victoria, BC and the MidAmerica GIS

Symposium (MAGIC) in Kansas City, MO. Finally three hands-on users workshops were conducted for interested local governments. One workshop was conducted at MN GIS/LIS conference on Oct. 3, 2008 in Rochester, MN, another workshop was held in Nov. 2007 in Fergus Falls, MN and another in Jan. 2008 in Bismarck, ND. All the workshops provided users with hands-on training and provided them with the opportunity to ask questions and walk away with a working application on their laptops.

The OpenMNND project is having great success in attracting interested organizations to help with testing and feedback. Many local organizations are excited about possibility of providing public access to cadastral data in an application that is cost effective for them to develop and maintain. We have also heard positive feedback amongst organizations wanting a consistent look and feel between applications. We feel we are well on our way to providing an open source solution that meets the needs of most local government applications.

### **Status of Data Access Activities**

- 1) *What Framework data theme(s) will be accessed under this project?*
  - a. Orthoimagery, cadastral, hydrography, governmental units, transportation. This is really dependent on the purpose of a particular application for an organization. Any framework data theme could be used with the client software.
  
- 2) *What is the data volume of Framework data anticipated for access (geographic extent)?*
  - a. This is dependent of the organization and geographic extent of the application. The client software is architected to handle a single city with only a few layers to a state organization with many layers. The volume of features also largely depends on the organization. An example is Douglas County, MN which has approximately 25,000 features in their cadastral layer.
  
- 3) *Who are the primary organizations providing the data for this project?*
  - a. A data provider could be anyone with data in a format supported by MapServer, WMS or WFS service. For the proposes of the organizations involved in the project and our demo's the data providers are the Minnesota Land Management Information Center (LMIC), MetroGIS, Minnesota DNR, Douglas County, Dakota County, Richland County and the North Dakota GIS HUB. LMIC ([http://www.lmic.state.mn.us/chouse/wms\\_image\\_server\\_description.html](http://www.lmic.state.mn.us/chouse/wms_image_server_description.html)), MetroGIS (<http://www.datafinder.org/services/index.asp>) and ND GIS HUB (<http://www.nd.gov/gis/mapsdata/web/>) all provided freely available data in both WMS and WFS formats.

## **Status of Framework Client Development**

### *1) What is the status of software development?*

- a. GeoMOOSE is currently on Version 1.4. The current functionality available at the 1.4 release can be seen in the gallery page on the GeoMOOSE website. Current functionality includes navigation tools, identify, selection, buffering, measuring, querying and printing. Currently GeoMOOSE requires MapServer to render all supported data sources except for WMS. The software was primarily developed around the concept of service oriented architecture so it provides users the ability to easily add in their own external services with GeoMOOSE.

The OpenMNND project team has also evaluated a “proof of concept” for direct WFS rendering in a browser. The OpenMNND project has funded part of the OpenLayers vector branch development available in version 2.4 to evaluate this proof on concept. The code can be downloaded from the OpenLayers project and an example can be seen at <http://openlayers.org/dev/examples/openmnnd.html>. The OpenMNND project determined that this code was not a viable solution for local governments at this time because the cadastral framework data tends to contain a large number of features and hundreds of vertices per feature. In testing direct WFS rendering in a web browser we found that the speed performance would not be satisfactory for local governments. This current code also does not support all the filter options in the WFS specification.

We have recommended using MapServer with WFS data sources as the preferred approach because it provides better performance. We feel that WFS rendering in the browser will continue to improve as computers get faster and support for generalizing the WFS data is added.

### *2) How will the client software be evaluated and quality assured?*

- a. The client software is currently being tested and evaluated by all collaborating organizations and other local government organizations that have gauged interested in the project. It is also available for testing by anyone in the public. This is a benefit of the client software being an open source project.

### *3) Describe your experience and purpose in accessing the data services?*

- a. The OpenMNND project is targeting local units of government as their primary audience. With the GeoMOOSE client code it is easy for a local government to configure an application with some of their own local data, but then have the flexibility to add WMS or WFS services from the Federal, State or other surrounding local governments.

For many smaller local governments this has been the first time they have been introduced to the concept of using OGC data services such WMS and

WFS. Most are utilizing the WMS services for background layers more at this time than WFS data sources. Most local governments find it easier to simply store the vector layers locally because they are small in nature compared to orthoimagery.

- 4) Describe any internal or external users that are using the client.
- a. GeoMOOSE is currently being used by a number of organizations for both internal and external applications. A number of organizations have production applications working. Some of the organizations include Dakota County, MN, McLeod County, MN, City of St. Paul, Metropolitan Mosquito Control District, Buffalo-Red River Watershed District and Morton County, ND.

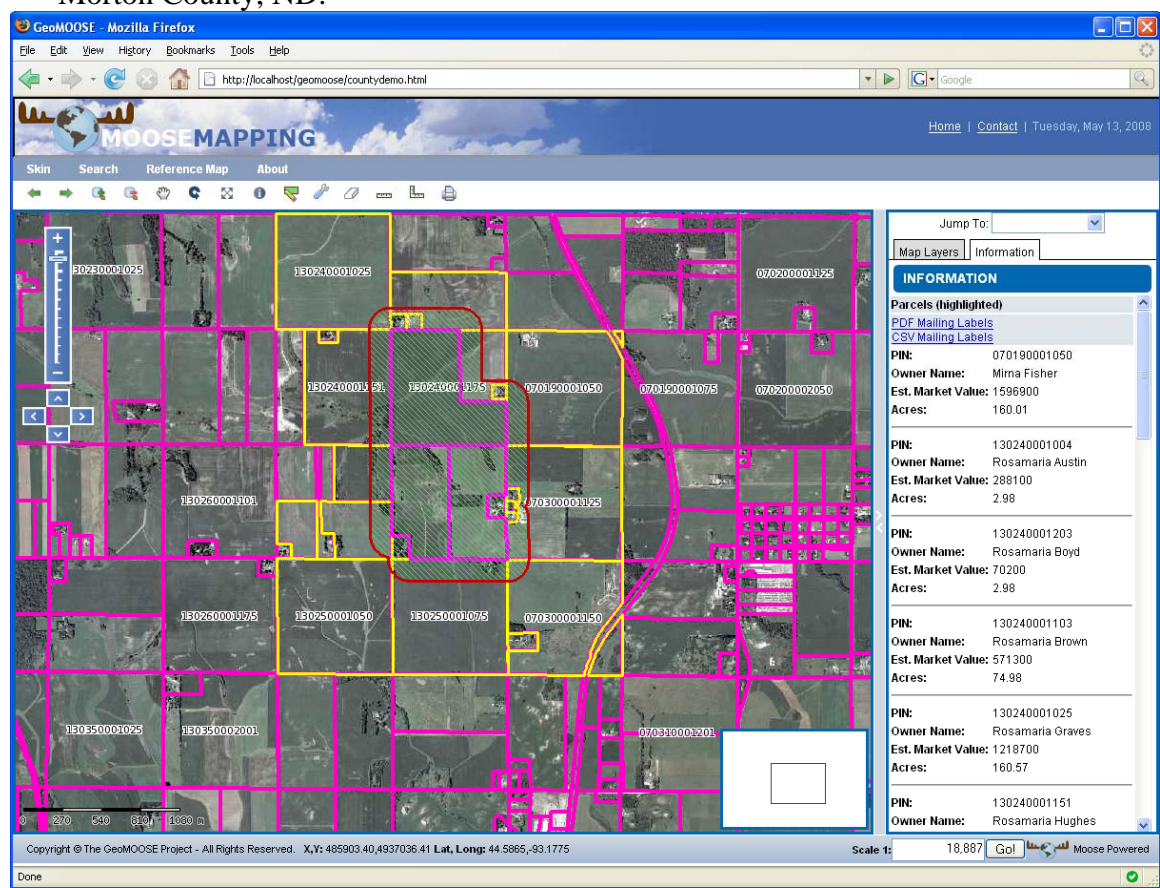


Figure 2. Dakota County Demo Application Packaged with the Download

- 5) Identify plans for promotion and distribution of this software.
- a. The OpenMnND project team has been promoting the software and open source project at a number of conferences, meetings and informally amongst the GIS community as described in the project narrative. We intend to use the GeoMOOSE website as the primary distribution method for the software. The software has also been package for use with MapServer as a MS4W (<http://www.maptools.org/ms4w/index.phtml>) download package to make it simple for windows users to install.

## **Project Management**

- 1) *Will this project's activities continue in the future?*
  - a. Yes, we have every belief this project will continue as an Open Source project into the future. It has a lot of momentum behind it right now in Minnesota and North Dakota and is attracting users from around the world. The email list has been growing steadily over the past year and we continue to provide support via the mailing list. We hope to grow that through the GeoMOOSE Open Source project.
  
- 2) *Describe the next phase in your project.*
  - a. The next phase project will be to continue to grow the software community through the Open Source community. Considerations for the next releases of the software include graphical markup tools, integration with Open Layers map control, and ability to group layers into a single image. We will also continue to look for funding mechanisms to help with development, documentation and outreach.
  
- 3) *Requirements (more technical assistance, software, other)?*
  - a. Currently MapServer is required to render all data sources except WMS. WMS data sources can be rendered directly by GeoMOOSE without a server side component. The goal of the software was had in mind to support other mapping engines such as ArcIMS and WFS directly, but due to limitations in funding, project schedule and production feasibility this was limited to MapServer and WMS.
  
- 4) *What areas need work?*
  - a. We need to improve the documentation for users and work on configurability issues for local governments. We also need to keep promoting the use of WFS and WMS to local governments for their cadastral data applications. We also need to continue to work on abstracting the concept of service oriented architecture to support the different user cases of local governments and the use of external data services.

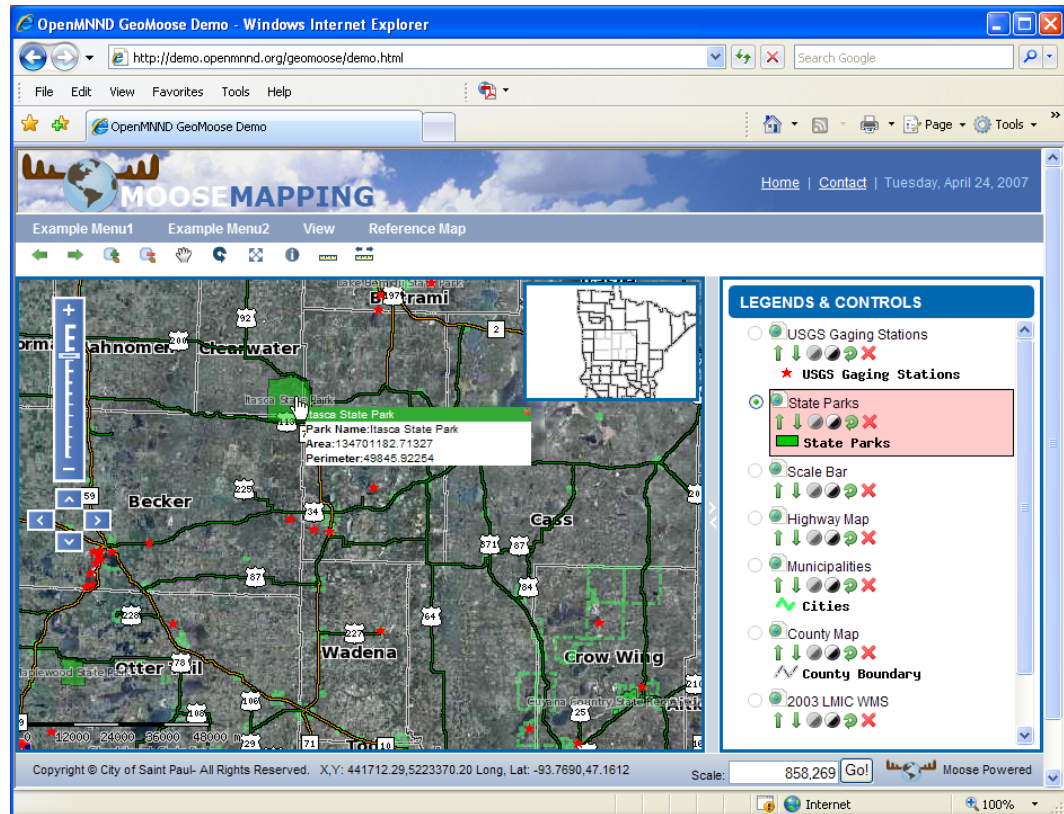


Figure 3. State of Minnesota Demo Application Package with the Software Download.

### **Feedback on Cooperative Agreements Program**

- 1) *What are the program strengths and weaknesses?*
  - a. The strength of the program is the ability to promote OGC specifications and provide startup funding for ideas that can grow in to bigger projects. At this point we don't see any weaknesses of the CAP program.
- 2) *Where does the program make a difference?*
  - a. The program provides a mechanism to support the NSDI's goals and promotion of framework data layers. Many organizations could not afford to understand or take an initiative to support NSDI's goals and OGC specifications without the support of the program.
- 3) *Was the assistance you received sufficient or effective?*
  - a. Yes, the FGDC staff is very responsive and prompt.
- 4) *What would you recommend doing differently?*
  - a. No, we can not think of anything to recommend for handling the program differently.
- 5) *Are there factors that are missing or need to consider that were missed?*



- a. It would be good to have a category in the CAP grant that focused specifically on local government initiatives and the cadastral framework data. Local governments make up such a large demographic of GIS users and the cadastral data is need by all levels of government, private sector and the public for decision making.

6) *Are there program management concerns that need to be addressed?*

- a. No, we have no concerns about the program management.

7) *If you were to do this again, what would you do differently?*

- a. When multiple organizations are involved in the project, the organization and planning phase starts off fairly slow. We would allow more time for planning and organization in our timeline. Otherwise we feel the program is functioning well and would not change anything else.