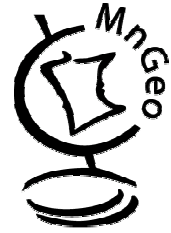


NSDI Cooperative Agreements Program

CATEGORY 7: DEMONSTRATION OF GEOSPATIAL DATA PARTNERSHIPS ACROSS LOCAL, STATE, TRIBAL, AND FEDERAL GOVERNMENT



FINAL REPORT

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Project Title: Minnesota Local Government Boundaries –
An Initiative to Support the National Map and NSDI
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EXECUTIVE SUMMARY

The Minnesota Geospatial Information Office (MnGeo), working in close partnership with other state agencies and local governmental units, designed and implemented the first tangible stages of a collaborative and streamlined approach to manage and maintain authoritative, accurate, current and non-redundant municipal and township boundary data statewide. Existing legislative and administrative review requirements provide incentives to assure that this process is both enduring and capable of evolving. The project builds upon previous work of MnGeo and its partners, and documents the best practices, agreements, and technical characteristics required to ensure that results can be sustained over time and that will serve as a guide to extending the process to other NSDI partners. Current data are now being updated on a regular cycle and published through web services that support The National Map and other national geospatial programs. This project complements other data integration projects guided by MnGeo, which has statutory authority to coordinate GIS efforts in Minnesota. The project team is encouraged that progress in developing a more universally accepted boundary process in Minnesota will be further accelerated through the development of a statewide parcel business plan supported through an ongoing Cooperative Agreement Program Project (#G11AC20048).

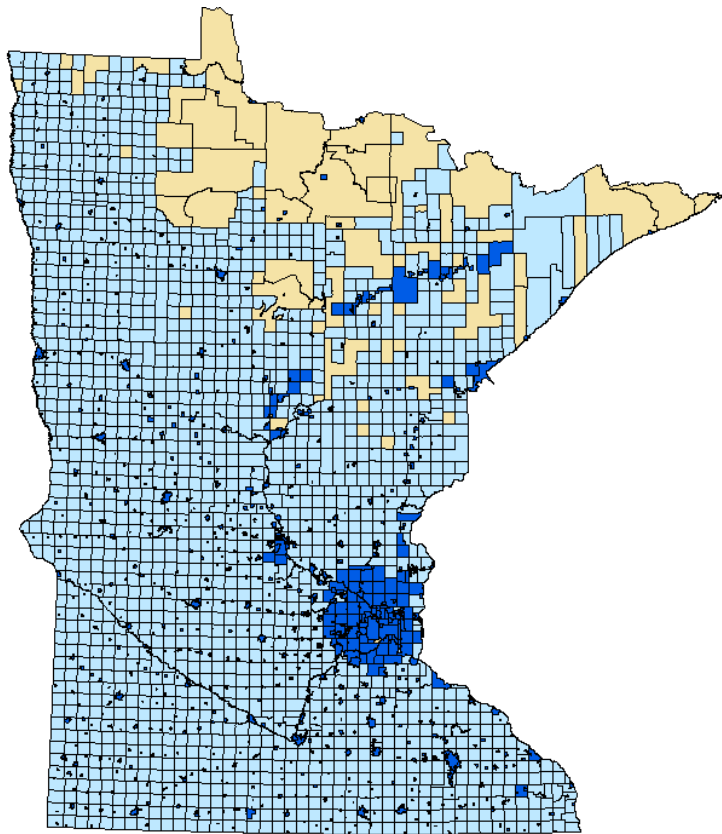


Figure 1. This CAP project helped integrate boundary data for Minnesota's 853 Cities, 1,786 political Townships and 71 Unorganized Territories.

PROJECT NARRATIVE

Data Integration Elements

The focus of this project involved: 1) **identifying primary authorities** for the gathering, inspection and publication of accurate and timely municipal boundary information within Minnesota, 2) attempting to work with those organizations to **develop a process** by which boundary changes could be identified in a standardized manner and gathered in one place, 3) using that updated information, **creating an accurate and timely statewide boundary geospatial database**, that is updated on a regular cycle and published for public access on a predictable schedule, and 4) **creating strong working relationships** with all relevant authorities so that appropriate cooperative agreements can be crafted to ensure the continuously refined evolution of an enterprise-wide process to provide a statewide resource of authorized, accurate and standardized boundary data.

A description of achievements under each of those focus areas follows:

1. **Collaborators:** The organizations that worked to collaborate on this project all value accurate boundary information in their daily business requirements:

Municipal Boundary Adjustment Unit; Office of Administrative Hearings. The MBAU administers and adjudicates the uniform system of municipal boundary adjustments codified in Minnesota Statutes. Legal orders are issued for the creation or dissolution of municipal boundaries through incorporation, consolidation, annexation or detachment of land. Jurisdiction is statewide. MBA staff facilitates approximately 250 petitions for boundary adjustments annually. The majority of petitions are from property owners; the rest are from cities and townships. All adjustments affect local government, as well as property owners, and have the potential for conflict or agreement. MnGeo contracts services to MBAU for the development and maintenance of the Boundary Adjustments Reporting System (BARS) web site and docket management system.

Transportation Data and Analysis Office; Minnesota Department of Transportation. Among its many responsibilities, TDA – through its Geographic Information and Mapping Section – maintain planning level cartographic data, including the State’s trunk highway system, official state highway map, and city and county maps mandated through FHWA. Updated boundary mapping has been a crucial component of those county and local government maps since the 1930s as they form the basis upon which highway miles by jurisdiction are monitored and calculated in order to allocate highway user tax distribution funds (State Aid). MnGeo works with MnDOT to validate state databases with that Agency’s municipal boundary files.

Tax Research Division; Minnesota Department of Revenue. Revenue is a boundary data consumer. The Tax Research Division tracks annexations as part of its responsibility to administer local option sales tax for those taxing districts in which they are applied. The Agency also applies accurate civil township acreage calculations in formulae used to establish Local Government Assistance (LGA) rates provided by the state. MnGeo is mandated in State Legislation to provide annual township acreage figures to Revenue.

Elections Division; Office of the Secretary of State. Election district and voting precinct boundaries are identified and updated using current boundary data. The Secretary of State also works with the Bureau of the Census, particularly through the Boundary and Annexation Survey

(BAS) process to maintain updated boundaries. OSOS consumes the data developed as a result of this CAP project.

League of Minnesota Cities and the Minnesota Association of Townships. It is clear that the source of the most accurate and up-to-date municipal boundary information is local government. The project team is grateful that the umbrella organizations representing city and township government in Minnesota supported its work and participated in evaluating the goals of the project, as well as its deliverable products.

2. **Process:** At the end of each fiscal year, MnGeo calculates township acreage values statewide. To achieve that result, the office worked with MnDOT to incorporate its 2008 boundary file to form the baseline for a statewide data layer. The office then developed a procedure to update the boundary geometry of the statewide data layer to incorporate information about all annexations that are reported to be *approved* through the MBAU adjudication process. The statewide data layer, including all the new approved annexations, is updated four times per year and delivered to the Department of Revenue under contract. In addition, MnGeo provides recalculated tabular township acreage statistics to Revenue annually.

The technical procedure incorporates a centralized, transaction-based system providing the capability to make timely updates and offering opportunities to collaborate with county and local governments and authorized state agencies when questions occur. Basic steps in this fully documented process include:

- Initial development of an ArcGIS SDE dataset of governmental unit boundaries and related adjustment data. The encompassing Geodatabase is versioned to permit concurrent editing and to enable retrieval of archived historical data. The dataset itself contains three separate feature classes: 1) coordinate geometry data of municipal annexations and detachments in line format, 2) an aggregation of these line data into polygons according to their entailing adjustment docket number, and 3) the final city, township and unorganized territory boundaries in polygonal format.
 - Loading a complete boundary data set into this new Geodatabase and improving the geometric accuracy of some local boundary data using Advanced Editing Traverse Tools in ArcMap (see Figure 2).
 - Applying topology rules that govern the geometric logic applied to newly inserted boundary data, eliminating gaps and overlaps.
 - Applying new adjustments to boundary data as annexations are formally approved by the MBAU on an annual nominal update cycle. Quarterly updates were successfully completed for all four quarters for fiscal years 2011 and 2012 under this project.
3. **Data Served:** The resulting database, referred to as the CTU (City, Township, Unorganized Territory) boundary data, is a unique, managed resource, horizontally integrated to incorporate established boundary data updated annually to reflect recent, certified annexations. Annual publication of the resulting statewide boundary file is provided as a static Shapefile with metadata, and as an OGC-compliant Web Feature Service GML.

A static updated boundary data set (name: MNGUBS12) has been captured and is being streamed through a Web Feature Service for MnGeo customers.

The data may be viewed at: http://www.mngeo.state.mn.us/wfs_moose/

GetCapabilities requests may be directed to: <http://geoint.lmic.state.mn.us/cgi-bin/mapserv?map=/home/httpd/html/cap/gubs.map&service=wfs&version=1.0&request=GetCapabilities>

Metadata may be retrieved at: <http://www.mngeo.state.mn.us/chouse/metadata/mnctu.html>

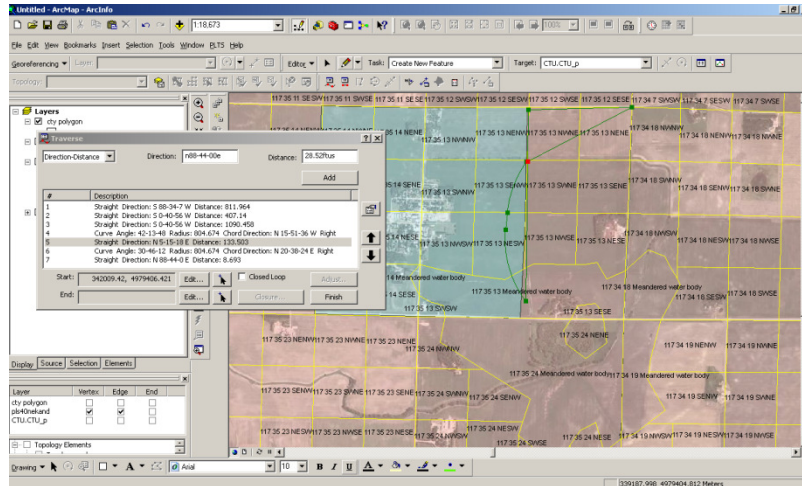


Figure 2. The ArcGIS Traverse tool applies coordinate geometry (COGO) obtained from as-read legal survey descriptions provided in an approved boundary change petition from the Municipal Boundary Adjustment Unit to insert boundary realignments as part of the annexation process.

4. **Creating relationships:** Although no new formal cooperative agreements were crafted during this project, a number of new working relationships were formed and some established relationships renewed and invigorated.

The contract to provide quarterly updates to the Department of Revenue has been renewed again for 2012, based on the continued value the quarterly updates provide. Additionally, MnGeo has created a dedicated internal budget of \$10,000 to maintain the township acreage update process in order to fulfill Legislative requirements that meet Revenue's business needs.

The contract to provide web support and further development of the Office of Administrative Hearings BARS docket management system has been extended through 2012.

On June 6, 2011 the project team held a Stakeholder meeting which described our prototype strategy for developing and maintaining an enterprise boundary database. All critical sectors of the community were represented at this half-day event. Meeting attendees included:

Stakeholder Meeting Attendee	Affiliation
Norman Anderson	MnGeo
David Brandt	Washington County
Anna Brenes	MnGeo
Chris Cialek	MnGeo
David Fricke	Minnesota Association of Townships
Adam Fulton	City of St. Louis Park
Peter Henschel	Carver County
Jim Hibbs	State Demographic Center
Ann Higgins	League of Minnesota Cities
Jon Hoekenga	Metropolitan Council
Star Holman	Office of Administrative Hearings
Andrew Koebrick	Office of Geographic & Demographic Analysis
Jim Krumrie	MnGeo
Fred Logman	MnGeo
Peter Morey	Minnesota Department of Transportation
Brad Neuhauser	Office of the Secretary of State
Tim O'Malley	Office of Administrative Hearings
Nancy Rader	MnGeo
Jeff Saholt	Minnesota Department of Transportation
Susan Schleisman	Office of Administrative Hearings
Brian Udell	Minnesota Department of Revenue
Bob Wolbeck	Minnesota Department of Transportation

The meeting's agenda was designed to provide background information, a proposed plan of action and devote plenty of time to discussion before identifying next steps. While all participants agreed that moving forward with a statewide boundary database was advantageous, many specific issues would need to be resolved before it could completely serve this diverse group of organizations:

- A precise definition of what is meant by an “authoritative” database would need to be agreed upon. (The current database is referred to as an enterprise resource, meeting documented specifications, but we refrain from calling it *authoritative* as no real sanction is in place to guarantee its validity.)
- The value of the database in its current state lies in its visibility, which highlights discrepancies and provides a resource around which resolution strategies can be determined. Once corrections are agreed to, the repair is documented in the database. This visibility also discourages costly data duplication and focuses attention at all levels of government on fewer, more reliable options.

- Publishing these data through web services provides a convenience that helps encourage their use. Access has been utilized by a number of the organizations represented at the meeting.
- The database has a published nominal horizontal positional accuracy equivalent to that of 1:24,000-scale mapping. While that's an acceptable accuracy for regional or statewide uses, it falls short for county or local government uses. Positional accuracies at scales customary for parcel-level geospatial data collection should be the long-term goal.
- The jury's still out on the ultimate value of this database until it is understood how it can be used as a catalyst to identify and resolve boundary location issues. No other option exists statewide. So this is a good place to start.
- The effort could benefit from more resources being dedicated into statewide integration of parcel data, collected and maintained at the county level.

Recently, a number of local governments have contacted MnGeo to report boundary issues discovered in the CTU Boundary database. This new activity indicates that the data are indeed being viewed and scrutinized and that a broad user community considers the resource a credible information source, the maintenance of which is of value to them. Examples include the City of Pine Island (see sidebar for details), the City of Bethel, Anoka County and the City of Wells, Faribault County. The latter instance has helped to open a dialog between the MBAU, MnDOT the city and county which is resulting in research being undertaken by the state to investigate the handling of two annexations which took place in the 1959 and 1961 in an effort to resolve a boundary discrepancy issue. The project team considers this development to be significant, as it represents an important new relationship helping to resolve local boundary issues and hopes that the resolution will be immediately reflected in the CTU database.

Boundary Discrepancy Resolution

A Case Scenario: Annexation for the City of Pine Island Olmsted County, Minnesota

Background: Minnesota state law requires that a map accompanies all annexation petitions and resolutions. On occasion, the submitted map may not match the legal description, or the legal description is incorrect. Either situation results in horizontally incorrect boundary data. The statewide City, Township and Unorganized Territory (CTU) boundary dataset serves as a tool to discover errors and correct them through amendments to boundary adjustment.

Problem: In the case of Pine Island, the legal description for Orderly Annexation 1404-1 did not match the map included with the original boundary adjustment petition. The county, tipped off to the discrepancy by inspecting the enterprise boundary database, alerted the State early in 2012.

Resolution: MnGeo worked closely with Rochester-Olmsted Planning, corrected, and reported the errors to the State Municipal Boundary Adjustment Unit and updated the CTU boundary data. The CTU dataset was updated using GIS data created by the local County GIS department working with the County Recorder's Office.



Documentation, Publications, Presentations

All relevant data offerings and documentation related to this project are located on the project web page. MnGeo anticipates actively managing this website as part of its First Stop Pages online information service. CTU Boundary information can be found at:

http://www.mngeo.state.mn.us/CTU/CTU_project.html



The screenshot shows a web browser window displaying the Minnesota Geospatial Information Office website. The page title is "Minnesota Local Government Boundaries". The main content area features a paragraph explaining the high demand for a well-documented statewide dataset of current and accurate boundaries of Minnesota's cities, townships, and unorganized territories (CTU). Below this, there is a section titled "View and Download Data" which lists several ways MnGeo provides current CTU boundaries and related data:

- **CTU boundaries**
 - [NorthStar Mapper](#), see "City and Township" layer in the "Boundaries" section
 - View boundaries
 - Download all or part of the GIS shapefile
 - [CTU GIS shapefile](#)
 - Read documentation
 - Download the statewide GIS shapefile
- **CTU database**
 - Search by name of city, township or unorganized territory to find its latitude/longitude and assigned codes
 - Download to use in spreadsheets
 - Integrate web service into your application
- **Municipal Boundary Adjustments**

Updates to CTU are made based on boundary adjustments reviewed by Municipal Boundaries Adjustments staff of the Minnesota Office of Administrative Hearings.

 - [Docket system](#): find details and track the status of proposed boundary adjustments
 - [Interactive map](#): see locations of proposed boundary adjustments

Below this, there is a section titled "Grant Project" which states that much of the work to develop the CTU data was funded through a 2010 Federal Geographic Data Committee CAP grant, as part of an initiative to support the National Map -- MnGeo worked closely with stakeholders from state and local government to develop the CTU boundary data prototype that meets or exceeds minimum data quality standards. It also mentions that MnGeo researched the following:

The following materials are available:

1. ***Processing CTU Data: Best Practices for Updating and Maintaining City, Township, and Unorganized Territory Boundaries Using ArcSDE.*** The detailed description of procedures developed as requirements of this project to incorporate boundary adjustments into the CTU database.
2. ***June 6, 2011 Stakeholder Meeting Materials.*** Including presentation slides, agenda, attendee list, and meeting summary notes.
3. ***Access to current CTU shapefile and metadata.*** February 8, 2012 downloadable file
4. ***Boundary Adjustments Reporting System.*** Access to the Office of Administrative Hearings BARS web site, including interact map of the locations of current annexation activities.

5. *WFS Demonstration Viewer*. Offering a comparison of statewide boundary data from 2002 through 2012.

6. *Codes for the Identification of Cities, Townships and Unorganized Territories (CTUs) in Minnesota*.

A database containing GNIS identification codes for all Minnesota cities, townships and Census-defined unorganized territories in Minnesota. MnGeo and the Metropolitan Council are formal partners with the USGS in maintaining updated GNIS codes for governmental units in the state.

Data Theme Details

Metadata describing the Minnesota Governmental Unit Boundaries dataset is published on our state Clearinghouse and is harvested by GeoSpatial OneStop (Geodata.gov). MnGeo has made a commitment to update those data, the shapefile download site, the WFS that serves them and its metadata on an annual basis.

Issues

A surprising number of issues arise when trying to integrate governmental boundary information provided from authoritative county sources, but adjusted by state agencies and annexation processes. Perhaps the first issue is one of defining “authoritative” data. A state agency office, like MnGeo, can make no credible claim to publish authoritative boundary data. The best we can offer is to provide access to data derived through a well-documented, transparent and inclusive process. We consider County boundary data to be authoritative, but when it conflicts with equally authoritative data sanctioned through a legal process overseen by the Office of Administrative Hearings, we feel it is our responsibility to act as a facilitator to arrive at mutually agreeable resolution to boundary conflicts rather than a place to resolve those discrepancies outright. Results from recently completed redistricting decisions have created a renewed scrutiny on municipality boundary alignments. As a result, we have seen our facilitation role begin to develop with some positive, but as yet incomplete results.

We are certain there are numerous inconsistencies captured in the integrated CTU boundary database compiled and updated as the product of this project. As those discrepancies are identified, our goal will be to engage the proper authorities to help bring each issue to a satisfactory, defensible resolution, and thereby progress toward an increasingly authoritative data resource.

Relationship with USGS

MnGeo has a long, successful and strong relationship with the USGS. From our collaboration as the first large state DOQQ program in the early 1990s, through a progressive NHD cooperative over the past decade, to numerous successful CAP projects, the state of Minnesota has long valued and nurtured its USGS relationship.

Minnesota was one of the first states to develop an FGDC-style Clearinghouse node, formally adopting a CSDGM compliant metadata guideline statewide in 1998. Unfortunately, MnGeo does not have a formal ongoing agreement with the USGS to provide data to The National Map. We are eager to offer the CTU database for publication on the National Map Viewer, however, if these data would be of value.

NEXT STEPS

Explore web-enabled boundary mark-up/edit capability

Create formal service level agreements with partners

Better distinguish boundary definitions among state agencies and county governments (especially: federal aid boundaries, unorganized territory divisions)

Explore formalizing relationship with USGS with regards to prospective state contributions to the National Map

CAP FEEDBACK

What are the CAP Program strengths and weaknesses?

The CAP Program provides seed money to help initiate projects or investigations that would be difficult, or impossible to otherwise execute. An awarded CAP project identifies to project partners and other stakeholders the acknowledged value of their efforts. Requirements to apply have been reduced to a primary core, which make good ideas easy and economical to formulate into effective proposals.

Without considerable forethought, it is often challenging to maintain the momentum a CAP award provides once the project period has lapsed.

Where does it make a difference?

The CAP program provides a point around which often disparate organizations or interests can come together for an explicit purpose over a well-defined period of time.

Was the assistance you received sufficient or effective?

Not sufficient to achieve all the goals initially stated. But, the investment has proven to be effective. We are experiencing interest in the information products created as a result of this CAP project, which is resulting in cooperative actions being taken to resolve issues that were invisible (or easy to ignore) before the project began.

What would you recommend that the FGDC do differently?

Provide more lead time when advertising upcoming offerings.

Are there factors that are missing or additional needs that should be considered?

None come to mind.

Are there program management concerns that need to be addressed, such as the time frame?

It is often difficult to shoehorn projects into a strict one-year time frame. The FGDC is gracious with providing extensions, but it might also consider allowing project periods greater than 12 months.

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

Reduce the scope of our proposal and focus on a tighter set of objectives.