A Program for Transformed GIS in the State of Minnesota:

Agency Interviews

FINAL

March, 2009

Prepared by:

APPLIED GEOGRAPHICS, INC.
Empowering People with Spatial Solutions

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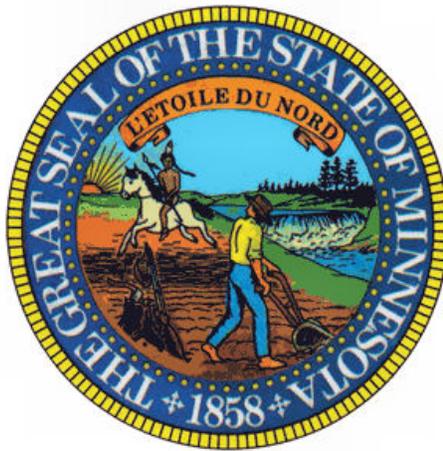
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Prepared on behalf of
The Enterprise GIS Steering Team

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March, 2009

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Introduction

During this project's information gathering phase – which included, workshops, interviews and an on-line survey – more than 20 interviews were conducted with state agencies, the Metropolitan Council, the Legislative GIS Office and a federal agency focus group. These interviews were conducted with varying combinations of GIS practitioners, CIOs, and program managers to characterize the major commitments to GIS that each agency has made, with a specific focus on the agency's perspective about developing an enterprise GIS solution for state government.

The interviews provided a snapshot of GIS use throughout state government as well as agency perspectives on enterprise GIS related issues and their potential solutions. The information gained from these interviews helped inform the overall program design and strategy for transforming GIS within Minnesota that is embodied in the companion document titled: *A Program for Transformed GIS in the State of Minnesota: Program Design & Implementation Plan*. This document is structured into the two sections found below. The first section, **Agency Synopses**, provides an overview of the business functions that are supported by GIS. These synopses are also found in section 3.1 of the *Program Design & Implementation Plan*. The second section of this document, **Agency Profiles**, provides a fuller profile and additional details on each agency's GIS program as documented through the interview process.

1 Agency Synopses

1.1 Board of Water and Soil Resources

Geospatial technology supports six main business areas within BWSR. Landowners submit agricultural conservation best management practices on-line in order to receive Soil and Water Conservation District grant money. Conservation easement geometry data from Reinvest in Minnesota, a program that protects water and soil resources by removing marginal and sensitive cropland from production, is collected to produce a statewide data layer. The Minnesota "Ditch Law" mandates the maintenance of watershed and watershed district boundary files. Minnesota wetlands are defined, violations are detected, and construction mitigation credits are tracked through the use of aerial photography and GIS/GPS tools and systems. Approximately 80% of

Minnesota's published soil survey data has been digitized and contributed to the USDA Natural Resource Conservation Service soil database.

BWSR, a small but mature adopter, has been using GIS for over 10 years. Two full-time GIS professionals report to the IT manager, who has a GIS background and is a member of the senior management team. There are 17 ESRI Desktop licenses used throughout the agency and AutoCad is used for reading engineering and construction drawings. LandView, an open source GIS developed by
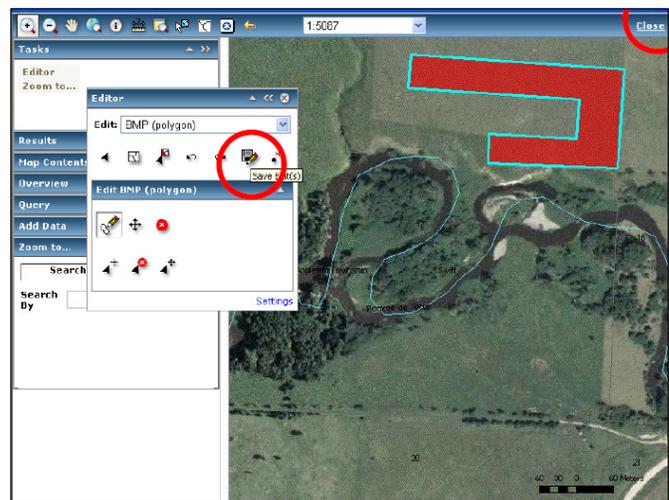

eLink's Web Data Entry tool

the Minnesota Department of Natural Resources, is used as a desktop data viewer and for simple map production, such as best management practice mapping for local review. A geodatabase of frequently requested data simplifies the map production process. Interns use a GPS enabled tablet with ArcEditor to collect wetland information. BWSR relies on data access and distribution and other geospatial support from DNR, LMIC and other state agencies. The GIS staff supports major geospatial enabled applications such as: eLink for plotting best management practice implementation areas and NRDSS for soil survey data query and download. Several web-based applications are maintained to support the business processes described above. The GIS team's approach makes GIS tools and capabilities available to as many people as possible and GIS projects are tied to specific business processes wherever feasible.

1.2 Department of Agriculture

Geospatial technology is integrated into a number of key MDA business processes. Each year mobile technology is used to perform approximately 20,000 inspections of farm and food production facilities to monitor regulated agricultural chemicals, enforce food related state regulations, and track reports of food contamination. Digital terrain analysis is used to identify critical conservation areas and best agricultural management practice locations are collected from landowners. Invasive plants, disease locations, and insect infestations are tracked and profiled. Water drainage and soil productivity analysis is performed and surface/ground water is tested for pesticide and fertilizer runoff. Public access to MDA data is provided by web applications, such as "What's In My Neighborhood – Agricultural Interactive Mapping" which identifies known and potential agricultural chemical and ground water contamination sources.

MDA, a mature adopter of GIS, has a GIS staff of 4 led by the agency GIS Coordinator within the CIO's Information Technology Division. This small agency-wide support group, funded by the agency divisions, is responsible for coordinating the use of GIS and GPS technology, enabling geospatial data sharing, and implementing data standards. In the last 5 years the agency's use of GIS has matured significantly. There are 30 to 40 core desktop GIS users and about 150 field inspectors who use approximately 100 Bluetooth-enabled GPS tablets to collect geospatial data in the field. From the field, this information is synchronized with department servers at the end of each day. MDA also has a substantial GIS server environment that supports almost 20 web-based applications; about half of these are for internal use. Overall, the MDA user community understands how GIS can contribute to business operations and is forward thinking in new ideas for how GIS can be applied. For example, the availability of 2003/2004 aerial imagery has generated considerable interest in new and innovative uses for GIS technology.
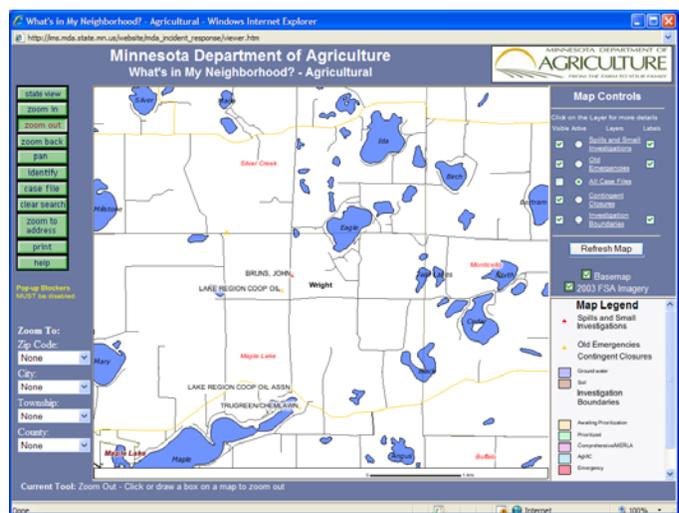
What's in My Neighborhood?

1.3 Department of Administration

The Department of Administration has begun to use GIS within a few of its programs, especially to support demographic, environmental, and archaeological analysis and real estate management, but most of Administration's GIS capabilities are found within the Land Management Information Center (LMIC).

LMIC was the first state program anywhere to use GIS when it was established in the 1978, but has since evolved into the unofficial statewide geospatial coordinator. LMIC maintains the Minnesota Geospatial Data Clearinghouse and provides custom mapping and GIS services to a variety of customers, primarily other state agencies. LMIC maintains a wide array of geospatial technology including ESRI desktop and server products, open source server products, Maptitude, GeoPDF, EPPL7, and both Oracle and SQL Server database platforms.

LMIC's consulting services are funded using a cost-recovery model. LMIC supports coordination using a matrix management style, drawing resources from other LMIC programs as necessary. Details about LMIC and its services follow.

Data and Map Product Distribution. LMIC serves as a single state agency point of contact for geographic data, including data directories, interactive data searches, and public access to data, maps and web services over the Internet.

The Minnesota Geospatial Data Clearinghouse (MGDC) is a collection of geospatial data sources coordinated by LMIC. The MGDC is used to distribute data to state and federal agencies, local governments, the general public, and the private sector. There are 20 federated MGDC nodes; each maintains their own servers. LMIC's node has over 250 data sets and serves as an archive for other state agencies and a host for state agencies without their own node. GeoGateway is an MGDC tool that enables metadata searches across all nodes and links to web pages at each node describing the content and data access instructions. LMIC also maintains web mapping image services (WMS) that allow many state agencies and county governments to easily access specific image extents over the Internet.

GIS Coordination. LMIC acts as the liaison with federal agencies and national organizations, such as the National States Geographic Information Council (NSGIC), an organization of state GIS coordinators. LMIC also provides administrative and technical support to the Minnesota Governor's Council on Geographic Information and maintains a list of GIS contacts for all Minnesota counties.
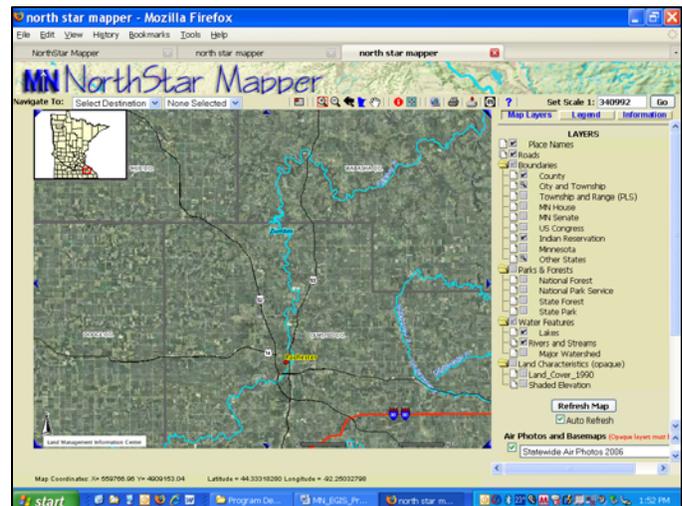
LMIC also coordinates the state's involvement in the National Agricultural Imagery Program (NAIP) which produces county-based digital mosaics of color, leaf-on aerial imagery. This program is funded by contributions from eight state agencies -- PCA, Mn/DOT, DNR, MDA, BWSR, Health, Public Safety and LMIC. LMIC orchestrates the state's involvement and has contributed significant staff time and technical resources to the effort.

Consulting and Project Services. LMIC's service bureau provides a full-range of practical GIS solutions and services to other federal, state and regional agencies. Rates are set yearly to recover costs. Most of the current workload is related to data development and there is a smaller volume of web application development.

Examples of fee-for-service projects include: Assistance with the deployment and operational support of DisasterLAN, the MN Homeland Security and Emergency Management incident management system; Development of a storm water system for Met Council; Litigation support to US Department of Justice on a tribal law suit; Application development to manage wind turbine and pipeline permitting for the Department of Commerce.

1.4 Department of Commerce

There are many program tasks within the Department of Commerce that could be enhanced with greater use of geospatial technology. Commerce is a citizen advocate during the energy facilities permitting process that covers wind farms, power plants, pipelines, and transmission lines. It also performs environmental and resource planning and produces 25 year energy use forecasts. Solar resource maps are created for solar energy production planning. Commerce maintains and publishes the locations of 300 E85 Ethanol pumping stations and annually inspects every fuel pump at the state's 2,500 fueling stations. Underground fuel storage tanks are located and analyzed to determine removal priorities. Every grocery and commercial food scale is annually inspected and calibrated. A fleet of 50 vehicles is required to support the 40 field inspectors and the agency's fraud investigators. Efficient inspector routing that includes fueling stops at E85 stations – a governor's mandate for all state vehicles – is strongly desired.

The Department of Commerce, a late adopter, has no dedicated GIS staff. The Office of Energy Security has some map production capability and maintains 3 ArcGIS licenses. GIS reference data is stored on network drives and both the LMIC clearinghouse and the DNR Data Deli are accessed for other geospatial information.

1.5 Department of Education

The DOE uses geospatial technology in two primary areas. First, school locations, districts, and attendance area boundaries are maintained, and updated annually (manually using marked up PDF maps). These data sets are used within the agency, and locally for a variety of purposes, such as planning bus routes and projecting student populations. Second, the Food and Nutrition Service (FNS) uses GIS to support the administration of the USDA's Child Nutrition program

that partners with over 1,000 public and private sponsoring organizations located in schools, child care centers, adult care centers and summer feeding sites.

DOE, a specialized adopter, has a full-time GIS coordinator, another .5 FTE, and a few additional proficient GIS users in various divisions. Approximately 35 map requests are produced each year. DOE is building a GIS infrastructure including ArcGIS Server with an ArcSDE database to support several FNS applications. The FNS must determine client site spatial locations through geocoding or using locations supplied by vendors using 10-year-old GPS equipment. Current geocoding capabilities are inadequate and deliver inaccurate locations, especially in remote areas of the state. DOE could reduce the cost of GIS operations and would benefit tremendously from access to enterprise GIS services such as ArcGIS server for application hosting and an accurate geocoding web service.

1.6 Department of Employment and Economic Development

DEED is largely responsible for supporting employers and job seekers. It manages data sets detailing the location of over 160,000 employers, 2.5 million jobs, 200,000 Unemployment Insurance (UI) claims and a variety of other administrative data as well as forty seven work force centers aimed at supporting job seekers and businesses. One of DEED's core business drivers is data analysis and publication. The agency views GIS technology as key to effective analysis and presentation of many types of employment, economic development, and program data.

DEED developed an early on-line GIS web-site that published dynamic Census Origin-Destination commute-shed maps and reports along with other economic data layers for the seven county Metro region. DEED also provides geographic analysis on a variety of labor market and administrative program data. DEED is currently planning to geo-enable some of its existing workforce development web-sites (e.g. MinnesotaWorks.Net) so that users can see maps of job locations in association with relevant facilities such as schools, child care and public transportation. The MNPRO economic development website allows businesses and developers to search for available commercial and industrial real estate. DEED is interested in adding a mapping component to display the distribution of available properties.

While DEED is a specialized adopter with a modest program, they are taking geospatial technology seriously. The agency maintains one full-time GIS application developer and has convened an internal GIS Steering Committee. The agency currently maintains ESRI desktop technology and is investigating the near-term purchase of a commercial GIS web-server. The agency also gained early experience with Open Source GIS tools built on top of the MapServer for Windows package.
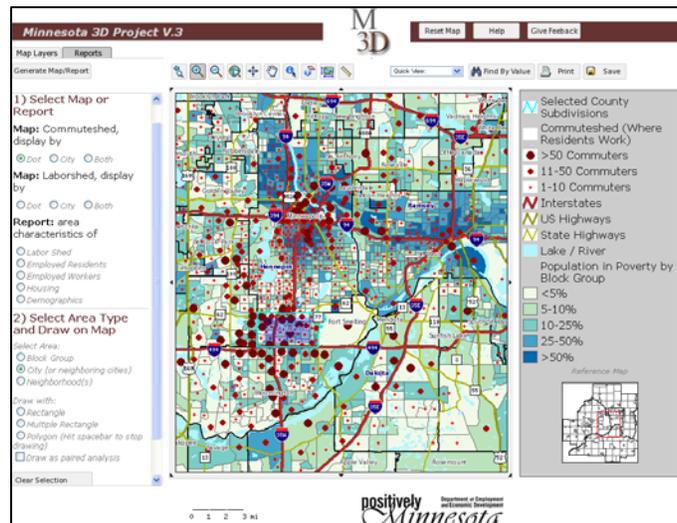
1.7 Department of Human Services

As a late adopter with an emerging program Human Services has only begun to use geospatial technology. However, it has begun planning for broader utilization. Many of the examples below include what is planned and hoped for in the near to mid-term.

Many Human Services policies have "proximity" criteria. For example, when moving a child from his or her home, the agency should attempt to move the child to another home that is "close" to his or her current neighborhood. GIS will help Human Services better make those determinations from candidate homes. Human Services is involved with over 14,000 child care centers across the state and would like to accurately map all of these facilities. Human Services is involved with 44 child abuse prevention councils and would like to map their service areas to identify service gaps. Human Services envisions using GIS in emergency situations to identify group homes that may require prioritized or assisted evacuations. Child Safety currently uses GIS to produce a variety of maps such as county-based maps showing concentrations of children with different disabilities or the distribution of children in foster care and other out-of-home care.

Currently, Human Services has very limited desktop GIS capacity. At present there is one copy of ESRI's ArcGIS software and one copy of MapInfo. Recently, Human Services completed a Strategic Plan for the 2008-2012 time period. The plan emphasized "data driven decisions" and the development of "business intelligence systems." GIS is identified as a business intelligence system of interest in that plan.

As a new user, Human Services would benefit greatly from an enterprise approach and the assistance and resources that would become available. In addition, Human Services would benefit from collaborative data sharing with other agencies such as DEED for employment information, Health for birth and death registries, and even the DNR for boating licenses which can be germane in identifying people capable of making child support payments that they are delinquent on.

1.8 Department of Health

Many MDH programs are supported, to varying degrees, by geospatial technology. Drinking water source areas are mapped, water quality is analyzed, groundwater is modeled, and well heads are protected. Outbreaks of 95 reportable diseases are geographically identified, located and tracked. County based maps of disease and injury rates are produced and distributed. Public health preparedness and response activities are managed with simple map production. Birth and death records are kept statewide. Nursing homes, mortuaries and cemetery complaints are investigated and "report cards" are created for nursing homes. Disaster areas, emergency shelters, and drug stockpiles are mapped during emergency responses. Noxious cloud releases are modeled to determine potentially affected areas.

Minnesota West Nile Virus Monitoring, 2008
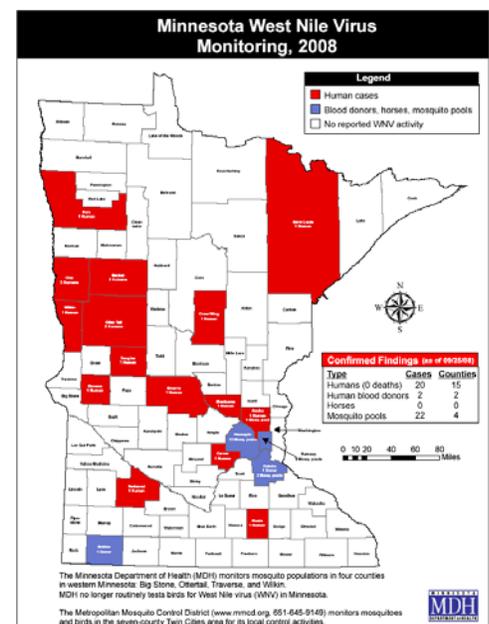
MDH is a specialized adopter of geospatial technology. Though Health does not have a coordinated program, GIS and mapping are used within many of its divisions, with a few full-time GIS managers and over 100 non-GIS professionals who use GIS on a regular basis. The Environmental Health division has been using GIS for 15 years and has an advanced geospatial infrastructure that supports interactive map viewers, while other divisions produce simple county maps using Microsoft Word templates. Citrix servers make GIS applications accessible to seven district offices. All divisions recognize the value of GIS and are eager to put it into greater practice, but they are constrained by funding. One significant constraint, imposed by federal grants, requires that 95% of funding be spent within the program. This makes sharing geospatial expertise across divisions difficult.

1.9 Department of Natural Resources

GIS is instrumental to dozens of business processes across DNR's business units. A few examples include: Mapping county biological rare animal survey data; publishing interactive and paper recreational maps; tracking forest fire locations; demarcating areas of scientific and natural importance; performing regional hydrogeologic assessment; providing time-sensitive response to natural disasters by conducting fly-overs to create spot imagery. DNR has significant business requirements for geospatial collaboration with other state agencies including: Development of the National Hydrology Dataset with LMIC; forest inventory and assessment with the USDA Forest Service, stream gauging and other water management efforts with PCA and USGS; multiple activities with the Department of Health; rare species data collaboration with NatureServe, a non-profit affiliated with the Nature Conservancy; coordination of coastal zone issues with Canada and other states; collaboration and coordination with the Bureau of Indian affairs and several tribal governments.

DNR, a mature adopter, has made significant and sustained investments in GIS technology since the 1980s. An 8-person GIS section, under the direction of the CIO, provides GIS operational and technical assistance and support to Department Management and field staff. The agency also maintains at least 7 additional full-time GIS staff throughout the agency. DNR implements a wide variety of GIS software including ESRI desktop products, Open Source server products, and both PostGIS and Oracle Spatial database products. Mobile computing is becoming increasingly important and "real-time update" versus "detached synchronization" methods are being explored. DNR has developed the Data Resource Site and a strong metadata management framework for making statewide GIS data available to all agency staff through replication to over 75 DNR offices locations. DNR's self-service Data Deli is an innovative application that makes DNR and other agency geospatial data publicly available via
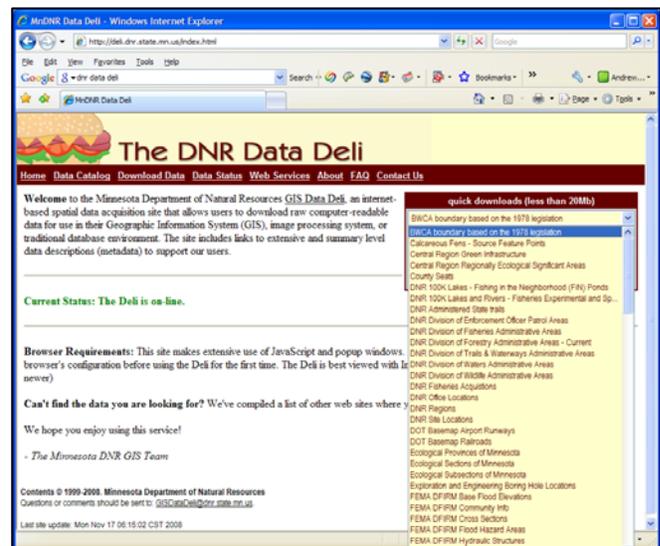
the Internet. DNR has a strong interest in obtaining access to data, such as parcels, maintained by county entities and has entered into data sharing agreements and collected data from approximately 30% of counties. These agency efforts provide a model for a statewide framework that can be used by all agencies.

1.10 Department of Public Safety

Many of the Department of Public Safety's divisions – ranging from Driver and Vehicle Services to the State Patrol to Justice Programs – use geospatial technology to support business needs, but DPS has not fully capitalized on its potential and is considered a specialized adopter and emerging program.

The State Patrol has an advanced system that provides 911 computer aided dispatch (CAD) and automated vehicle locating (AVL) to support emergency response and fleet visualization. Driver and Vehicle Services use GIS to support the geocoding and mapping of over 87,000 accidents per year and uses this information to help establish priorities for roadway safety improvement projects. The Bureau of Criminal Apprehension uses GIS to map registered predatory offenders and assess their proximity to schools and day care centers. The Homeland Security and Emergency Management (HSEM) division works with the federal government on mapping major infrastructure facilities, such as nuclear power plants, for hazard mitigation and event pre-planning efforts. There are also near term plans to provide GIS capabilities within the state's emergency operations center (EOC). The

DisasterLAN Incident Management System

State Fire Marshall's office uses geospatial technology to support inspections and accident after-action reporting on the 65,000 miles of pipelines that traverse the state. The Office of Justice programs use GIS for a variety of mapping activities such as assessing the efficacy of grants given to support crime prevention and victim services. Maps include grantee locations and their service areas, facilities to support juvenile justice issues, and identifying hotspots that may help target future grants.

Despite the importance of geography, most geospatial technology is implemented at the program or division level, with limited interaction exists between geospatial practitioners. In addition, much of the activity is not fully integrated into divisional workflows. Currently, there is no department-wide activity, although the Office of Technology Support Services and the CIO are increasingly interested in pursuing agency level enterprise solutions. For instance, there are opportunities to directly integrate geospatial technology with HSEM's new DisasterLAN software within the EOC. The DPS utilizes the geospatial offerings of both Intergraph (largely

through the State Patrol) and ESRI. The State Patrol's AVL system has the potential to serve as a model and/or enterprise resource for other agencies that are interested vehicle locating systems.

1.11 Department of Revenue

Revenue employs geospatial technology in several business processes, such as supporting the Streamlined Sales Tax Governing Board, a consortium for collecting and distributing local sales tax generated by catalog and Internet sales. Neighborhood analysis is performed on tax returns to discover anomalies and identify potential audit candidates. Agricultural field valuations that span multiple DOR regions are compared to help understand regional tax differences. GIS analysis and mapping are applied to a variety of business and research questions, such as geocoding classes of taxpayers or taxable entities for analysis to determine trends and/or patterns. Ad hoc maps are produced to support a variety of reporting and presentation functions, such as the series of 10 thematic maps that are produced twice a year to illustrate the decreases, increases, and other changes in tax revenue.
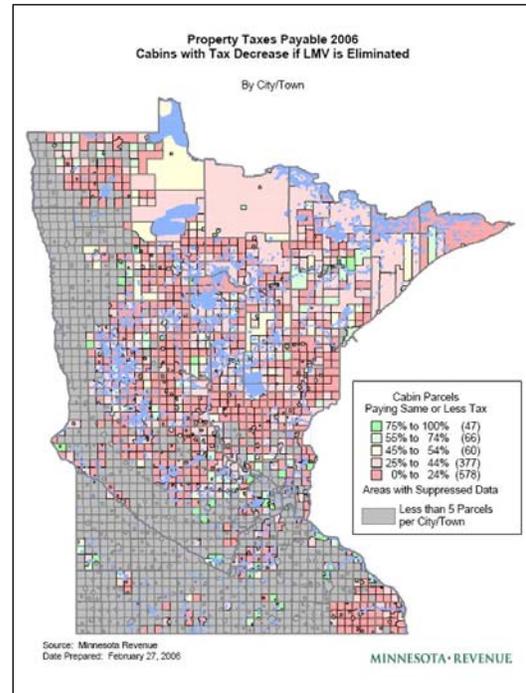
DOR, a specialized adopter, has one full-time position located within the Tax Research Division. This position provides GIS support and mapping capability to multiple agency divisions. MapInfo Professional is the primary GIS software used by DOR. Google Earth assists in quality control evaluations of roads data. MapMarker, MapInfo's geocoding engine, is employed to determine X, Y coordinates for all businesses and individuals that report to DOR. This geocoding capability is sophisticated and is used by other agencies, such as LMIC, for bulk address geocoding.

1.12 Department of Transportation

Mn/DOT is a heavy user of GIS and CAD technologies throughout the agency. Real-time information on traffic incidents, road conditions, construction delays, and images from Twin Cities Metro Area traffic cameras are reported via the "511 Traveler's Information" web site (see image at right) and phones/PDAs. A number of federal government mandates define GIS supported business needs (e.g. safe routes to schools, environmental justice, and census). GIS is used for engineering and planning highway and bridge improvements as well as archeological site protection. Maintenance operations such as emergency management, vehicle crash mapping, roadway striping, vehicle routing, asset management and integrated work order management all

use geospatial technology. Both mobile and web-based applications provide view and query capability to Mn/DOT geospatial data that is derived from 179 different data sources.

Mn/DOT, a mature adopter, has a well established 7-person Enterprise GIS unit within the Information Technology group. Though GIS strengths vary by division, 27 of 39 Mn/DOT offices use 84 ESRI desktop product licenses. There are roughly 850 GIS and 800 CAD users throughout the organization. Though it is estimated that about 95% of users only need to view and query geospatial data, the conversion of CAD engineering drawings to GIS spatial features is cumbersome and results in significant challenges to efficient agency-wide data workflows. Mn/DOT maintains 30 map services and 15 web-based applications. Older applications are currently being converted from ArcIMS to ArcGIS Server using a Geocortex web site template. The 511 information site is in the process of being migrated to Google maps. Mn/DOT also operates a 30 station, statewide geodetic control network and mobile GPS/GIS units are used for in-field mapping work, while RTK GPS receivers are used for survey grade work. Mobile geospatial computing is seen as the largest growth area over the next two years.
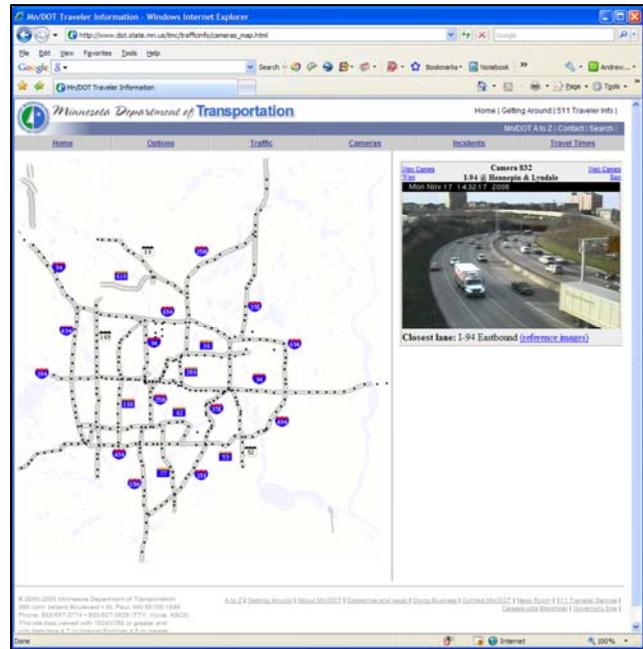
1.13 Pollution Control Agency

GIS permeates numerous programs and business activities throughout PCA. Contamination sources are determined through the use of analytical models, up/down stream load analysis is performed and existing discharges/contributions are identified. Storm water management is supported, through the University of Minnesota, with land use/land cover and impervious surface analysis. Surface water investigations are enhanced through satellite data analysis to locate contamination signatures and to prioritize water quality monitoring sites. Rules are applied for locating sites for new landfill facilities. Annual recycling survey results are mapped to document county-based participation and electronics disposal availability. Remediation sites are mapped to identify potential impacts to people and resources. Ground water contours are developed and plumes are modeled to determine contaminant movement. Emission sources that impact air quality and contribute to regional haze are identified. Facility-based models assist the emission permit approval process and prioritize permit holders who are in violation. Environmental justice is supported by examination of water impairments and with assistance and prevention programs for underserved populations.

PCA, a mature adopter, is among the largest and most sophisticated users of GIS technology in Minnesota state government. PCA has a 5-person "Lateral Team" that provides agency-wide GIS leadership from within the Information Services Office (ISO). PCA recently reexamined agency-wide data management practices, including GIS, and established a formal Data Services Section with one of the ISO GIS positions slated to be the geospatial data champion on behalf of the agency. Throughout the agency there are approximately 5.5 additional FTE dedicated to GIS activities. The power-user and casual-user community at PCA is estimated to be over 100.
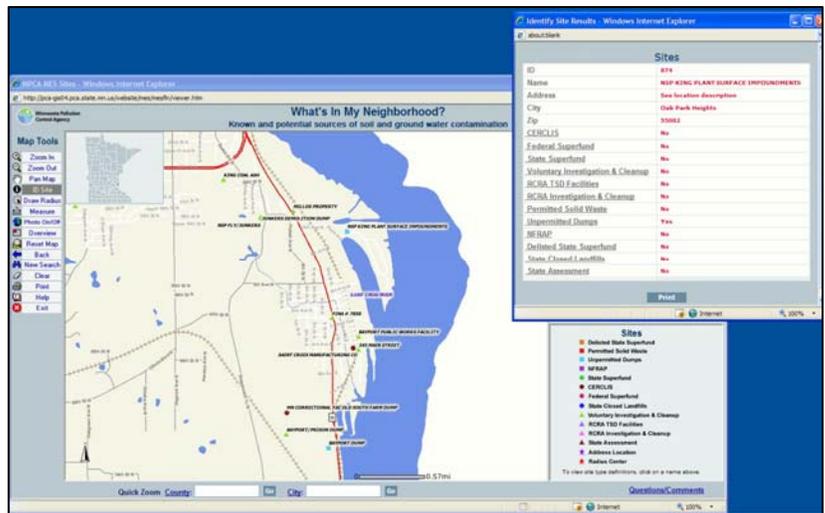
What's in My Neighborhood?

There are two key geospatial viewer applications that are used extensively within the agency and by the general public: The "What's In My Neighborhood" viewer provides facility and regulatory information for a user-defined area of interest; and the "Environmental Data Access" viewer exposes surface water, ground water, and air quality monitoring information. PCA's most important internal database contains facility information and related monitoring data. Most of these monitored entities have associated geospatial locations and an ArcEngine application allows program custodians to refine the spatial location information. This point-based editing application may have broad application in other agencies and could be made available as an enterprise resource. PCA shares geospatial information via an FTP site and many public data sets are distributed via the LMIC geospatial data clearinghouse.

1.14 Legislative Coordinating Commission

The LCC uses GIS to reapportion legislative districts every 10 years following each US census. Legislative bills are researched and maps are created whenever an examination of geographic data pertains to a proposed bill. For instance, maps of arsenic poisoning and elevated lead blood levels were overlaid with socio-economic data to better understand impacts of recent legislation on PCA's permitting process.

The GIS manager and a staff of 2.5 FTE provide all GIS and overall IT services for the LCC as well as GIS support for the entire Minnesota
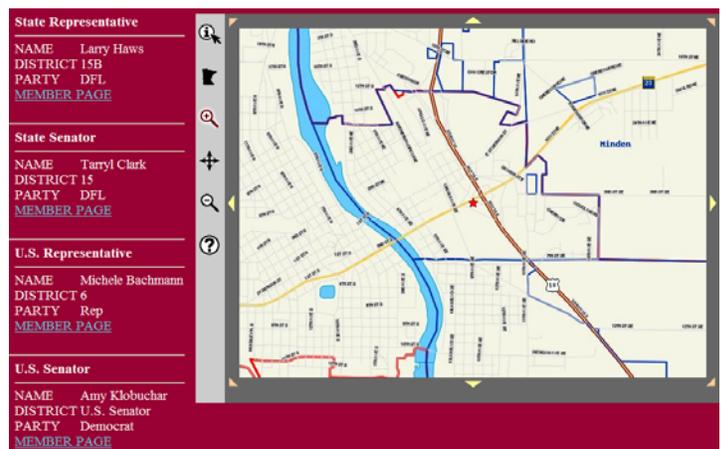
Who Represents Me?

State Legislature. Two ESRI licenses are used for map production. Maptitude software is used for redistricting. Open Source tools are used to house the agency's spatial databases (i.e. PostGIS), and the MapServer software hosts web applications.

1.15 Metropolitan Council

The Metropolitan Council, a regional planning agency that includes the 7 Minneapolis-Saint Paul Metropolitan counties is considered a state agency for this GIS transformation project and has significant and numerous business drivers that require GIS technology. A number of transit and para-transit processes require GIS, including: planning, modeling, routing, scheduling, marketing, operations and police dispatching. Regional growth and land use management, research, planning, monitoring and forecasting are facilitated by GIS. Environmental protection geospatial support includes surface water monitoring and modeling, aviation planning and mitigation, and assessment of lake conditions using orthophotography. Sewage conveyance and wastewater treatment facilities are planned, built, managed, and monitored using GIS capabilities. Low-income housing, social services, and foreclosure prevention also benefit from the application of GIS technology.

Metropolitan Council, a mature adopter, has a several GIS staff centralized within its Information Services unit. Metropolitan Council staff also supports MetroGIS, which promotes and facilitates geospatial data sharing/standards and develops web applications in the metro area as collaboration among GIS interests in the region. The Council provides coordination resources through a full-time GIS Coordinator and an additional 1.5 FTE of technical support to MetroGIS. In turn MetroGIS supplies much of the GIS data needed by the Council. The Metropolitan Council has well over 100 GIS users of various expertise levels who use geospatial data and applications to produce maps, graphs, tables, images, and analysis to support the Council's operations and planning functions. Met Council coordinates and collaborates with local metro governments to acquire accurate geospatial data as efficiently as possible. This data is standardized and made available to local governments as well as "up-stream" consumers, such as state government. A variety of ESRI, Google, Microsoft and Open Source software tools are used by the Metropolitan Council. Siemens Automatic Vehicle Location/GPS technology is used on all MetroTransit busses to provide location information once per minute. Hastus scheduling software is used to integrate transit route geography and schedule information for analysis and reporting.
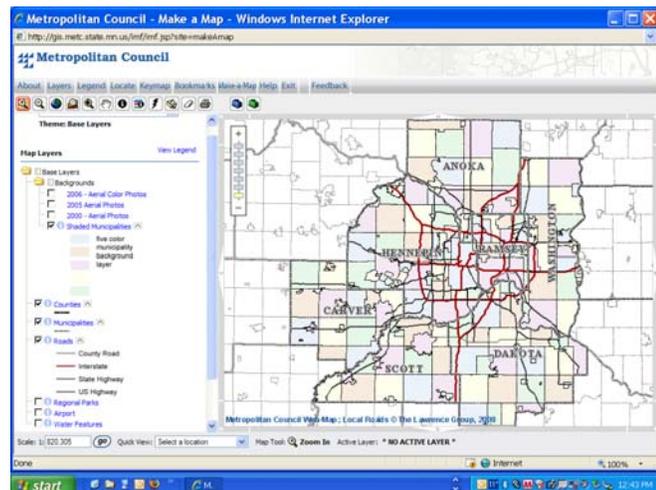
1.16 Other Small, Late Adopters

The **Department of Corrections** and the **Department of Labor and Industry** have very small or non-existent GIS programs and neither has any dedicated GIS staff or infrastructure. Instead, they rely on other agencies, or outside vendors, to support their geospatial needs, such as map production or spatial analysis. These agencies are constrained by budgets, staff expertise, GIS software licenses, and a lack of access to appropriate data. Training and implementation assistance for basic map production capabilities were mentioned as necessary prerequisites for establishing GIS programs within these agencies.

Though these agencies have a general of awareness of what GIS is, they have a limited understanding of the full potential of the technology and how it can be used within their business operations. Both agencies see the potential for GIS as a program management and communication tool and expressed a desire to learn more about the benefits and uses of GIS. This type of agency is particularly encouraged by the focus on an enterprise-wide approach that will help make GIS more accessible.

2   Agency Profiles

2.1 Board of Water and Soil Resources

Date of interview: June 18, 2008

Conducted by: Andrew Buck, Applied Geographics, Inc.

Interview participants:
Tim Ogg, Information Technology Manager
Connor Donnelly, GIS Coordinator

Agency Overview

The Board of Water and Soil Resources (BWSR) mission is to improve and protect Minnesota's water and soil resources by working in partnership with local organizations and private landowners. The board consists of 17 members including local government, citizens, and employees representing other state agencies. BWSR is a small organization with a relatively small number of GIS users. About half of the 73 employees are based in field offices.

The department has been using GIS for over 10 years and has 2 full-time GIS professionals. In addition, the IT manager has a GIS background and is a member of the senior management team. The GIS team's approach is to make GIS tools and capabilities available to as many people as possible. GIS projects are tied to specific business processes wherever possible. Map production is also a large part of BWSR GIS operations. BWSR relies on data and other support from DNR, LMIC and other state agencies.

GIS Program & Capabilities

- BWSR maintains 17 ArcGIS Desktop licenses (12 ArcView, 3 ArcInfo, 2ArcEditor).

- The MN DNR application **LandView** is used as a desktop data viewer and for simple map production.

- **MN RAM** (Resource Assessment and Monitoring), developed by the US Army Corps of Engineers is used as a quick survey tool for wetland data collection.

- GPS enabled tablets with an ArcEditor application are used by field staff and summer interns to collect wetland information in a versioned geodatabase to track changes over time.

- Autodesk CAD software is used to read engineering drawings of restored and other wetland designs. CAD is also used to create RIM Easement polygons which are converted to a statewide easement layer stored as a shapefile and Geodatabase.

- The BWSR GIS budget is approximately: $5,000 Hardware, $15,000 Software, $5,000 Training, and $120,000 Staff.

- To facilitate the production of ad hoc maps within BWSR, the GIS team maintains a geodatabase of frequently requested data and a catalog of commonly requested maps.

- **eLink** (Electronic Link) is a web-based GIS enabled software package developed by Cegnea as the product Watershed, connects state and local government. eLink has on-line data editing tool to allow landowners to plot BMP implementation areas (points, lines and polygons) using reference orthophotos. This product is being upgraded to ArcGIS Server 9.2 in the fall of 2008. eLink is supported by ArcSDE on an Oracle platform.

- **NRDSS** (Natural Resource Decision Support System) is an ArcGIS Server 9.2 application that complements the USDA Web Soil Survey. This product, developed by an outside contractor, allows users to perform multiple queries of SSURGO soils data and download it in formats not currently available from the Soil Survey. NRDSS consumes utilizes LIMIC's DOQ WMS service. NRDSS is supported by ArcSDE on a SQL Server platform.

- **Wetland Banking System** is an application used to manage wetland banking credits for private lands.

- BWSR does not have a written data distribution policy.

Data Provided

BWSR maintains the following data sets along with relevant metadata. They are available to other state agencies, federal agencies, local governments, the private sector and the general public.

- **Re-Invest in MN (RIM)** – conservation reserve easement layer.

- **Best Management Practices (BMP)** – implementations of conservation best management practices. Distributed upon request.

- **Watershed Districts and Watershed Management Organizations (WMO)** – Boundaries of watershed management areas (mandated in the metro area).

- **Soil Survey Geographic Database (SSURGO)** – USDA/NRCS Soils Data. This positionally accurate data contains polygons with 3D horizons and attributes is the best available data on soils in Minnesota. Approximately 80% of the state has had Minnesota's soils. This data resides in a MS Access database and is also available in shapefile format via the LMIC clearinghouse.

- **Statewide Orthophotos** are currently maintained on a BWSR server. BWSR is planning to move towards use of orthophotos via the public WMS map service instead of storing them on an internal network.

<u>Constraints</u>

- Lack of funding.
- Lack of staff expertise.
- Lack of time.

GIS Data Requirements & Issues

<u>Data Sharing</u>

- BWSR uses the DNR DRS to distribute some data, such as RIM easements, but needs easier ways to distribute data outside state government. Web mapping services cannot be used by all consumers and open web access to full datasets might cause privacy concerns. For instance, the SWCDs would like to have easier access to the 4 years of BMP data that BWSR has accumulated.

Business Requirements for GIS

- **Best Management Practices (BMP).** Landowners, typically farmers, are given grant money through county Soil and Water Conservation Districts (SWCD) to implement agricultural conservation best practices. The SWCDs are governed by a board and are funded 1/3 by USDA, 1/3 by BWSR and 1/3 by other sources (county, tree sales, etc.).

- **Re-Invest In Minnesota (RIM)** is a program to purchase easements to take agricultural cropland out of production. Easement geometry is usually provided as an AutoCad file. This is georeferenced and added to the State easement (RIM) data layer. This data is then made available to other state agencies via DNR's DRS service. It is not available through the DNR Data Deli.

- **Water Source Protection.** State legislation has mandated that watersheds in the seven county metro area must be governed by either a Watershed District or a Watershed Management Organization (WMO). These authorities are funded through local levies. The Minnesota "Ditch Law" regulates agricultural and transportation runoff. Drainage authorities may hand off this responsibility to the water shed authority.

  The districts are responsible for maintaining their district boundaries. These are reported to the Secretary of State. BWSR maintains a shapefile of the watershed district boundaries. The district boundaries are defined by parcel boundaries. This can lead to gaps between districts when parcels are reconfigured.

- **Conservation Planning/Wetlands Protection.** The Minnesota Wetlands Conservation Act (WCA) legislated a wetland credit banking process as one means to offset construction impacts to the state's wetlands. There is a Public Banking program and Private Banking program. BWSR, DNR and Local Government staff are involved in the project approval and credit certification for both the Public and Private Banking systems. BWSR keeps track of

bank accounts, deposits, balances, withdrawls, sales, etc. The Public program uses State/Local government money to establish or buy credits that are used to offset wetland impacts created by road construction performed by Township, City, County, or State road authorities. The Private banking program is used as one means by which private developers can acquire credits to offset wetland impacts caused by development/building projects. BWSR tracks accounts and available credits but sales and prices are negotiated between private parties in the Private Banking program. BWSR monitors the wetland restoration/creation projects that are used to create credits for these two banking programs. BWSR uses GPS enabled tablet PC's to visit a sampling of wetland sites and create a geodabase that represents the state and maturation process of wetland restoration/creation projects.

- **Soil Survey.** BWSR staff contribute to USDA Natural Resource Conservation Service (NRCS) Soil Survey Geographic Database (SSURGO). Approximately 80% of the published soil surveys in Minnesota have been digitized to date. The Legislative Commission on Minnesota Resources (LCMR) has provided funding to augment the SSURGO program to make the data more usable by NRDSS.

Services and Support Needed

- BWSR relies on numerous organizations and other state agencies for data, consulting services, and on-line capabilities.

- LMIC provides Statewide DOQs via WMS.

- DNR services include: Data Deli and WMS capabilities. In addition, BWSR is a DNR Data Resources Site (DSR) and maintains a replica of DNR's standard base data.

- OET provides computer help desk support to BWSR (that is unrelated to GIS support).

- Most training is provided by two private companies: ESRI and Rowekamp.

Future Plans

- BWSR would like to get data viewing capability to a broader set of staff in the agency. BWSR is currently investigating options for viewers and data distribution. The result of the ESRI ELA would have significant impact on the cost of available viewing software.

Other GIS or Enterprise Comments and Observations

- BWSR benefits enormously from its close relationship to DNR. An enterprise program should recognize both formal and informal cross-agency relationships. There are many opportunities to provide valuable training, mentoring and the benefits of experience.

- Software cost reduction can be achieved through an ESRI Enterprise License Agreement (ELA) or through management of shared seats. While open source software can have lower license fees, it is more costly in staff time to learn, use and maintain. An enterprise organization could provide be staffed to provide training and mentoring for open source tools.

Links

Watershed product page:
http://www.cengea.com/app/Product_Solutions/Watershed/index.html

2.2 Department of Agriculture

Date of interview: June 16, 2008

Conducted by: Andrew Buck, Applied Geographics, Inc.

Interview participants:
Larry Palmer, CIO
Mike Dolbow, GIS Coordinator
Ben Miller, Dairy & Food Inspection Division
Roger Mackedanz, Pesticide & Fertilizer Management Division

Agency Overview

The Department of Agriculture GIS Coordinator is in the Information Technology Division and leads a staff recently enlarged to 3. This group, funded by the agency divisions, is responsible for the coordination and use of GIS, enabling spatial data sharing, and implementing data standards.

In the last 5 years the agency's use of GIS has matured. The user community understands how GIS can contribute to business operations. New ideas for how GIS can be applied are now being driven by the user community. The availability of 2003/2004 NAIP aerial imagery has further generated interest in the new uses for GIS technology.

There is significant use of GPS by remote field inspectors who synchronize information with department servers at the end of the day. Currently, geospatial data is collected during the inspection process. Future goals are to use GIS/GPS technology to identify and locate inspection sites as well as collecting additional data during the inspection.

There is a close working relationship between the Department of Agriculture and the Department of Natural Resources. Both departments share common projects and share much data. DNR serves base data to Agriculture and publishes some Agriculture data; in return, Agriculture provides services and expertise.

GIS Program & Capabilities

- The Department of Agriculture's current fiscal year budget for GIS is estimated to be:
    - Hardware $ 8,000
    - Software $ 25,000
    - Consulting $ 0

- o Training $ 4,000
- o Staff $ 200,000
- o Other Services $ 15,000

- There are approximately 30-40 core users of ESRI ArcGIS desktop tools. At one point there were 9 ESRI customer id numbers, but these have been combined.

    - o 10 Single use ArcView licenses used on laptops

    - o 11 Concurrent Licenses (5 ArcInfo, 1 ArcEditor, 6 ArcView)

    - o 4 ArcGIS Desktop Analysis Extensions (Spatial Analyst, Network Analyst, Geostatistical Analyst, 3D Analyst)

- Agriculture maintains an ArcGIS Server Enterprise (Standard Edition) license in a production and staging environment running ArcIMS and ArcSDE on a DB2 RDBMS platform. There is one server dedicated for data editing support.

- There are between 12 and 24 ArcIMS web applications. About half of them are for internal use only.

- At least one application uses a browser based Java code to write feature coordinates into the ArcSDE database. This requires a servlet engine (ServletExec) to be run on the ArcIMS server. The application enables web-based **heads-up digitizing** to create point locations on top of aerial imagery, which several divisions use. However, there is no capability to edit or move these points once positioned.

- Downloaded county based MrSID files. Agriculture also maintains a copy of DNR-served and organized (ECW formatted) state-wide **National Agricultural Imagery Program** (NAIP) orthophotography on a local server.

- **Mobile technology** is used widely within the department. New GPS uses are continually being introduced. Some current and desired uses are:

    - o Store Pest & Fertilizer inspection locations in CIS
    - o Navigation to inspection locations
    - o Locate geospatial features in wide open spaces
    - o Research and sampling activities for regulation non-compliance
    - o Investigate use and misuse of chemicals by performing field inspections and mapping blow and drift

The department has approximately 100 Bluetooth-enabled **GPS enabled tablets** and PDAs (Garmin & Trimble) and 2 Sokkia sub-meter DGPS units. These are used by the 150 field inspectors who work out of their homes, often in rural areas, to capture inspection locations and other spatial data.

Landview is a lightweight, open-source (one developer) GIS application developed by DNR. It can be used as an on-line or desktop based GIS. Current plans are to install Landview on

most GPS enabled laptops. One unit has FarmWorks installed. FarmWorks is agricultural software for integrated management of crop and livestock records.

There are 15-20 ArcPad licenses in various uses and versions. It is not implemented on all mobile units. Support is driven by user requests.

Collected GPS data is synchronized with the Department's servers at the inspector's home during the evenings, but the department struggles to get this information validated and integrated into an Enterprise GIS. One challenge of the GPS program is how to keep the handhelds current with the latest enterprise GIS data.

Initially, the value of GPS collected data was hard to explain to field employees who often "knew" where a facility to be inspected was located. Over time, the value of the data collected was realized. New and innovative uses for GPS technology are now being generated by field activity.

Generally, GPS units are used independently of the GIS group. Users are encouraged to work with the GIS group for one-time reporting needs and to develop easily supported business processes that are fully integrated with GPS tools.

- The department maintains an ArcIMS web site, "***What's In My Neighborhood? – Agricultural Interactive Mapping***", that provides viewing access to known and potential sources of agricultural chemical soil and ground water contamination.

- The Department maintains a written data distribution policy.

Constituents

- **Counties.** Agriculture has ad hoc relationships with the state's counties. DNR is taking the lead for the state in collecting parcel data from the counties via brokered agreements, but Agriculture does not currently have access to any of this data outside the metro region. Seven-county metro parcel data is available via the MetroGIS parcel licensing agreement.

- **United States Department of Agriculture (USDA).** USDA is the largest current and potential partner. Soils data is provided to Agriculture from the Natural Resource & Conservation Service (NRCS). Agriculture also provides farm data to the UDSA's Farm Services Agency (FSA), the FSA Farm Loan Program, and the Animal and Plant Health Inspection Service regarding animal health and disease programs.

- **EPA.** EPA has some need for geographic representation of Agriculture data (i.e. findings), but this is not a strong business driver.

- **Other State Agencies.** Data is exchanged with DNR, Mn/DOT, PCA, and BWSR.

- **Private Companies.** Agriculture provides data to environmental consultants, such as Environmental Development Resources (EDR), the real estate industry, and dairy producers.

- **Not-For-Profit Agencies.** The Department of Agriculture is a national partner with the Slow the Spread of the Gypsy Moth Foundation and provides related geospatial data.

- **General Public.** Access is given to all regulatory data. Agriculture informs the public of potential legislation that comes before the Public Utilities Commission (PUC) that might affect the agriculture community.

Constraints

- **Funding.** The software budget is adequate. The hardware budget is small.

- **GIS headcount.** Staffing is adequate, though having only 3 GIS professionals for a mapping-dependant department of 450 limits the breadth of new projects that can be initiated.

- **State-Wide Services and Data.** Key issues for agriculture are access to state-wide data and services for data not developed by Agriculture. Examples include:

    o Accurate state-wide geocoder (especially in rural areas)

    o State-wide streets and addresses

    o State-wide data sets:

        - High resolution elevation data (30M pixel LIDAR)

        - Orthophotography (e.g. more frequent NAIP imagery)

- **Data Sensitivity.** Certain data elements, such as the number of cows located on any particular farm is sensitive and must be managed appropriately.

- **Inadequate internet bandwidth.**

GIS Data Requirements & Issues

- **State-Wide Road Data.** DNR accesses Mn/DOT's transportation data via DNR. Mn/DOT's road systems network is organized by county boundaries. Agriculture needs a network that covers the entire state, and uses ESRI's road network data for network analysis. For statewide geocoding, MDA purchases addressed centerlines from TeleAtlas.

- There is an increasing need to be able to **serve data to field operations**. Mobile hardware use is growing along with the demand for reliable data. Inspectors need access to information about what is being inspected. Field operations need to be integrated with on-network systems, such as CIS. A simple to use combination of live services and snapshots for less dynamic data is needed.

Data Sharing

- The Department of Agriculture uses base data that comes from the Department of Natural Resources (DNR). Agriculture is a DNR Data Resource Site (DRS) site: DNR pushes shapefiles to a Linux box at the Department of Agriculture.

- Better public access and publishing is needed for data stored in MDA's ArcSDE environment, e.g. Agricultural Incidents and Minnesota Grown locations. This is planned either by extracted snapshots or by publishing services via ArcGIS.

- The Department of Agriculture is the authoritative source and custodian for the following state-wide data layers:
  - Ethonol Plants
  - Minnesota Grown Directory Locations
  - Surface Water Monitoring Sites
  - Agricultural Incidents and Spills
  - Dairy Farms
  - Gypsy Moth Surveys
  - Noxious and Invasive Weed Surveys

- Some Agriculture data (surface water quality monitoring sites and ethanol plants) are published to the DNR Data Deli. Because of the Deli's well-known status as a data download site, Agriculture would like to publish more data in this manner.

Business Requirements for GIS

- Developing a **sustainable agricultural economy** for Minnesota.

- The department is in the process of converting from numerous paper-based processes to a single integrated electronic system. There are two main components to the new system: The **Licensing Information System** (LIS) and the **Compliance Information System** (CIS). All divisions are using LIS and two divisions are using CIS. All divisions will eventually use both systems. CIS has a link to GIS data via an enterprise geodatabase (DB2 with ArcSDE). These implementation efforts are driving the collection and automation of spatial data throughout the department.

- CIS was implemented in the beginning of 2007 to **track regulated agricultural chemical inspections.** The existing inspections location information was abandoned due inaccuracies related to geocoding. New polygons are being created for the operational boundaries of agricultural chemical facilities. In 2008, CIS was expanded to include the facilities regulated by the Dairy and Food Inspection Division.

- Fewer standards exist for **non-regulatory programs** and no enterprise applications exist for these important functions.

- The Minnesota Grown Program is a **statewide marketing partnership** between the Minnesota Department of Agriculture and Minnesotans who grow or raise specialty crops and livestock.

- GIS is heavily used in the research and assistance to the development of **agricultural best management practices**. Elevation data is used to perform digital terrain analysis for identification of critical areas for conservation practices. Graphics are developed to

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effectively communicate impaired waters restoration planning and implementation concepts to stakeholders and the public. The GIS team's contribution to this effort is increasing over time.

- The Plant Pest Survey collects data on insects, diseases and weeds during the growing season by field staff distributed throughout the state. Results (including pest profiles and maps indicating locations) are published weekly.

- The Departments of Agriculture and Natural Resources are responsible for coordinating the management of **invasive plant and insect species** in the state. Department of Agriculture staff conduct surveys for invasive pests such as gypsy moth, Japanese beetle, Grecian foxglove, bark beetles, soybean rust, sudden oak death and chrysanthemum white rust disease and also oversee the state weed and seed laws. Survey results collected in the field are frequently converted into shapefiles or geodatabases and shared with state and federal partners.

- A **network analysis** desktop application is used within the department for water drainage and soil productivity analysis. Network analyses of inspector locations in relation to drive-time distance to regulated facilities have also been performed in ArcGIS. The Network Analysis extension and other extensions also have potential for water drainage and soil productivity analyses.

- Support for historical map reviews, such as the Beauford Ditch.

- Prioritizing vulnerable wellhead protection areas and tracking water quality trends in Southern Minnesota watersheds.

- Tracking County and Township land use ordinances.

Dairy and Food Inspection Division

- The Dairy and Food Inspection Division is responsible for enforcing state regulations related to the production and distribution of food related products and investigating reports of food contamination. There are four program areas:
    o Dairy – Farms and dairy production plants
    o Food – Retail, manufacturing, and distribution.
    o Meat – Processing plants that are not USDA inspected.
    o Feed – Animal Feed manufacturing, mills, and retail outlets (including pet food stores, etc.)

- There are approximately **20,000 facilities** that are **inspected**. Over 90% of all farms and 80% of food production facilities in Minnesota have been **geolocated,** but the department has struggled to validate and integrate these locations into an enterprise GIS. Everything that is inspected has a spatial location. Inspectors often have difficulty locating retail food locations that are located in strip malls.

- Some food inspections in Hennepin and Ramsey County are delegated to county inspectors. Fewer facilities in these locations are geolocated.

- **Closest Inspector Analysis.** Efficiencies could be gained if tools to compute the drive times from the inspector's location to the facility to be inspected were further developed and

supported by better location and transportation network data. Better facility locations (MDA) and a revised transportation network (state enterprise) are needed to build confidence in the analysis results.

- **Routing and Navigation.** The capability to determine inspection routes and provide navigation to inspection sites would ideally be integrated into the CIS application. A stand alone application would also meet the need. Automated Vehicle Location (AVL) is desirable, but is a relatively a low priority.

Pesticide and Fertilizer Management Division

- This division inspects and regulates the storage, distribution, and use of **agricultural chemicals** in Minnesota including all pesticides and disinfectants. Site specific nutrient applications are tracked and yields are mapped. Household disinfectants and pool chemicals, such as chlorine, expand the department's purview beyond rural agricultural to include consumer protection and the inspection of retail stores handling such merchandise.

- Data collection within various experimental designs for biological control of weeds. Identifying/tracking biological control (insect) recovery points

- Surface and ground water runoff and testing. There are Memoranda of Understanding and Agreements (MOU/MOA) with PCA regarding handoff processes managing infractions.

Emergency Response

- The Department of Agriculture is the lead agency for emergency response and clean-up of regulated chemicals.

- During major state emergency incidents (e.g. floods, the bridge collapse, etc.), resources from all Department of Agriculture divisions are pulled into the State Emergency Coordinating Center (ECC). There is a strong need for better access to geospatial data during these emergency responses. There should be a better process to integrate Department geospatial data with ECC operations.

- Spill incidents and locations are tracked using the "***What's In My Neighborhood? – Agricultural Interactive Mapping***" web site.

Plant Protection Division

- Inspect and certify horticulture nurseries.

- Using traps to map **gypsy moth infestations**, working with national and local groups to develop treatment and eradication programs and to identify potential sources such as saw mills and nurseries.

- Eliminating or minimizing the impacts of exotic or invasive species

Services and Support Provided To Agriculture

- **DNR** provides numerous services to agriculture including support for the Agriculture DRS, DNR Garmin (a GPS interface) and DNR Landview.

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- **LMIC** has provided support to help georeference old plat maps.

- **Consultants** are used by agriculture for training, applications development, and for redesign and conversion of public facing web sites to ArcGIS Server.

Future Plans

- Direct access, or shapefile extraction, to DNR's Data Deli from MDA's ArcSDE server is planned.

Other GIS or Enterprise Comments and Observations

- **Geocoding** is only used for preliminary location finding. Current capabilities are not accurate enough for rural areas. A state-wide geocoding service that can provide an expectation of accuracy in rural areas would provide much improved efficiency throughout the department.

- A goal within the Department is to have a **unique location id** for each regulated facility that is used across all divisions.

- The department needs an easier way to present numerous types of data to the general public. A "What's located on my site" application would be useful and well used. Serving and publishing more data would help present a better image of the Department's work to the general public.

- More GIS coordination at the state level would provide overall help to Agriculture. For instance, a state level measurement of standards compliance would help enforce data standards, even within agencies.

- Agriculture would like to see standardization in job classifications for people who are essentially full time GIS professionals. Depending on division, different job titles are doing the same work.

- Agriculture is willing to enter into data sharing agreements, but is reluctant to pay for access to data without significant benefit. For commercial datasets useful to the entire state, Agriculture would rather see a state enterprise entity make that purchase for all state agencies.

- Agriculture sees tremendous opportunity for the establishment of a new GIS coordinating office for state agencies. The department would consider shifting some budget money (e.g. data purchases) as well as contribute MDA shared services to the enterprise. Key shared services that would be useful to Agriculture are:
    - Basemap creation and hosting
    - Cartographic products: major roads, urban areas, natural areas
    - Desktop license management
    - Imagery and other geospatial data purchase and distribution
    - Geocoding services

2.3 Department of Administration: Land Management Information Center

Date of interview: June 18, 2008

Conducted by: Andrew Buck, Applied Geographics, Inc.

Interview participants:
David Arbeit, Director, Office of Geographic & Demographic Analysis
Fred Logman, Project Coordinator
Cris Cialek, GIS Clearinghouse Supervisor
John Hoshal, GIS Services Supervisor

Agency Overview

- The Land Management Information Center (LMIC) has its origins in the late 1970s as a provider of land use maps. Over the years, it has evolved into being a provider of GIS consulting and serves as the de facto statewide geospatial coordinator. The center maintains the Minnesota Geospatial Data Clearinghouse (MGDC) and provides custom mapping and GIS services to a variety of state agencies and other customers.

- There are three components to the LMIC organization. The center is structured into two major groups: fee-for-service consulting and data/map product distribution. The third component, GIS coordination, uses a matrix management style and draws resources from the throughout the organization as necessary.

  - **Fee-For-Service**. LMIC's service bureau provides cost-effective and practical GIS solutions and services to other federal, state and regional agencies. Rates are set yearly to recover costs and contribute to a revolving fund.

  - **Data and Map Product Distribution.** LMIC serves as a single point of contact for geographic data, including data directories, interactive data searches, public access to data, maps and web services over the Internet.

GIS Program & Capabilities

- LMIC supports a wide array of geospatial technology including:

  - ESRI: ArcGIS Desktop, ArcIMS, ArcGIS Server, ArcSDE

  - Open source: International Map Server, Data Server

  - Caliper: Maptitude

  - TerraGo: GeoPDF (view, manipulate and update mapping data within an Adobe PDF file)

- o LMIC: Environmental Planning Programming Language (EPPL7)

- o RDBMS: Oracle, SQL Server

- Budget (Service Bureau Only)
  - o Hardware   3,000
  - o Software   8,580
  - o Consulting   2,500
  - o Training   5,300
  - o Staff   480,288
  - o Other   82,888
  - o **Total**   **582,556**

LMIC History

- The Land Management Information Center (LMIC) was founded by legislation in 1978 to provide periodic updates of land use inventory data for use as map overlays in the planning process. Initially, LMIC was operated out of a revolving fund. During the 1980's, LMIC's role expanded within the planning department to provide a fee for service capability to other agencies to prove GIS technology and provide a temporary work force. LMIC was still funded through a revolving fund; however general fund loans were used to finance capital investments, such as LMIC's first mini computer.

- Legislative efforts during the 1980s directed LMIC's involvement in various projects such as Natural Resource data integration. LMIC had no authority to enforce standards and had to work collaboratively. For instance, legislation provided money for the creation of spatial town boundary data, but did not outline who was the authoritative owner. LMIC collected data from multiple sources (U.S. Census, Secretary of State, etc.)

- LMIC was seen as the agency with GIS technical skills. Early DNR GIS efforts relied on LMIC resources. Eventfully, the revolving fund grew to between $500K-$600K dollars.

- Minnesota was the first large state to develop a Digital Orthorectified Quad (DOQ) (aerial image corrected to remove radial and topographic distortion). LMIC was the liaison to federal mapping agencies for this project.

- In response to a historical need to organize data, early efforts between LMIC, DNR and MetroGIS began to document Minnesota's spatial data using the Environmental Planning Programming Language (EPPL). With a grant from the Minnesota Legislature (as recommended by the Legislative Commission on Minnesota), metadata editing tools were built and a sub-set of the 1993 FGDC metadata standard was developed into the **Minnesota Geographic Metadata Guidelines.** This standard covers the data's background, quality, spatial organization/ reference and data distribution details. They were vetted by the Governor's Council on Geographic Information and were adopted by the Information Policy Office (IPO), the predecessor to the current Office of Enterprise Technology (OET).

- These standards are widely used and define the metadata model for the **Minnesota Geospatial Clearinghouse (MGDC)**. LMIC continues to advocate for the guidelines and pursues grants to continue the development of capacity that can benefit from the standards.

For instance, in 1999, the **GeoGateway** search tool was developed to query metadata at the MGDC nodes.

- As GIS technology matures, the migration away from providing data files to serving data as web services once again raises the issue of organizing available resources. The evolution of metadata standards allows for the flexibility to include services. Three FGDC Cooperative Agreement Grants (CAP) promoting the use of metadata enabled other agencies to implement MGDC nodes.

- In 2005, LMIC wrote a white paper titled '**Minnesota State GIS Enterprise Conceptual Architecture Design**.' It outlines a framework for a centralized "broker" capability that provides a searchable registry of services. Implementations of this concept will promote interoperability among data and application providers and reduce long-term data resource costs for service consumers.

- In 2008, the **GeoService Finder** was developed in conjunction with MetroGIS to simplify the process of organizing and locating services. It provides a GIS directory and brokering functions as outlined in the Enterprise Conceptual Architecture Design document and supports the Services Oriented Architecture (SOA). This on-line inventory tool has accounts for content providers who register a new service using a template based description of the service. The service categories are:

    o **Remote Application**: An interactive application that is run at a remote site that a client accesses through an internet browser. The client does not need to run any additional software.

    o **Standalone Application**: Software and data that can be downloaded and run locally.

    o **Component**: Code that can be downloaded then included in routines and executed locally

    o **Service**: Services run at a remote site that a client accesses, or "consumes", through the Internet; the client may need to run additional software (e.g. using ArcGIS to access orthoimagery via a WMS image server).

The GeoServices Finder is new and has many registered services. However, there is a lack of active updating of the records and the GeoFinder is not being broadly used. Promotion of the GeoFinder is needed. Publication and quality assurances processes also need to be developed.

Fee For Service

- The fee-for-service bureau is smaller than it has been in past years. Most of the current workload is related to data development. There is a smaller volume of web application development work.

- Consulting support services are provided to a variety of federal, state and regional agencies such as Commerce, PUC, Met Council, Mn/DOT, USGS, Minnesota Historical Society, etc.

- **Core services** include:
    o GIS requirements analysis and needs assessment

- o Geospatial data management
- o Database design consultation, development and implementation
- o GIS application design, development, implementation and hosting
- o Digital cartographic production and publishing
- o Implement, support, promote and provide training for geospatial data standards

- Example **fee-for-service projects** include:

  - o Assist MN Homeland Security and Emergency Management (HSEM) with support of incident management system, DisasterLAN. If the State Emergency Operations Center is activated, LMIC will provide requested data and services.

  - o LMIC serves as the Minnesota state node for National Hydrography Dataset (NHD).

  - o Develop storm sewer system for Met Council.

  - o Forest Stand Management data development for DNR Forestry.

  - o Develop and host web GIS viewer application "True North" to support Minnesota history based GIS curriculum for K-12 students.

  - o Provide litigation support (data and map production) to the US Department of Justice on a tribal law suite regarding land and timber reimbursements.

  - o Develop application to manage wind turbine and pipeline permitting for the Department of Commerce.

  - o Host ArcIMS summer food applications for the Department of Education.

- LMIC's service bureau also creates and **maintains geospatial data** for its clients:

  - o Electric Utility Service Areas (EUSA) - Commerce

  - o Historic General Land Office (GLO) survey maps in digital format - MN Historical Society

  - o National Hydrography Dataset (NHD) for Minnesota - USGS

  - o High Voltage Transmission Lines / Wind Turbines – Commerce

Data and Map Product Distribution

- The data and map production team grew out of the DOQ work. In 1990, DOQs were distributed on 9-track tape, and then CDs were used to accept and distribute county based data. Over time other mechanisms such as an on-line CD Juke Box were deployed. This lead to the development of FTP as an internet-based data distribution method. Eventually the current Web-based Services were put in place.

- The **Minnesota Geospatial Data Clearinghouse (MGDC)** is a collection of geospatial data sources that is coordinated by LMIC. The MGDC is used to distribute data to state agencies, federal agencies, local governments, general public, and private sector. There are 20 federal, state (MN and neighbors), regional nodes (data sources) on the MGDC who maintain their own data servers. Each Minnesota state agency clearinghouse entry has a metadata page that

describes the file's data distribution information including online download instructions where applicable. Some data (e.g. DNR watersheds) is contained on multiple nodes.

Minnesota state agency nodes include:

- o Land Management Information Center (LMIC)
- o Department of Natural Resources (DNR)
- o Department of Transportation (Mn/DOT)
- o Pollution Control Agency (PCA)
- o MetroGIS – Twin Cities Metropolitan Area

- LMIC maintains a node on the MGDC that archives, manages and provide access to over 250 data sets (some from LMIC, some from other state agencies). This data is arranged by theme and contain links to metadata on the clearinghouse. Some state agencies do not have their own node. Their geospatial databases are managed within LMIC's node.

- **GeoGateway** is a search tool of the MGDC. Users can choose from a list of nodes and use keywords, time frame, and location (text pull downs, latitude/longitude or interactive map). Metadata records at the state agency nodes are searched and relevant links to the metadata are grouped by node and displayed. The metadata, in turn has data distribution/download details.

- Minnesota was the first state to contribute to the **National Agricultural Imagery Program (NAIP)** which produces county-based digital mosaics of color, leaf-on, aerial imagery. This on-going program began in 2003 and has evolved with contributions from 7 agencies including PCA, Mn/DOT and DNR. LMIC does not provide funding for this program, but does manage the state's involvement in this federal program, develop metadata and hosts the resulting data products. LMIC created an on-line web mapping image services (WMS) that is used by many state agencies and county governments.

- A grant from Cayuga Community College funded the development of an image "clip, zip and ship" tool that can be used to identify, isolate, and download geographic data for specific regions.

- LMIC is planning to expand its data distribution capability with web feature services (WFS) and data exchange portals. They have been exploring a roads feature service with MnDOT as a proof of concept. Other ideas include developing more sophisticated and integrated web services and data broker capabilities.

GIS Coordination Function

- LMIC acts as the liaison with Federal Agencies and national organizations, such as the National States Geographic Information Council (NSGIC) and the Federal Geographic Data Committee (FGDC). Al Robinette, LMIC's first director contributed to the formation of NSGIC.

- LMIC provides administrative and technical support to the **Minnesota Governor's Council on Geographic Information.**

- LMIC maintains a list of GIS contacts for all Minnesota counties.

- LMIC helps to coordinate and/or manage major data sharing/cost sharing initiatives of regional or statewide scope. For instance, LMIC is the statewide coordinating entity for orthoimagery and provides WMS services for orthoimagery.

- Both a written data distribution policy and a pricing schedule are maintained.

Constraints

- Lack of funding

- Lack of staff training and expertise in newer technologies.

- Lack of specific mission and/or authority to carry out or promote enterprise-wide policies, best practices and standards

Business Requirements for GIS

Services and Support Needed

- The Department of Revenue has a variety of "high-end" geocoding tools that are made available for LMIC's bulk geocoding use.

- LMIC receives services and support from other organizations, such as: Mn/DOT, DNR, Met Council, Dept of Agriculture, a number of Minnesota counties and federal agencies (EROS, USDA). For instance, Met Council funded the development of the GeoFinder.

- To meet a clients project requirements, LMIC will acquire special data, software and technical support from the private sector

Other GIS or Enterprise Comments and Observations

- As the de facto coordinator, LMIC believes that the new coordinating entity should be an incubator for Enterprise GIS (EGIS) to define EGIS goals, expectations and definitions. The willingness of state agencies to participate can be increased by defining the payback in terms of cost saving, increased capacity, and increased reliability. Participants must be held harmless so their core business is not put at risk by participation in EGIS activities.

- In order for a GIS transformation to be successful:
  o There must be a sustained commitment to coordination. Currently, LMIC has no authority to coordinate.
  o The roles of the coordinating entity, consumers, and agency providers must be defined and promoted.
  o Users must include local government.
  o The coordinating entity funding mandate must be sustainable

- One idea suggested during the interview is that the coordinating entity be given the authority to review agency staffing and support plans with some leverage to recommend that an available service be used instead of hiring a new resource.

2.4 Department of Commerce

Date of interview: June 19, 2008

Conducted by: Andrew Buck, Applied Geographics, Inc.

Interview participants:
Greg Fetter, Chief Information Officer
Jeff Haase, Demand Efficiency Program Supervisor, State Energy Office
Lise Trudeau, Engineer, Renewable Energy & Advanced Technologies

Agency Overview

The Department of Commerce is responsible for ensuring equitable commercial and financial transactions and reliable utility services by: regulating and licensing business activity in more than 20 industries; investigating and resolving consumer complaints; advocating the public's interest before the Public Utilities Commission; and, administering various state programs.

The Office of Energy Security (OES) manages energy assistance funds, advocates in the public interest on energy utility rates, resource planning and facility siting. The OES provides information and assistance to residents, builders, utilities, non-profits and policy-makers on home improvements, financial assistance, renewable technologies, policy initiatives, and utility regulations.

Within the OES the State Energy Office administers the Federal State Energy Program, which provides grants and program funds for renewable energy, efficiency and conservation activities. Within the State Energy Office are the Weatherization Assistance Program (WAP), and the Conservation Improvement Program(CIP). WAP uses energy conservation techniques to reduce the home energy costs for income eligible families. CIP requires that all utilities operating in the state have efficiency and/or conservation offerings available for their customers to assist them in improving efficiency or reducing the total amount of energy consumed within homes or businesses.

The Energy Facilities Permitting group within the OES conducts permitting, regulation and environmental review of energy facilities in conjunction with the Public Utilities Commission (PUC). The energy office is an advocate on behalf of the general public during PUC environmental reviews of utility filings. Areas of jurisdiction include:

- Power plants (producing over 50 Megawatts of electricity)
- Electrical transmission lines
- Pipelines
- Wind Farms

The Market Assurance Division is responsible for enforcement, fraud investigation, securities registration, and insurance policy analysis. Regulated industries include insurance, banking/ mortgage, real estate, securities, collection agencies and notaries.

The Weights and Measures Division is responsible for device calibration and inspection for all gas pumps (2,500 stations, 25,000 pumps) and all grocery and other commercial scales throughout the state.

The department is also responsible for all regulation and permitting of phone land lines (not cellular) and fiber optic cabling. They perform area code and exchange mapping for splits and reassignments. They also (with the PUC) manage the Telephone Access Minnesota (TAM) program to ensure that the hearing impaired have telephone access via the Minnesota Relay and other hardware grant programs.

GIS Program & Capabilities

- There is no dedicated GIS staff. However there are several employees who have experience producing maps for inclusion in reports and other documents.

- The Department of Commerce maintains 1 floating ArcGIS license and two ArcView Desktop licenses.

- Spatial data sources include copies of reference data stored on network drives as well as the LMIC clearinghouse and the DNR's Data Deli.

- The Office of Energy Security generally uses GIS technology to produce maps to provide information about energy resources in the state, facilitate the various permitting processes and for citizen review.

Constraints

- Few funds have been devoted to GIS systems, data, training and use.
- Commerce has only a few GIS trained staff.
- There is limited awareness of how GIS can be used as a communication tool to improve the department's business processes.

GIS Data Requirements & Issues

- **Wind speed data** has been collected via observation over a 40 year period. This data, licensed from WindLogics, is used in the wind power site approval process.

- Access to current **utility company service areas** is desired to determine exclusive areas that are served by only one utility and to resolve boundary disputes among utility companies.

- Access to **state demographic data**, population, incomes, etc. along with **State gross domestic product** information and **residential energy use** statistics could provide valuable input to the facilities planning process.

Business Requirements for GIS

The Office of Energy Security was established within the Department of Commerce to support Governor Pawlenty's efforts to secure a clean energy future. Key energy related initiatives discussed during the interview include:

- **Location of Alternative Fueling Stations:** To encourage the use of alternative fuels, the DOC maintains and publishes the locations of alternative fueling stations. Alternative fuel initiatives include: Hydrogen, Biodiesel blending pumps and E85. E85 is a blend of gasoline and up to 85% ethanol, produced by corn and other grains. There are 330 E85 pumping stations in Minnesota.

   It was suggested that alternative fuel station locations could be provided to on-line mapping applications such as Google Maps and MapQuest. This would help promote public awareness and encourage additional alternative fuel usage.

- **Fleet Management:** A governor's mandate requires that state owned vehicles use E85 fuel. The Department of Administration maintains a fleet of 50 vehicles that are used by DOC's 40 Weights and Measures field inspectors and the DOC's fraud investigators. A mapping application to help locate E85 pumps along the inspector's route will help increase fleet and inspector efficiency.

- **Inspection Routing:** Commerce has 40 field inspectors traveling throughout the state to calibrate and inspect thousands of scales and fuel pumps. To manage this workload the efficient routing of inspection routes is strongly desired. ArcLogistics, an ArcGIS Desktop application, was suggested as a potential solution.

- **Energy Facilities Permitting:** While the PUC makes the final decisions on permits for new energy plants, Commerce's planning and advocacy group ensures that citizen input is given during the Certificate of Need review process. This process provides environmental and resource planning as well as 25 year forecasts of energy use based on price estimates and weather. The goal to determine the true need for a new facility and to protect consumers from unwarranted rate increases.

- **Underground Fuel Storage:** The Petrofund program provides financial assistance for the removal of leaking underground storage tanks. Commerce works with Minnesota Pollution Control Agency (MPCA) to track underground tank locations. A spatial data layer of underground tanks can be combined with other GIS data (i.e. DOH Well locations) to identify tanks that have a high risk for groundwater contamination.

- **Energy Assistance Program:** A $100M fund to help pay for home heating costs for households in the state that have the lowest income and highest fuel costs. GIS analysis could identify areas of low income, high fuel cost, and program benefit.

- **Solar Resource Maps:** Commerce produces 8.5" x 11" PDF maps showing solar radiation levels across the state for use in solar energy planning.

Services and Support Needed

- Access to GIS data, software, training and best use practices are needed for expanded use of GIS in the department.

<u>Future Plans</u>

- Explore ArcLogistics to see how its routing and navigation functions might be deployed to improve fleet and inspector efficiency.

Other GIS or Enterprise Comments and Observations

- Commerce users could benefit from training on how to get started with GIS. Lessons on how to generate simple maps and use them to effectively communicate would help to bring the geospatial technology in the Department to a level where anyone can use it.

- The interviewees felt that the Department of Commerce has a fairly low level of GIS aware and does not have many "power users". The State Agency GIS (SAGIS) group is a good vehicle to increase exposure GIS best practices and activities in other departments. A format that provides for training and demonstrations would be most helpful. It was suggested that SAGIS agenda and programs might be offered at multiple levels: GIS managers and experienced users might be interested in more advanced topics, while novice users could benefit from learning how to create simple maps.

- A simple on-line GIS viewer that provides access to Minnesota base data would meet about 95% of the Department of Commerce's needs. It would also be a useful mechanism to expand the GIS utilization to a broader audience.

- A simple on-line GIS viewer to provide access to solar/wind data to the general public would provide a useful service to the Department's of Commerce's constituency.

- Other ideas for services that could be provided to the Department of Commerce from a statewide coordinating entity include:

    o A repository (catalog) of available web services that could be consumed by Commerce GIS users.

    o A Best Practices RSS feed could provide periodic ideas and reminders about the available resources and uses for GIS.

    o A statewide enterprise GIS wiki with a searchable help section. This would foster communication between agencies and provide a valuable "how to" resource.

2.5 Department of Education

Date of interview: June 17, 2008

Conducted by: Andrew Buck, Applied Geographics, Inc.

Interview participants:
Jake Stark, Assistant Web Master
Scott Freburg, GIS Coordinator

Agency Overview

- The Minnesota Department of Education strives to be an innovative education agency serving a wide range of customers: approximately 850,000 K-12 students and their families; 118,000 young children participating in a variety of early learning programs including Head Start and Early Childhood Family Education (ECFE); 82,000 adult learners participating in adult education programs including GED and citizenship programs; Minnesota's 339 school districts and over 52,000 licensed teachers.

- The Food and Nutrition Service of the Minnesota Department of Education administers U.S. Department of Agriculture (USDA) Child Nutrition Programs and partners with over 1000 public and private sponsoring organizations serving over 700,000 Minnesota children and adults. Locations include schools, child care centers and homes, adult care centers, and summer feeding sites.

The Department of Education is building out its GIS infrastructure. It now has a full-time GIS coordinator who formerly supported the department in LIMC. There are a few pockets of GIS capability in various divisions. There are several applications that are hosted on Education GIS servers. In addition, GIS is used for ad hoc map production and data management.

GIS Program & Capabilities

- The Department of Education maintains 2 ArcGIS licenses.

- The Food and Nutrition Service application has a stand-alone map service accessed through the Cyber-Linked Interactive Child Nutrition System (CLiCS). This mature ArcIMS application was developed by an outside vendor. A new version of CLiCS is currently under development and will not have a GIS component. However, a new ArcGIS Server 9.3 application is planned that will provide speed and process efficiencies for both staff and clients.

- ArcGIS Server 9.2 is in place. There are plans to install ArcSDE 9.2/SqlServer 2005 this summer.

- GPS is used by 10 companies that have daycare clients. As part of the daycare application with the Department of Education, GPS is used by the companies to collect latitude and longitude readings. The 10 companies use the GPS to get those locations. The GPS equipment is approximately 10 years old and is reaching end-of-life. Ideally, a web service could be developed that would provide latitude and longitude coordinates for any address in Minnesota.

- Address validation is performed in-house with an ArcIMS based geocoding application. An ArcGIS Online geocoding service is currently being beta tested.

- Data and GIS support services are provided to Education by LMIC, DNR and MetroGIS.

- Provide GIS map production support for various divisions within the Department of Education. There are approximately ad hoc mapping requests 35 requests per year.

Data Developed and Maintained

Three main spatial data layers related to statewide elementary, middle, and secondary school are maintained by the Department of Education:

- Statewide elementary, middle and high **school locations.** Information on non-public and charter school data is also maintained. The public school data has higher quality than the private/charter school data.

- Statewide **school district boundaries.** This data changes less frequently than attendance boundaries.

- **School attendance boundaries** showing the assigned elementary, middle, and high school for a given residential location. This data is subject to change and is most closely reviewed in the yearly update cycle.

This data is shared to other local, state and federal government agencies and well as the general public and academia. PDF maps are generated and available on the Department's web site. There is an annual local review process that identifies changes to the school and district information. These updates, generally in the form of manual mark-ups on printed PDF maps, are sent to the department. The boundary files are in the process of being upgraded to 1:24000 scale.

Constraints

- Lack of funding

GIS Data Requirements & Issues

- The Food and Nutrition Service needs to have accurate spatial locations for their clients (schools, day care centers, summer food sites, etc). The process to accurately geocode addresses with the currently available data is difficult, especially in remote parts of the state. The Lawrence Group (TLG) data is high quality, but does not exist beyond the greater Twin Cities region. TeleAtlas data is less reliable in rural areas. A beta ESRI ArcGIS Online

service has been used to increase the address matching accuracy. The interviewees felt that an accurate state run geocoding service, available to all state agencies, would be a cost effective solution for this ubiquitous requirement.

- Education uses geographic data provided by LMIC, DOT, DNR and Agriculture. An enterprise wide repository of statewide data layers would reduce the time required to research and locate available data. A repository would also reduce the need for local management of copies of authoritative data produced by other departments.

- Geographic base data is downloaded from LMIC, DOT and DNR.

Business Requirements for GIS

- Maintain information and produce maps detailing school locations and district/ attendance area boundaries. These data and maps are used internally and at the local level for a variety of planning purposes.

- Provide GIS support for Food & Nutrition Service applications which require the maintenance of specific eligibility boundaries for its programs. The Summer Food Program serves 300 sites and provides over 1 million meals per year.

Services and Support Needed

- The Minnesota State Colleges and Universities (MNSCU), an agency of the University of Minnesota, coordinates the efforts of higher-education and maintains data about post-secondary schools. This information would be useful to the Post-Secondary Enrollment Options (PSEO) program at the Department of Education.

Future Plans

- Develop an ArcGIS Online data viewing application.

- Rollout application support the Summer Food Program of the Food and Nutrition Service. This will include food sites and program eligibility layers.

- An on-line **Public School/District finder** GIS viewer is envisioned to replace the district PDF maps. This publicly accessible service would allow for locations of schools based on an entered address. It would have interactive toggling of layers and will provide information on schools including a "Report Card" assessing the schools performance.

- Production of a standardized school geodatabase and standardized district maps that can be easily used within the department.

Other GIS or Enterprise Comments and Observations

- The interviewees feel that the most important areas of focus for an enterprise solution would be related to making access to data easier and manage GIS software licensing at the enterprise level.

- The department of education has been looking into an Enterprise License Agreement to make ESRI products available for public schools. However, it will be difficult to obtain the funding.

- A statewide geocoding service that provides accurate address locations for rural out-state areas.

- It is probable that the Department of Education could benefit from a "Center of Excellence" that maintains GIS applications servers that could host the department's applications. Efficiencies could be gained by freeing up resource time devoted to administering a GIS server environment. The time recovered could be made available for building additional applications that serve the business needs of the department.

Links

http:education.state.mn.us

2.6 Department of Employment and Economic Development

Date of interview: June 26, 2008

Conducted by: Michael Terner, Applied Geographics, Inc.

Interview participants:
Oriane Casale, Labor Market Information Office
Sherry Falb-Joslin, Project Manager
Jessica Fendos, GIS Applications Developer
Steve Hine, Labor Market Information Office
Henry May, CIO
Fred Logman, LMIC

Please note: the write-up below was prepared from notes taken during the meeting and supplemented by a written document titled "Business Requirements for DEED GIS Project" provided by DEED during the meeting.

GIS Overview & Capabilities

DEED views its mission as "helping people, businesses and communities succeed" and a means for DEED to fulfill this end is through collecting data on employment and economic development from a variety of organizations and then packaging and making those data useful to its customers (e.g. job seekers, employers, public policy planners, etc.). GIS is viewed as a key tool for packaging data and enhancing its display.

DEED initially became involved in GIS in 2001 when its Labor Market Information Office (LMI) pursued a pilot project in association with the Bureau of Labor Statistics that involved geocoding over 150,000 employers located in Minnesota and creating basic maps from the geocoded data. Subsequently, this office pursued a grant funded effort to create a GIS website – called M3D – that dynamically displays commute shed and labor shed maps and reports. This project was pursued in association with the University of Minnesota's Center for Urban and Regional Affairs (CURA) and the website remains accessible from DEED's website -- under the Labor Market Information heading. The website was built with and deployed using a variety of Open Source GIS tools including PostGIS, MapServer, and Chameleon.

DEED has taken GIS seriously and supports a full-time GIS Applications Developer and convened a GIS Steering Committee. In addition to Open Source GIS tools, DEED possesses ESRI technology including ArcGIS desktop.

Business Requirements for GIS

In addition to the two projects described above DEED has implemented, or plans to implement several additional GIS capabilities that support their primary business drivers of data publication and effective presentation of employment and economic data. These include:

- **Cartographic support of DEED Website:** GIS-based maps and interactive cartographic displays are found sprinkled throughout the DEED website. Examples include:
    - Maps identifying the regions for labor market data availability
    - Clickable maps showing the location of WorkForce Centers and state staff with the ability to click on a center to drilldown into more detailed information

- **Support of MNPRO Website:** MNPRO is a website designed to allow businesses to identify real estate that is available for development and to encourage new development in the state. Currently, the website provides text-based access to available property. DEED hopes to geo-enable this application by adding a GIS interface that provides access to demographic, natural resource and infrastructure (e.g. transportation) information that can assist a user in preliminary site suitability assessment.

- **Supporting MinnesotaWorks Website:** The MinnesotaWorks.net website aims to match job seekers and employers. As with MNPRO, the current website does not have a mapping interface but there are plans for geo-enabling it. DEED believes that by adding mapping capability will prove useful to end-users so that they can assess the proximity of a job opportunity in relation to services such as: childcare, schools, and transportation, particularly public transportation.

GIS Data Requirements & Issues

DEED is the primary "data owner", or curator for the following themes:

- Employers and employment
- Origin-destination data (original work data derived from DEED LMI which was synthesized by the US Census Bureau and eventually aggregated and packaged by DEED LMI)
- Unemployment claims

In addition to some original geocoding of employer data, DEED is a licensed user of the InfoUSA product which contains the location of businesses throughout the country. Several other state agencies are interested in business locations and thus this data set has the potential to be obtained and made available via a state government-wide enterprise license agreement.

The raw employment data at the individual/firm level is not a public data set and cannot be shared. However, DEED LMI is able to process these raw data to create aggregated, derivative products such as county/town summaries.

<u>**Data Sharing Requirements**</u>

DEED has broad interest in obtaining and utilizing GIS data from other organizations. For example, DEED LMI has obtained the 7-county parcel data set from the MetroGIS program and incorporates these data in the M3D and another mapping website. DEED LMI also acquires day care center locations from the Department of Human Services and schools data from Education that is incorporated into their websites.

Other GIS or Enterprise Comments and Observations

- DEED is strongly supportive of a state government-wide enterprise GIS strategy and particularly the notion of "shared GIS services". Interestingly, during 2008 DEED was in the process of assessing how to invest in an internet mapping solutions (e.g. Open Source vs. commercial solutions; costs to acquire; costs to maintain and manage) to support the deployment of their GIS websites. While reviewing the feasibility of an enterprise GIS system that would connect DEED GIS users to a centralized spatial database and be interoperable with the State GIS model is underway, the proposed shared web services architecture and/or shared services centers promise avoided costs -- a primary benefit of the enterprise GIS approach.

- In addition to shared services, DEED has a strong interest in GIS data standards and the notion of a state government-wide data repository/library. Such resources would help a data intensive organization such as DEED to both find what they need from, and also to share what they have with other agencies.

- DEED is a frequent and sophisticated user of U.S. Census data. Many other state agencies have similar requirements to access Census information. As such, DEED has the potential to assemble raw U.S. Census information into useful products on behalf of the enterprise. In this realm, DEED has the potential to *contribute* its expertise to the enterprise GIS program.

2.7 *Department of Human Services*

Date of interview: June 25, 2008

Conducted by: Michael Terner, Applied Geographics, Inc.

Interview participants:
Mary Arvesen, Information Technology
Nancy Doucette, Pandemic and All Hazards Planning
Karen Gromala, Child Care
Jane Kennedy, Information Technology
Robert McDowell, Information Technology
Ralph McQuarter, Child Safety
Debbie Rielley, Fleet Management
John Wiersma, Data Warehousing

Please note: the write-up below was prepared from notes taken during the meeting and supplemented by a written document titled "Potential GIS Uses" provided by DHS during the meeting.

GIS Overview & Capabilities

The Department of Human Services (DHS) is a large agency with a broad array of business activities. While there are numerous opportunities for GIS to support these business activities, currently there is only minimal and spotty utilization of GIS. As such, there is increased interest in GIS and enormous opportunities to expand GIS utilization within the agency. Recently, DHS completed an agency-wide strategic planning exercise. Among the key findings and recommendations of that exercise was a move towards "data driven decisions" and new investments in "business intelligence systems". GIS was explicitly identified as a component of required business intelligence systems.

During the interview it was reported that there is one copy of desktop ArcGIS that is actively used within Child Safety and another copy of MapInfo within the HIV group, although it is used minimally. In addition, there has been limited contracting for services, such as geocoding, through LMIC.

Since the interview took place, DHS has provided supplemental information which indicates that Health Care is now involved in a pilot implementation of SAS Enterprise BI for county mapping. This pilot provides county-based mapping of human service oriented variables (with drill-down capability to produce subset totals, based on other variables such as demographics).

Business Requirements for GIS

The business requirements for GIS within DHS are extremely varied. As described above, only a very small number of these requirements are currently being met. The interview identified the following uses, or potential uses for GIS:

- **Applying proximity criteria:** For instance, when a child is moved from their home it is highly desirable to move that child to a location that is nearby to his/her current neighborhood. GIS can be used to identify and assess candidates for re-placement that are spatially close to the child's existing home.

- **Child care support:** The agency would like to map all 14,000 child care centers across the state. This will help identify whether "quality childcare" is uniformly available and where there may be service gaps.

- **Child abuse prevention councils:** The agency would like to map the 44 existing child abuse prevention councils and their services areas. This mapping will help identify service gaps.

- **Situational awareness during an emergency:** The DHS is responsible for assisting in the response and recovery to major emergencies and requires reliable information on populations that they serve who have special needs. For instance, during an emergency maps showing the location of group homes could be created to assist in prioritized evacuations.

- **Logistics planning:** DHS manages several State Operated Services (SOS) such as Community Behavioral Health Hospitals and substance abuse treatment centers that require essential and critical resources on an ongoing basis. SOS would like to map all of the approximately 150 "direct care sites" across the state. This resource would help DHS identify "next nearest" information in the event that one facility runs out of a resource (e.g., food or medication) or if a delivery is missed. Subsequent to the interview, DHS reported that SOS has begun implementing part of this program and now has two individuals trained in the ArcView GIS software. These personnel are engaged in geocoding the locations of these mission-essential service delivery sites.

- **Fleet management:** DHS maintains a large fleet of vehicles that are used by personnel working in the field. DHS sees potential benefits to using automated vehicle locating (AVL) technology to understand where its fleet is, and to also explore opportunities for reducing its fleet by sharing vehicles with other agencies that have overlapping jurisdictions (e.g., could MnDOT vehicles in the same region provide backup).

- **Aging:** There are a variety of mapping and GIS activities that can support the services DHS provides to the elderly. For example, the MinnesotaHelp.Info web-site has a "Senior Link" module that provides a "facility finder". This "facility finder" provides an ability to search for senior services and facilities, and once a query is completed one of the result options (exposed through the "Use the Results" function) is "show these results" on a map. The application then presents the map as a Yahoo! Maps mashup that shows the Yahoo! base map and the DHS facilities as points on that base map.

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- **Thematic mapping:** DHS uses GIS to produce a variety of thematic maps that help describe the distribution of problems as well as the distribution of social services provided by the agency. Examples include:
  o Child abuse and neglect
  o Foster care and other "out of home" care
  o Adoption and state guardianship
  o Population migration by ethnicity and nationality
  o Children with disabilities

GIS Data Requirements & Issues

- Human Services has a large need for access to census data and currently purchases licenses to these data sets.

- Human Services has an established need for geocoding both its own facilities and services as well as individuals who utilize those services. This implies a strong need for excellent street centerline and/or address point data sets.

Data Sharing Requirements

- Human Services is actively investing in a data warehousing so that it can bring together its own data sets in association with information created and maintained by other agencies. While this approach has not been explicitly practiced for geospatial data there is great potential to do so. Examples of data sets that DHS has obtained from other agencies and house in its data warehouse include:
  o Employment data from the Dept. of Employment and Economic Development
  o Birth and death registry data from the Dept. of Health
  o Boat licensing data from the Dept. of Natural Resources which is used to track down individuals who may have the means to pay delinquent child support

- Several other agencies are interested in some of the geospatial data that DHS possesses. For instance, day care centers are of interest to both public safety (e.g. from a prioritized evacuation perspective) and DEED (from a prospective job suitability perspective). Such agencies may be in a position to assist DHS in automating these data in GIS format. DEED reported that they have geocoded day care center locations to support one of their web-sites.

- Due to the fact that many of DHS's own data sets pertain to individuals who receive state assistance or have special needs, there is a strong need, and statutory requirements (as in HIPAA) for DHS to be able to establish "secure data sets" with controlled access only for authorized users.

Other GIS or Enterprise Comments and Observations

As an agency relatively new to the GIS world, DHS would have the potential to benefit greatly from a state government-wide enterprise GIS approach. They would be a direct consumer and beneficiary of "enterprise services" (e.g. geocoding, development of base maps) and this would

lower their need to make internal investments in GIS technology and software, thereby further lowering the barriers to their further entry into GIS deployment. In addition, the technical support and guidance capabilities offered by the enterprise GIS approach would support DHS in further envisioning and articulating the potential benefits of GIS within the agency.

2.8 Department of Health

Date of interview: June 17, 2008

Conducted by: Andrew Buck, Applied Geographics, Inc.

Interview participants:
Margaret Kelly, Assistant Commissioner
Wendy Nelson, CIO
Anna Gaichas, Research Analysis Specialist
Anne Walaszek, Research Analyst
Asa Schmit, Project Manager
Brian Johnson, GIS Administrator
Bruce Olsen, Unit Supervisor
Jerry Alholm, Systems Architect
Kari Guida, Planner / Data Analyst
Lacey Hartman, Senior Research Scientist
Mansour Haldidi, Information Technology Coordinator
Mike Ring, Developer
Pete Frank, Information Technology Supervisor
Philippe LeGrand, Hydrologist

Agency Overview

MDH protects and improves the health of all Minnesotans. There are seven divisions plus an administrative function:

- o Infectious Disease Epidemiology , Prevention and Control
- o Environmental Health
- o Public Health Laboratory
- o Compliance Monitoring
- o Health Policy
- o Community and Family Health
- o Health Promotion and Chronic Disease

There are 7 district offices throughout the state that have a combined staff of 200. There are 1100 Department of Health employees at the department's headquarters in St. Paul.

The agency's divisions, in general, work fairly autonomously from each other. The use of GIS mirrors this separated approach. User experience levels and GIS capabilities vary considerably in the various divisions. Some divisions have mature GIS operations with many users, while others have little GIS exposure or experience. All divisions recognize the value GIS and are eager to put it into practice if the constraints of funding, training/mentoring and data access can be overcome.

GIS Program & Capabilities

- The Environmental Health Division has been using GIS for 15 years and has the most advanced GIS infrastructure. They maintain water quality data, make it available for distribution on the department's web site and also host the County Well Index data viewer described below. They also maintain a data catalog of the GIS data that are stored on a networked file system and in ArcSDE.

- There are a few full-time GIS managers, technicians and programmers, but there are over 100 non-GIS professionals who utilize GIS services on a regular basis

- Most departmental GIS software is from ESRI. There is some MapInfo and a simple internally developed Microsoft Word application.

- The agency maintains a written data distribution policy and a data pricing schedule.

- GIS applications are made accessible remotes using Citrix server software.

Services and Support Provided

- **County Well Index (CWI) Online** is a web-based (ArcIMS) version of the CWI data system developed by the Minnesota Geological Survey (MGS) and the Minnesota Department of Health (MDH) for the storage, retrieval, and editing of water-well information. The CWI database contains basic information, such as location, depth, and static water level, for wells drilled in Minnesota. The database contains construction and geological information from the well record (well log) for many wells. CWI Online also provides mapping of wells onto aerial photos, allowing users to visually identify well locations

Data Provided

- The Department of Health maintains multiple data layers related to drinking and ground water protection. This data is publicly available on the department's web site as simple PDF maps or in GIS Shapefile format with metadata.

  - Groundwater susceptibility to class 5 injection wells (Class V Sensitivity)
  - Drinking Water Supply Management Areas (DWSMA)
  - DWSMA Vulnerability
  - Drinking Water Supply Management Areas
  - Probability of nitrate contamination to groundwater

- Fully developed maps of DWSMA and Nitrate Probability are also available on the Departments web site.

- In addition to the location to public water supply wells, contaminants in well water are reported to the Environmental Protection Agency (EPA). This data is also made available to the Department's of Agriculture, Natural Resources, Transportation, and the Pollution Control Agency.

<u>**Constraints**</u>

- Federal funding has strict limits on how the money can be used. For this reason it is often difficult for more experienced GIS users within the agency to help less experienced users. These restrictions, to a lesser extent, are also imposed by state funding.

- Lack of funding was described as the primary constraint in the use of GIS at the Department of Health.

- A lack of staff expertise was also presented as a constraint. Among the reasons given: lack of organizational support; lack of understanding of the need for GIS: the need to first leverage the usability of GIS in order to build support for it.

- Some divisions have adequate GIS software support while others felt that they did not have enough access or that the available software was limited to ESRI products.

- Some divisions state that not accessible due to expensive licensing costs.

- When software is available, training is limited. Generic GIS tools have a steep learning curve for non-GIS professionals. When training is provided, is difficult for novice users to know how to get started using the tool. More long-term support for new users is needed.

- A few divisions mentioned a need for better and easier access to data.

GIS Data Requirements & Issues

- Other agency data sources that are used by Health include:
    - Mapping service from Land Management Information Center (LMIC) to access aerial photos and topographic map layers
    - DNR Data Deli (spatial data acquisition site)
    - IMS,WMS,WFS services from MetroGIS

- ESRI services are used to geocode addresses to locate water wells.

- **Addressing:** There are needs for a standardized address format, a process for validating new addresses, and tools for cleaning up existing addresses. Current address cleaning techniques do not have enough specificity to meet federal mandates.

- **Standard Base Map Data:** A regularly published geodatabase of a selected set of statewide base data layers would reduce the time required for compilation of data from numerous sources and enable the presentation of a consistent set of data across multiple applications and organizations.

- **Elevation Data:** 2 foot contour data is needed for ground water analysis and other Health programs.

Business Requirements for GIS

- **Drinking Water Quality**: Defining groundwater provenance and protect public drinking water source area: well head delineation. Locating new, existing, and historical water wells. Assist local health departments with protecting private water supply wells. Responding to other state and federal agency requests concerning land or water use impacts on drinking water quality. Assessing, analyzing and archiving groundwater quality data for potability.

- **Ground Water Modeling:** Modeling to support ground water protection efforts.

- **Disease Tracking:** There are 95 reportable diseases and many reporting methods to geographically identify and track the locations of outbreaks of disease including invasive bacterial disease cases. There is a need to identify possible exposures to diseases and locate possible outbreaks by tracking exposure and location of individuals. Use geocoded data on cases to assign census tract number to link with census tract data to calculate incidence rates based on socio-economic variables. Monitor and analyze changes in disease occurrences over time. Perform statistical analysis.

- **Chronic Disease:** Collect statistics and locational information.

- **Public Health Tracking:** Levels of public health preparedness and response activity. Level and type of public health spending. Level and type of public health workforce/FTEs. Aggregate county health data. Generate (MS Word based) maps. Administer MN Children with Special Health Care Needs (MSCHCN) and Women, Infants and Children (WIC) outreach programs.

- **Map Production:** County maps of disease and injury rates.

- **Contaminant Sources:** Identification of potential source sites.

- **Births and Deaths:** Record keeping with mapping component.

- **Compliance Monitoring:** Investigate complaints about and generate maps of nursing homes, mortuaries and cemeteries symbolized by complaint activity. Create nursing home "Report Cards".

- **Traumatic Brain Injury:** Maintain repository of all hospitalized TBI and spinal cord cases. Geocode injury locations. Validate addresses for mandated mailings to all reported persons about available resources.

- **Emergency Response:** Mapping needs: disaster area, shelter, stockpiles, and sensitive receptors. Cloud release (plume) modeling.

<u>Services and Support Needed</u>

The following items were identified as current GIS needs and ideas for future uses of GIS in the department. Many of these ideas could be used by other MDH Divisions and therefore might best be provided from a central organization.

- **Map Production:** There is a large need for easily produced small maps that can be used in documents and reports. An essential common map production tool would allow department specific data to be added, permit map configurations to be saved for future use and would have flexible printing and map image productions features.

- **3D Geolocation:** The protection of water sources would greatly benefit from the ability to visualize properly stratified geology using 3D modeling tools.

- **Interactive Web Mapping:** A generic application that could be tailored for specific business needs would allow for Health information to be publicly distributed more easily. For instance, a nursing home finder could locate potential nursing homes with a reasonable distance from a relative's home. This tool could provide access to data about the nursing home including its "Report Card". Interactive web viewers could also be used to disseminate information about on-going crises (e.g. Google map of California fires).

- **Fee for Service Consulting:** The health department could benefit from having a fee for service GIS consultants available from within state government or the private sector. Staffs could be augmented with "in-sourced" consultants. The types of services desired include: data development, GIS tool use, mentorship, applications development, and training (which could be outsourced to 3rd parties).

Other GIS or Enterprise Comments and Observations

- It was stated that the MDH has evolved with ESRI software and has grown accustomed to using it. However, new entrants (e.g. Google, Microsoft, Manifold, Open Source, etc.) are generating interest. These new technologies should be evaluated and considered as an alternative to the dominant software stack. As the pool of GIS expertise grows, the use of the "best of breed" software and applications should also grow.

- Data standards and policies, including the response to legal issues, should be coordinated by a central organization.

- Data sharing policies and memoranda of understanding between state agencies could be formalized in a state data sharing license coordinated centrally. This could mirror a Creative Commons license approach, with multiple levels of licensing, etc.

- The GIS transformation effort should be expanded to non-spatial data. Data set without location attributes also need policies on data sharing/ design/ distribution/ protection/etc.

- A catalog of available resources (data repositories, web services, map viewers, etc.) should be centrally maintained and regularly published. This will help potential users to learn about and quickly find GIS tools and data.

Links
- Source Water Protection data downloads:
  http://www.health.state.mn.us/divs/eh/water/swp/maps/

- County Well Index Online data viewer:
  http://www.health.state.mn.us/divs/eh/cwi/

2.9 Department of Natural Resources

Date of interview: June 24, 2008

Conducted by: Michael Terner, Applied Geographics, Inc.

Interview participants:
Tim Loesch, GIS Section Manager
Glenn Radde, Public Waters GIS Coordinator, Division of Waters
Bud Kincaid, GIS Lead, Division of Forestry
Dave Lonetti, IT Coordinator, Division of Trails & Waterways
Renee Johnson, GIS Coordinator, Division of Lands & Minerals
Steve Benson, GIS Supervisor, Wildlife Section
Lynn Bergquist, GIS Coordinator, Fisheries Section
Tom Glancy, IT Supervisor, Division of Ecological Resources

Please note that a complete census of the DNR's organizational utilization of GIS was not possible within the constraints of a two hour meeting, and as such this write-up does not attempt to comprehensively document the agency's GIS efforts. Rather, this write-up attempts to characterize the major commitments to GIS that DNR has made with a specific focus on the agency's perspective and ideas for the development of an enterprise GIS for state government.

Agency Overview

DNR is among the largest and most longstanding users of GIS technology in Minnesota state government. The agency has made significant, sustained investments in GIS technology since the 1980's. Historically, DNR has recognized that their programs are intimately linked to the land and managers use and strongly support mapping and GIS activities.

GIS utilization and activity permeates the agency's business units and the technology supports numerous agency business processes. The agency takes GIS seriously including having a GIS Section under the direction of the CIO. The GIS Section maintains a formal DNR GIS Strategy and provides GIS operational and technical assistance and support to Department Management and field staff. The agency maintains a limited set of dedicated, full-time GIS staff beyond the GIS Section with at least seven (Wildlife, Fisheries, Lands and Minerals, Ecological Services, Trails and Waterways and Parks and Recreation, Forestry) additional people identified as having some level of GIS coordination as work duties. In addition to the eight people interviewed other DNR staff with GIS responsibilities staff include:

- Seven additional people in the GIS Section
- Five additional people in the Wildlife Section
- Two additional people in the Fisheries section
- 1 IT Coordinator in the Division of Parks & Recreation who could not participate in the interview

- 4 additional people in the Division of Forestry
- 4 additional people in the Division of Lands and Minerals

GIS Program & Capabilities

DNR implements a variety of GIS software including:

- ESRI ArcGIS 9.x desktop products (ArcView, ArcEditor, ArcInfo)
  - Previous generation ESRI ArcView 3.x is being phased out
- Internally developed clients based on Visual Basic 6.0 and ESRI MapObjects Lite
- Open Source server products including the University of Minnesota Map Server
- PostGIS
- Oracle Spatial

Future Plans

- Mobile computing and data collection are an increasingly important area that DNR is actively researching and investing in. Currently, key areas of inquiry involve weighing the choice between "real-time" field data update vs. "detached" (i.e. check-out) updating with a later synchronization and "check-in" process with the server.

Data & Services Provided

- DNR is one of the state leaders in providing access to a consistent GIS database across the agency. Toward that end, DNR has developed the Data Resource Site (DRS) and a strong metadata management framework for making statewide GIS data available to all agency staff, including those at regional and sub-regional offices. The goal was to provide the agency with a "one stop" data library with the GIS Section actively managing the contents of the DRS. Basically, a centralized instance of the DRS warehouse is periodically replicated to more than 75 DNR Office locations throughout the state. In addition, DNR has provided instances of the DRS to outside agencies such as Bureau of Water & Soil Resources (BWSR), the Dept. of Agriculture, the Department of Transportation, and a number of educational institutions.

- DNR is investigating and planning to build an agency resource for geospatial "applications and services" that will mimic what the DRS does for data. Again, the intent is to provide a "one stop shop" for applications and services that will show both what currently exists and what is under development.

- DNR is also a leader in making data available to the public through its innovative "DNR Data Deli" web-site (see: http://deli.dnr.state.mn.us/index.html). While not all statewide data is available through the Deli, most DNR holdings, as well as those by many other state agencies are. The Deli's on-line, self-service orientation is aimed at reducing phone traffic and the need for DNR human resources to support non-agency data distribution

<u>**Potential Center of Excellence Functions**</u>

- Both the DRS and the DNR metadata tools are resources that are leading solutions that could be provided to other agencies. In fact, the DNR has already extended DRS replication services beyond the DNR to three additional state agencies (i.e., BWSR and Department of Agriculture, and MnDOT). The DNR Data Deli also is well suited to distribute data not managed by the DNR and several state and federal units are currently distributing data using the Deli (USFWS, MnDOT).

GIS Data Requirements & Issues

- DNR GIS users identified several data gaps and areas where improved data is highly desirable. These include:
    - o Vegetation coverage
    - o Up to date landuse
    - o Species habitat
    - o High accuracy elevation (2' contours or better)
    - o Current local roads
- DNR works with and manages several data sets that have some sensitivity and potentially cannot be shared with the public. An example is rare and endangered species data that is available through a license agreement. . Any statewide effort at building a data library needs to address agency data security requirements.

<u>**Data Sharing**</u>

- There is strong interest within DNR in obtaining access to data maintained by county entities, data such as parcels. Historically, these data were pursued by DNR at a *divisional level*. Currently, these data are being pursued at an *agency level* so that once the data are acquired from a county they are available to **all DNR GIS users**. This often includes having the agency sign a formal data sharing agreement with counties. To date, DNR has collected local data from approximately 30% of counties. These efforts at the agency level provide a model for a *statewide* framework for entering into those agreements so all departments can gain access to local data once they are collected. DNR notes that there are significant challenges in standardizing county data once they are acquired.

- There is interest within DNR in gaining access to **county imagery data sets**. Often, county flyovers are done a larger scale and higher resolution than statewide efforts. DNR has been at the level of effort required to acquire these data from counties. To paraphrase one interviewee: "Since we are involved in regulating local land use and permitting natural resources, shouldn't we be able to see the land at the same resolution as county planners?" In short, lack of access to these types of data can hinder DNR's own permitting and regulatory activities.

Business Requirements for GIS

- As alluded to above, GIS is instrumental to many dozens of individual business processes and requirements across DNR's business units. This interview did not attempt to catalog these individual business requirements; however, the text below catalogs a couple of business requirements that were discussed in the context of an enterprise GIS approach for state government.

- DNR has occasional needs to fly "spot imagery" in response to natural disasters such as floods or fire. The agency has pilots in both the Division of Enforcement and the Division of Forestry that provide this capability on a regular basis. Other agencies have this need and it would be extremely valuable to have a statewide contract available for accessing these extremely time sensitive services.

- The DNR has significant business requirements to coordinate on geospatial matters with other governmental and private entities both within, and outside of state government. Examples that were cited include:

   o **Forest Inventory and Forest Inventory Assessment**, in coordination with the **USDA Forest Service**. In addition, before funding cuts, the DNR would historically catalog county forest lands in addition to state lands.

   o **Hydstra** represents collaborative effort between **DNR, USGS** and the **Pollution Control Agency (PCA)** for stream gauging.

   o Multiple ongoing activities with the **MN Dept. of Health.**

   o Collaboration with **Land Management Information Center (LMIC)** on development of the National Hydrological Data Set (NHD).

   o The Division of Waters collaborates with the **USGS**.

   o **Division of Ecological Resources** collaborates with **NatureServe** on rare species data. NatureServe is a private non-profit that is affiliated with The Nature Conservancy.

   o DNR collaborates/coordinates with **Canada** and other states on coastal zone issues.

   o DNR collaborates/coordinates with the **Bureau of Indian Affairs** and several **tribal governments**.

Other GIS or Enterprise Comments and Observations

- The agency has been successful in finding creative solutions to meet its needs. One example involves taking advantage of academic resources to help build GIS products of interest such as land cover. The idea is to help define research topics for universities that will result in not just a "project level" scope, but also data products that will help meet DNR, and statewide needs.

- The DNR suggests that there may be merit in encouraging the development of a "GIS Research Center" at a local academic institution. They cited the Center for Transportation Studies at the University of Minnesota (see: http://www.cts.umn.edu/) as real world model. Such a center would encourage public and academic coordination and collaboration to examine pressing issues and to build new resources.

- MetroGIS provides a good model for the state to learn from, particularly for multi-county data sharing.

- While acknowledging that Office of Enterprise Technology (OET) is the "logical home" for a coordination entity, it may not be the best "operational home". DNR has observed that OET has had limited success delivering and executing enterprise technology services. As such, DNR has some concerns about aligning a new "coordination entity" within OET at the outset.

- DNR observed that while LMIC has endured and continues to add value it has failed to exert strong leadership across state government. DNR also observed that budget cuts have impacted the scope of what LMIC can pursue, including the coordination agenda.

- DNR observed that a new "coordination entity" will face some tall challenges and a demanding set of existing state agency GIS programs. DNR had several strong suggestions for crafting a new, transformed coordination entity:

  1. The "coordination entity" needs a budget so that it has the resources to accomplish tangible objectives.

  2. The new entity should "do no harm" and should respect existing agency GIS programs and efforts.

  3. The coordination entity cannot be perceived as "wasting agency time and effort". There must be achievable, near-term goals that can encourage participation.

- DNR observed that there is an extremely strong and enduring GIS community in Minnesota, but there are challenges with the community continuing to grow. To paraphrase one interviewee: "the same core people from the 1980's are continuing to get things done. There have been some musical chairs and people are wearing new hats but it's the same cast of characters. One challenge is having this community nurture the new, next generation of state government GIS professionals."

- DNR observed that if enterprise GIS resources come on-line it is important that:

  1. They are operationally ready at the outset and designed to provide high performance.

  2. They include an "open architecture" so that agencies can actively and directly interact and contribute to the system (e.g., for an enterprise GIS data library, agencies should be able to "push data" into the library when they're ready to).

2.10 Department of Public Safety

Date of interview: June 25, 2008

Conducted by: Michael Terner, Applied Geographics, Inc.

Interview participants:
Lee Field, Bureau of Criminal Apprehension
Walter Cygan, Bureau of Criminal Apprehension
Loren Hill, Driver & Vehicle Services (formerly from MnDOT)
Jackie Mines, Emergency Communications Networks, E911
Mark Kam, Homeland Security and Emergency Management
Danette Buskovick, Office of Justice Programs
Dana Swayze, Office of Justice Programs
Paul Meekin, Office of Technology Support Services
Sean Mangan, State Fire Marshal's Office
Michelle Parish, State Patrol
Rick Juth, State Patrol, Communications
Fred Logman, LMIC

GIS Overview & Capabilities

While there is a great deal of GIS activity within the Depart of Public Safety (DPS), these efforts are pursued at the individual bureau or division level rather than at the departmental level. Use of the technology is varied and ranges from operational on-line systems to individual project-based activity. Due to the lack of a department-wide outlook, and based on how the interview unfolded, this write-up is organized alphabetically providing an overview of the GIS activities within each bureau or division.

Bureau of Criminal Apprehension (BCA)

The BCA's main GIS application is the predatory offender registration. As with other bureaus and divisions, this capability relies on the availability of accurate addressing information to allow offender locations to be geolocated. The BCA relies on statewide TeleAtlas data for geolocating and has built a web service to facilitate the geolocating process. The BCA uses Microsoft Virtual Earth for publishing geolocated data.

Once geolocated, offenders' locations can be compared to school and day care center information to assess risks and threats. Day care locations are obtained by downloading the Department of Human Services listing and then geolocating those facilities. The BCA maintains its own database of school locations.

The BCA is interested in building a comprehensive statewide incident repository that would provide investigative tools. Such a repository would be constructed by obtaining incident reports

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from counties and cities and geolocating the incidents. The BCA also sees opportunities in publishing a geocoding web service that could be accessed by local governments to support their own incident mapping (when they don't already have those capabilities).

Driver and Vehicle Services (DVS)

The main DVS GIS application plots the locations of accidents. Over 87,000 accidents occur on an annual basis and accident reporting includes a geolocating operation that creates an explicit latitude/longitude from a reported address on the text-based accident report. DVS coordinates its accident mapping activities and gets some geospatial support from MnDOT. In the future, it is desired that the geolocating process will be more precise by using GPS equipment available in cruisers and/or the ability to "heads-up digitize" an accident location while looking at an aerial image of the area.

The DVS uses the CMAP program for visualizing accident locations. The accident database is used to help prioritize safety improvement projects across the state, as well as performing "post counter measure analysis" to see if safety improvements have made a difference.

Emergency Communications Networks, E911

The E911 program coordinates the 115 public safety access points (PSAPs) involved in the E911 network. Every county in the state has at least one PSAP. Among other things the state collects 911 fees from telecommunications companies to fund the common elements of the 911 network. While this program is not yet directly involved in deploying GIS technology, advanced 911 systems deployed at the PSAPs include cartographic components that show the location of incoming calls on a map. Some county systems include data sets such as land marks and fire hydrants in addition street centerlines which are used to identify address locations.

While some systems rely on street centerline depictions of roads and addresses, others can use explicit address points. Some states – such as Rhode Island and New Hampshire – use 911 funds to support the development of statewide addressing databases.

Minnesota's E911 program is actively engaged in planning for "next generation" 911 (NG911) which involves building an IP-based network which will be more capable and reliable than existing systems. Planning for NG911 includes looking at GIS as a means of deploying and maintaining the master street address guide (MSAG) which will allow all calls to be placed in relation to addresses. As such, the deployment of NG911 provides enormous opportunities for improving Minnesota's addressing data and many other state agencies would greatly benefit from these addressing data improvements.

Homeland Security and Emergency Management (HSEM)

HSEM does not currently have a dedicated GIS program. Rather, periodic fee-based projects have been conducted via LMIC. Nevertheless, HSEM has broad interests in this technology which would support a variety of needs including:

- Working with Federal agencies on hazard mitigation and pre-planning for major events.

- Post disaster damage assessment and analysis (e.g. worked with LMIC to coordinate post-collapse aerial photography following the I-35 bridge collapse).

- Planning for nuclear power plant safety by having access to county-based data for areas surrounding the power plants. Nuclear power plant drills are conducted twice per year.

- The School Safety Program which involves having pre-plans to expedite school evacuations.

- Critical infrastructure mapping using *i*CAV tool provided by the Federal Department of Homeland Security.

- Hazard mitigation and the ability to deploy analytical models for plume dispersion and flooding.

In addition, HSEM is involved in adding geospatial capabilities to the state's Emergency Operations Center (EOC). It is envisioned that the EOC will have robust mapping capabilities to support both drills and activations. When activated, LMIC personnel are available to support the EOC in using GIS software on an ad hoc basis. In addition, HSEM has selected the DisasterLAN software to be the EOC's web-based portal tool and this platform supports geospatial displays.

HSEM is highly reliant on geospatial data that is produced by other state government agencies. Applications such as creating a "common operating picture" that can be shared during an emergency require access to all of the state's geospatial data holdings (e.g. roads, public infrastructure, natural resources, hazardous materials, etc.). This fact combined with the current absence of a dedicated GIS program would make HSEM a large beneficiary of an enterprise GIS approach across state government.

DNR has worked with HSEM and has a "map trailer" that contains GIS technology and is deployed to support the "fire teams" during fire responses.

Justice Programs

The Office of Justice Programs (OJP) is a grant giving agency and its funding supports a variety of crime prevention and intervention programs, including victim services. While OJP is relatively new to the technology their main interests involve assessing the scope and efficacy of the programs their funding supports. The OJP uses ESRI desktop technology and examples of some of the maps and data sets they have created, or are interested in, include:

- Location of all grant recipients
- Service areas of grant recipients
- Census analysis to understand populations served by grant recipients
- Facilities that cater to juvenile offenders
- Visualization of BCA arrest data
- Hot spots of juvenile activity based on BCA data

The OJP is actively interested in obtaining data from some of its sister law enforcement agencies. The OJP has been successful in obtaining raw data from BCA which it then geocodes itself. However, it has had challenges in obtaining data of interest from the Department of Corrections (DOC) in spite of a willingness to sign all required confidentiality and disclosure documents.

As a new user of GIS technology, OJP indicated a strong interest in gaining access to GIS support and assistance. Both a greater department-wide approach to GIS (perhaps with participation form OTSS) and an enterprise-wide approach to GIS across state government should help build better support mechanism for new users.

State Fire Marshall

The State Fire Marshall's office of pipeline safety is significantly involved in geospatial technologies. Static maps are used to support inspections and include facilities near to pipelines such as schools, hotels and day care centers. The pipeline safety program uses the states orthoimagery and contributed funds to the new 2008 flyover. Inspectors are equipped with laptops and use internet "air cards" to provide access to web based applications. Currently, mapping is provided via use of an ESRI ArcReader application loaded onto individual laptops. Inspection support will continue to be the dominant application and ESRI is providing a more robust solution which will support both inspections and accident after-action reporting including the ability collect GPS-based location information as part of the inspection.

The office has access to approximately 65,000 miles of pipeline data covering Minnesota. These data include all pipes as well as pump and compression stations which have been GPS'ed to an accuracy of approximately 20 ft. One challenge is that the pipeline data is not shareable as it is owned by the Federal government's Pipeline and Hazardous Material Administration. The data are protected due to the fact that they were collected from the pipeline companies.

State Patrol

State Patrol has been involved with GIS for over seven years since deploying a map interface to their computer aided dispatch (CAD) system. The State Patrol uses Intergraph's CAD solution and is able to track both event and individual units that respond to events. Maps can be viewed within the dispatch center and also in the field via mobile data terminals (MDT) located in vehicles. The CAD system is supplemented by an automated vehicle location (AVL) system that broadcasts the location of all units in the field back to 10 dispatch centers. The CAD and AVL solutions are shared with 20 additional "allied" public safety agencies. The Mn/DOT traffic control system also has access to the CAD information and there are future plans for Mn/DOT traffic assistance "helper trucks" to be added to the AVL system.

One of the primary challenges with the CAD system is gaining good and current street data for the entire state. Currently The Lawrence Group (TLG) data is used for approximately 30 counties with publicly available TIGER data obtained from the US Census covering the remainder of the state. In addition to the core street centerline data the system has 67 additional data layers. Many of these layers are obtained from other state agency GIS programs such as parks, trails and snow mobile areas from the DNR. The State Patrol itself manages the patrol

district and station boundary data layers. The State Patrol relies on Intergraph to provide technical support in loading data sets into the system.

The State Patrol also reported that currently the state's orthophotos are not available in the system although they would like them added. In addition, school locations, PSAP and EMS boundaries used to be in the system but were removed due to data unreliability, particularly with regard to data currency. There is an interest in adding these layers back if comprehensive data sources that are reliably updated can be identified.

The State Patrol is also deploying Intergraph's records management system which will automated the accident reporting process. Once fully deployed, this system will allow for map-based "incident analysis" spanning all filed reports.

Office of Technology Support Services (OTSS)

The OTSS is not directly involved in GIS activity at present; however, it is actively engaged in helping the DPS pursue enterprise applications and recognizes the potential for more of an enterprise approach for GIS within DPS. OTSS has assisted the DPS in pursuing enterprise applications for both "grants management" and "document management" and the same type of approach may provide benefits for GIS.

2.11 Department of Revenue

Date of interview: June 25, 2008

Conducted by: Michael Terner, Applied Geographics, Inc.

Interview participants:
Kent Treichel, Tax Research[1]

GIS Overview & Capabilities

- The Dept. of Revenue (DOR) has had one fulltime GIS position, located within the Tax Research Division, since 2001. While the GIS position is located in Tax Research, this person provides GIS and mapping capabilities across multiple divisions. In essence, DOR maintains a one person service bureau for the department.

- MapInfo Professional software is the primary GIS software used by DOR.

- MapMarker is employed as a geocoding engine.

- Google Earth is also employed to assist in quality control evaluations of roads data.

- The overall GIS budget including staff, hardware and software, data and consulting is approximately: $108,000 /year.

GIS Data Requirements & Issues

- DOR has a significant requirement for high quality data to support geocoding. DOR is a licensed user of The Lawrence Group's (TLG) and TeleAtlas **road centerline** and **ZIP+4** data sets. The TLG data are considered far preferable to TeleAtlas, however, at present TLG only covers 30 counties and TeleAtlas is used for the remainder of the state.

- DOR also has a significant requirement **municipal boundary** and **school district boundaries** to support streamlined sales tax administration (see description below). Originally, LMIC was contracted to update the municipal boundaries based on new annexations through 2003. Similarly, LMIC assembled and provided the best available school district boundaries (i.e. another type of tax unit). Since 2003, DOR has contracted with LMIC to update the municipal boundary file on an annual basis. However, updates are *only* assembled for the **14 towns** that apply a local sales tax and are thereby part of the streamlined sales tax regime.

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[1] The interview content was supplemented by Mr. Treichel's answers to the on-line survey that was implemented as part of this project.

- The DOR geocodes and carries an X,Y coordinate on all businesses and individuals that report to DOR and are tracked in their databases.

- DOR's complete data maintenance budget is $20,000 /year including license fees to TLG and TeleAtlas and data maintenance work sub-contracted to LMIC.

Business Requirements for GIS

- **Streamlined Sales Tax Data Maintenance:** Minnesota participates in the multi-state Streamlined Sales Tax Governing Board, Inc. consortium[2] (hereafter "Streamlined") that attempts to equitably collect and distribute local sales taxes generated by catalog and internet sales. Under this program Minnesota must provide Streamlined a variety of boundary (e.g. ZIP+4) and tax rate files on a quarterly basis. Streamlined then uses these files to collect various local sales taxes from major catalog and internet companies that are registered with Streamlined. Streamlined then provides the revenue to the states who in turn distribute it to the appropriate state and local entities. DOR uses its GIS to maintain and manage the boundary files and to facilitate data exchanges with Streamlined.
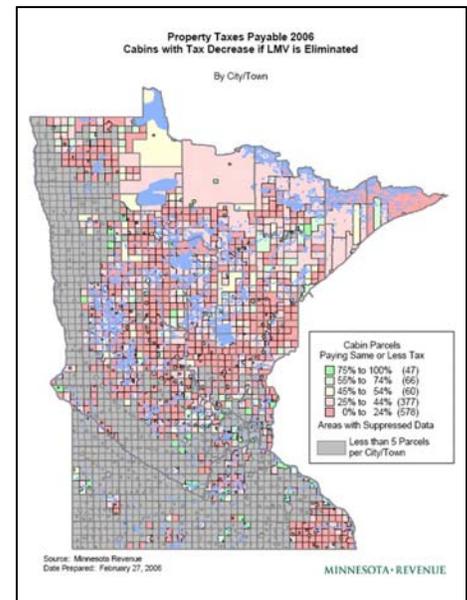
- **Ad hoc Mapping and Presentation Support:** The DOR uses the GIS to provide a wide variety of maps in support of reports and presentations (see figure at right). For example, after the "abstracted tax list" becomes available in the Fall and Spring, a series of 10 thematic maps are produced that illustrate things such as counties that:

  o Have increases in revenue
  o Decreases in revenue
  o Winners vs. losers

- **Support of Business and Research Questions:** GIS analysis and mapping has been applied to a variety of business and research questions over the past several years. Such analyses typically involve geocoding to locate various classes of taxpayers or taxable entities and then analysis to look for trends or patterns. Examples of this type of analysis include:

  o **Neighborhood based analysis of tax returns** to look for anomalies. Such analysis often provides "cross divisional" analysis and can support business questions such as whom to audit. For example, identifying low income people who own multiple expensive cars might raise questions about income reporting. Similar anomalous situations may exist between income and property valuation.

  o **Agricultural field valuation** to understand regional differences in valuation. After noticing that there could be significant differences in how fields were valued by DOR's

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[2]   See http://www.streamlinedsalestax.org/ for further details.

seven regional representatives and analysis was conducted to identify fields that spanned regional office boundaries and where there was a significant difference in the valuation on each side of the boundary.

Other GIS or Enterprise Comments and Observations

- There is significant untapped potential for additional GIS work within the DOR. While some existing capacity exists, further GIS effort is diminished because, in general, the department does not have a prevailing attitude of "data driven policy". As such, and in spite of great potential, GIS is viewed as more of a supporting tool, rather than a strategic tool that can help drive priorities and policies.

- In spite of the department's role in administering and supervising the property tax, unlike many other states, the DOR has no property mapping requirements, and all property mapping is administered wholly at the county level.

- Given the rural nature of much of Minnesota, the DOR requires "delivery point validated" (DPV) addressing to support geocoding. Many mailing addresses use PO Boxes that cannot be used to locate the person or facility.

2.12 Department of Transportation

Date of interview: June 19, 2008

Conducted by: Andrew Buck, Applied Geographics, Inc.

Interview participants:
Mike Barnes, CIO
Dan Ross, Supervisor, Enterprise GIS Services
Bill Roen, IT Strategic Planning, Office of Decision Support
Bob Brown, Office Director Land Management
Charlie McCarty, GIS Architect
Joella Givens, Metro District GIS Coordinator
John Rindal, Program Management, Office of Decision Support
Jonette Kreideweis, Office Director Transprotation Data Analysis
Richard Morey , Chief Surveyor Land Management

Agency Overview

- The Minnesota Department of Transportation (Mn/DOT) operates and maintains 12,000 miles of state roads and 4767 bridges. There are roughly 4600 employees and 250 information systems. 90% of Mn/DOT data is location based (mostly points, corridor centric, with some linear referencing).

- Mn/DOT has a well established Enterprise GIS unit with a staff of 7 in the Information Technology group. GIS strengths vary by division. As the geospatial technology capability at Mn/DOT continues to mature, systems are more easily integrated using common tools improving data access and data quality. However, simple enterprise access to division based data remains an issue to be resolved.

- Mn/DOT is a heavy user of both GIS (desktop and web-based) and CAD technology. Integrating workflows to incorporate both technologies presents significant challenges for the easy flow of information.

GIS Program & Capabilities

- 37 of 44 Mn/DOT business areas use ESRI desktop products (84 ArcGIS Desktop licenses – 61 ArcView, 23 ArcInfo using 2 license servers).

- 95% of users only need to view and query geospatial data. A small amount of data is downloaded and analyzed. Conversion between CAD and GIS formats is a challenge.

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- Mn/DOT has about 15 web-based applications. Some older applications are being re-written from ArcIMS to ArcGIS Server. As new (.NET/ Web ADF) applications are created using a web site template (Geocortex), the ArcGIS Desktop license count will decline.

- Mn/DOT maintains roughly 2000 Microstation CAD licenses, mostly in Engineering.

- Mn/DOT has a 3-tier support model.
    o Key Users – Answer end user questions at the business area level.
    o GIS Coordinators – Several of the largest business areas and 2 of the 8 Mn/DOT district offices has a GIS coordinator with a broad base of GIS knowledge.
    o Mn/DOT EGIS Staff Coordinator – Works with district/area coordinators to resolve issues. Holds quarterly coordinator meeting. Reports to EGIS Services Unit supervisor.

- **GPS**. Mn/DOT operates a Virtual Reference System made up of a 30 station statewide (except far north) geodetic control network to provide real-time and post-processing error correction. Mobile GPS receivers (Trimble, Garmin) with GIS are used for mapping (seen as the largest growth area in the next two years). RTK GPS receivers with portable GPS base stations are used for survey work. Many functional areas within Mn/DOT have some asset location data collected via GPS.

- Mn/DOT maintains a copy of the statewide orthophotos.

- Mn/DOT maintains a 3 year GIS strategic plan that is part of a larger Information Technology strategic plan. It is reviewed annually. The first official plan is currently under review.

Services and Support Provided

- Mn/DOT funds part of an FTE to assist with planning functions in the 9 Regional Development Commissions (RDC) who are heavy users of Mn/DOT GIS services.

- MN/DOT provides external customers and partners access to data through multiple GIS web map services and applications

Data Provided

- DNR's Data Deli is a source for Mn/DOT data. Plans are in place to migrate this access to a services oriented architecture.

- Mn/DOT is the custodian for the following statewide data layers:
    o Transportation Network and associated assets (e.g. signs, guardrails, etc.)
    o Traffic Volumes on Trunk Highways
    o Pavement Information on Trunk Highways
    o Bridges
    o Right of Ways on Trunk Highways

Constraints

- Some local and **county agencies lack resources** to provide data in easy-to-use formats.

- There is a **lack of coordination** for GIS technology policy within Mn/DOT. No one person fills the GIS coordinator role for policy. Technology is deployed where it can serve the most customers.

- There are **not enough skilled resources**. Pockets of GIS capability exist in various divisions, but these resources are constrained and usually in "fire fighting" mode. Promotion of GIS may result in a demand overload.

- Integration of **CAD and GIS environments** presents many challenges:

  o The availability of resources determines whether GIS or CAD is used on any particular project. Engineering does not have a large GIS capability; CAD is used for most engineering projects. There are not enough resources with CAD/GIS integration skills. Job protection concerns are also a factor in choosing which technology to use.

  o It difficult to access CAD data for GIS uses. Integration technology is complex. Conversion tools are needed to convert CAD plans into GIS reference data.

  o It is difficult to integrate CAD projects an integrated view across projects. Data attributes are difficult to manage using CAD.

  o There are counties that require CAD formatted data.

GIS Data Requirements & Issues

- Many of Mn/DOTs systems function as application silos making access to Mn/DOT data difficult. Some data is in narrative form and does not have spatial locations.

- There are 179 data sources needed just for project scoping. Much of this is maintained by Mn/DOT, but a significant amount comes from outside sources (Army Corps of Engineers: Flood Plains, Cities/Counties: land records).

- The following data categories are needed for Mn/DOT applications:
  o Crash Locations
  o Assets
  o Soils
  o Demographics (e.g. population)

- The following **statewide data** require long range plans that do not rely solely on voluntary participation and funding. Data development prioritization should focus on data that supports economic development.

  o Statewide **municipal boundaries** data needs an identified custodian and a regular update process. This should be maintained at two scales: 1:24,000 for planning purposes, and a much larger scale suitable for survey work. Federal and tribal land boundaries should be included.

  o Regularly scheduled statewide **orthophotos**.

  o Updates to Digital Raster Graphic (DRG) are scanned and georeferenced quadrangles produced by USGS.

- o Statewide **addressing** data.

- o **Elevation** data with 2 foot contours.

- o **Interstate connections** for roads and watersheds.

- **Mn/DOT Business Council for Data:** There is a large demand for shared data. However, management sees many independent data collection efforts that do not result in shareable data. The Data Council was formed to formulate a data governance model, identify communities of interest, and determine data needs. The council has borrowed ideas from other states (VA, MD) and uses focus groups to identify needs and set data development priorities.

Business Requirements for GIS

- **Traveler Information** and road conditions. The states 511 system (currently CARS-511 from Castle Rock) is migrating to Google. Real-time crash and congestion reports are provided by Mn/DOT RSS feeds. Currently, NAVTEQ street data is used for the road network.

- **Federal Mandates**: Federal government programs define business needs (e.g. safe routes to schools, environmental justice, census).

- **Project Planning**. GIS is used heavily in planning efforts for roadway and bridge improvements. Archeological sites are protected. Roadway deficiencies are tracked by planning district. Projects are linked to Mn/DOT/local performance measures. Large area projects (e.g. guardrail upgrades and median cable installation) also use GIS, though without specific location details. The transportation project plan contains 3 dimensional, high accuracy (GPS-based) roadway data.

- **Engineering**. Transportation project design.

- **Maintenance Operations**. Emergency management. Asset management, vehicle crash location mapping, roadway striping scheduling, storm drain maintenance, vehicle routing. Integrated work order management (e.g. do not perform milling work after fresh striping).

- **Interactive mapping**. Both mobile and web-based applications provide view and query capability.

Other GIS or Enterprise Comments and Observations

- **Benefits.** Mn/DOT is a large organization with mature GIS operations. It will benefit from GIS coordination across state-agencies in the following ways:

- o Access to spatial (and other) data from other organizations will be improved. Time and other efficiencies will be gained with a common store front.

- o EGIS investments made the state level can be leveraged by agencies. For instance, OET implementation of identity management will make building a Mn/DOT services oriented architecture (SOA) possible.

- o Costs can be avoided by leveraging server infrastructure and software licensing across agencies.

- **Data Ownership**. An open dialog about data ownership and custodian responsibilities, coordinated at the enterprise level, will eliminate duplicate data development efforts and avoid conflicts. For example, since highway right of way (ROW) adjustments can change parcel boundaries and Mn/DOT is the custodian for right of way data, then Mn/DOT's ROW data should be used to adjust parcel data. Mn/DOT would like to get updates to Mn/DOT owned data layers to owners of other affected data layers (e.g. ROW data to county recorders for parcel updates).

- A **"broker"**, at the state level could perform a number of important functions that would benefit all agencies:

  - o **Statewide data development.** The primary focus of a broker should be to facilitate the development and funding of statewide data layers (identified in the Services and Support section above).

  - o **Research new technology** (e.g. new COTS, Mashups), investigate options, recommend solutions and document best practice guidelines. Lead discussions with vendors to understand new software versions and to describe state needs (ESRI, Oracle, and Bentley).

  - o **Portfolio management and review.** Conduct meetings between agency GIS managers to establish a shared visibility of GIS activities across agencies. For instance, Mn/DOT needs GIS capability at the county level and did not know that the Department of Agriculture provided ArcGIS desktop licenses to some counties. Awareness of activities in other agencies will generate efficiencies.

  - o **Promote Enterprise GIS.** The central broker defines and promulgates a "marketing" message that articulates the overall vision for an integrated enterprise GIS (EGIS) environment, describes the benefits of EGIS, and enables recognition of how GIS contributes to the value chain of state government. Conduct outreach to articulate the state's need and hear statewide needs from local/ county user groups, Regional Development Commissions (RDC), area transportation partnerships.

  - o **Identify cross-agency data needs.** If custodians are aware of how other agencies use their data, then points of collaboration can be identified and management practices can be adjusted to meet the broader set of requirements.

  - o **Develop data and service sharing architecture.** Agencies need common tools and interfaces to promote the free flow of information. A broker should inventory and integrate the various components of existing agency GIS data repositories and web services. Each agency can provide services that are accessed from a common storefront, or portal, that would direct access to resources across the state enterprise. A component of this architecture could be a core data warehouse to house shared data layers.

  - o **A common security model** protects sensitive data**.**

  - o **Enter into data sharing agreements** with counties. The MN Data Privacy Act (DPA) asserts that all government data is public. It establishes practices to protect privacy and allows for cost-recovery fees to be charged for "inspecting" the data (i.e. receiving an

electronic copy). Data sharing agreements contain fee waivers and protect against further distribution.

- There should be more GIS **self-help** tools (e.g. simple map production).

- In this difficult budget period, formal **mandates** should be avoided if they are unfunded.

- The OET Chief Technology Officer is the state's enterprise architect and is primarily focused on business applications not on engineering applications or GIS integration.

- The MGIO should **lead the standards process** for Minnesota**.**

  o Engage in federal and other standards development. Coordinate introduction of new standards with vendors, academia, local and county governments, and state agencies. Study and resolve factors that slow the use of standards (multiple standards, not always followed by local government, tool incompatibility between MN and Federal standards).

  o Implement a state **data transfer standard** that considers the USGS Spatial Data Transfer Standard (SDTS), shapefiles, KML, web services, etc.

  o The **MetroGIS model** for data conflation works well and should be considered a model for the state. A standard format is described and requested of counties, who provide data on a voluntary basis. Any data format is accepted. Once aggregated, a standard format with a common sub-set of attributes is made available for sharing.

- Establish a strong governance model for the Minnesota Governor's Council on Geographic Information. Currently, the council has no authority to set policy and is essentially an advisory and promotion body with most of the work done in committees.

- Relationships between the MGIO and both the governor's cabinet and the State Legislative Office need to be established and nurtured.

- Develop relationships with other states' GIS initiatives to jumpstart MN programs: 911, land boundary management, water resources, oil fields, and pandemic planning.

Links

Traveler information:
http://www.511.mn.org

Interactive Base Map:
http://www.dot.state.mn.us/maps/gisweb/

ROW Mapping and Monitoring:
http://www.dot.state.mn.us/maps/gisweb/row/

Construction Project Viewer:
http://dotapp7.dot.state.mn.us/website/mndot%2Dconstruction%2Dexternal/viewer.htm

2.13 Pollution Control Agency

Date of interview: June 26, 2008

Conducted by: Michael Terner, Applied Geographics, Inc.

Interview participants:
Ed Meyer, Chief Information Officer
Glenn Skuta, GIS Programs
Tad Schindler, Information Services Office
David Fawcett, GeoDBA

Please note that a complete census of the PCA's organizational utilization of GIS was not possible within the constraints of a 2 hour meeting, and as such this writeup does not attempt to comprehensively document the agency's GIS efforts. Rather, this writeup attempts to characterize the major commitments to GIS that PCA has made while documenting many, but not all of the business activities which involve GIS.

GIS Overview & Capabilities

- PCA is among the largest and most sophisticated users of GIS technology in Minnesota state government. PCA has made significant, sustained investments in GIS technology and continues to innovate in providing GIS services within the agency. GIS utilization and activity is found across the agency's Divisions and the technology supports a multitude of agency business processes.

- During 2007 the PCA re-organized its internal GIS capabilities and established a five person "Lateral Team" that provides agency-wide GIS leadership from within the Information Services Office (ISO). This group works with many additional people who have a GIS focus, or GIS skills within individual divisions and programs. In addition to the 3 ISO GIS staff that were interviewed, other dedicated GIS staff mentioned during the interview included:

  - 2 additional people within ISO
  - 3 people within the Regional Division (covering the Brainerd and Rochester offices)
  - 1 person within the Prevention and Assistance Division
  - 1 person within the Industrial Division
  - .5 FTE within the Remediation Division

  Beyond dedicated GIS staff, PCA has a group of Power Users and estimates the community of casual users at over 100 people. Ninety-four individuals from PCA filled out the on-line GIS survey that was completed as part of this project. To promote knowledge exchange and a sense of community the Lateral Team helps organize an internal PCA GIS User Group.

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GIS Program & Capabilities

GIS Software:

- PCA implements a variety of GIS software including:
    - ESRI ArcGIS 9.x desktop products (ArcView, ArcEditor, ArcInfo)
    - ESRI's ArcSDE running on Oracle
    - Open Source server products including Map Server and PostGIS

Public GIS Applications:

- PCA has developed and maintains two key public data viewers that are used extensively by both the public and internal PCA program personnel (i.e. non-GIS staff).

    o The first application is referred to as "**What's In My Neighborhood**" and allows the user to define an area of interest and shows facility and regulatory information for that area. This application is currently delivered via ArcIMS but is being migrated to ArcGIS Server. The new version is scheduled to be launched during the 4th quarter of 2008. Future enhancements aim to make information on positive environmental activities and best practices – such as rain gardens or recycling centers – available through the viewer. Known uses of the application beyond public inquiry and internal PCA use include Tribal Governments performing research in advance of completing land transfers.
    See: http://www.pca.state.mn.us/backyard/neighborhood.html

    o The second application is referred to as "**Environmental Data Access**" and this exposes PCA monitoring information for several programs. At present there is an air quality, surface water and ground water instance of the application.
    See: http://www.pca.state.mn.us/data/eda/

GIS Data Requirements & Issues

- PCA has focused significant recent effort at reexamining its agency-wide data management practices in general, and for GIS specifically. As a data driven organization, this reexamination has highlighted a business requirement for "progressive data management" and a formal Data Services Section was established to help carry out data management.

- On the geospatial data side, one of the ISO GIS positions is aimed at being a geospatial "data champion" on behalf of the agency.

- PCA identified their two greatest unmet data needs as being:
    1. High resolution elevation data (e.g. capable of producing 2 ft. contours)
    2. Statewide parcels

    Other data sets that PCA uses that are required across many state agencies include:
    o Landuse/land cover
    o US Census

- PCA's most important internal database contains all the agency's facility and monitoring data. This database is referred to as "Delta" and is housed within Oracle and is maintained and accessed through customized Power Builder applications. Almost all entities within Delta are mapped (i.e. a coordinate location is assigned within the database) and individual PCA programs act as custodians of their facility information. PCA has constructed an ArcEngine application that enables PCA users to access the location information and refine the location. For example, if an original facility location for smokestack was derived from geocoding interpolation, this application will allow a user to "pickup" the point and move it to a more precise location that is visible from aerial imagery. This type of application may have broad applications in other departments that are maintaining point-based facility information and PCA would be amenable to make it available outside of PCA.

- The Delta database and its associated application is a large, sophisticated system and a key requirement is role-based editing so that while everyone within PCA can *view* facilities only authorized users within a specific program are allowed to *edit* those types of facilities. Again, this type of role based access is a requirement that many other agencies have and PCA can provide a useful approach for addressing this challenge.

Data Sharing

- The PCA currently meets requests for distributing its geospatial data in two forms. First, PCA maintains its own shared FTP site for posting data. Second, many public data sets are provided to LMIC and distributed via LMIC's data download site. PCA is supportive of making their public data readily available and would be open minded to providing data sets to other data distribution portals such as DNR's Data Deli. In addition to routine requests for specific data products, PCA receives many complicated requests that involve queries of larger data sets, complex attribute table joins and potentially the interpretation of results.

Intergovernmental and Intra-governmental Data Coordination Activities

- PCA works closely and in partnership with many programs of the US Environmental Protection Agency (EPA). Partnership work includes effort on the National Hydrography Database (NHD) to support water monitoring, water quality, impaired water, designated uses and stormwater permitting activities.

- PCA collaborates and exchanges data with many local government partners in many contexts, including:

  o Providing grants to counties and local governments and requiring that the data products created with grant moneys be shared back to PCA.

  o Obtaining enhanced feed lot data directly from counties.

  o Obtaining and utilizing county parcel data obtained from the Metropolitan Council

  o Occasionally obtaining small quantities of local parcel data that typically surround contamination sites with which PCA is involved

- PCA makes regular use of the services provided by LMIC including providing contract funds to perform NHD data improvement work. In addition, PCA coordinates with LMIC imagery data acquisition and utilizes LMICs imagery web services.

Business Requirements for GIS

As described earlier, GIS permeates numerous programs and business activities throughout the agency. The following provides many examples of GIS project work the agency is involved with that were mentioned during the interview. Attachment 1 provides a more extensive list of GIS activities and the business process that are supported that was gleaned from the 94 PCA responses to the GIS survey.

- **Determination of contamination sources**
  - Running analytical models
  - Identifying contamination loads in rivers and streams through upstream/downstream analysis
  - Identifying existing discharges/contributions to Lake Peppen in light of a "no new discharge" policy

- **Supporting stormwater management** (through the University of Minnesota)
  - Landuse/land cover analysis
  - Impervious surface analysis

- **Surface water investigation**
  - Performing satellite data analysis to find contamination signatures in water bodies
  - To identify eutrophication
  - To prioritize site visits for water quality monitoring

- **Facility siting**
  - Applying new rules for landfill siting

- **Recycling programs**
  - Mapping the results of an annual recycling survey, for example county-based recycling participation and the availability of electronics disposal programs

- **Remediation**
  - Mapping of remediation sites
  - Identifying people and resources near remediation sites and the potential impacts on them
  - Ground water contour development and plume modeling to identify contaminant movement

- **Air quality**
  - Examination of regional haze issues to identify sources with the largest impacts
  - Facility based modeling to support the approval of new permits and also to prioritize permitees that may be in violation

- **Environmental justice**
  - o Examining the socioeconomic impacts of water impairments
  - o Providing prevention and assistance programs to underserved populations

Other GIS or Enterprise Comments and Observations

- PCA is extremely interested and highly supportive of efforts to establish consumable web services that follow the Open Geospatial Consortium (OGC) standards and specifications (e.g. WMS, WFS). While PCA houses its own copy of statewide orthoimagery, they regularly access the WMS orthoimagery service hosted by LMIC and consume other services that emanate from DNR.

- PCA is also interested in exploring KML and KMZ services that will allow PCA data to be accessed from public mapping engines such as Google Maps and Google Earth. PCA is open minded to new approaches for making their data accessible to people who are interested in them, including third parties that might develop map mashups.

Attachment #1: PCA Responses to Question #19 from the GIS Survey

Text of question #19:
What are the principal business uses of mapping, location tools and/or GIS within your organization, whether current or planned? Please list the key business questions/activities/programs that the GIS is employed for? Please be as specific as possible, for example: "Protecting endangered species"; "Emergency response to flooding"; "Planning for roadway improvements"; "Tracking the location of dead birds infected with West Nile Virus"; "Providing interactive maps to field crews on laptops"

Notes:
Each respondent could list up to five separate responses to this question.
Some responses may have been duplicated by different respondents.
Responses of "don't know" were removed from this list.
Respondent's own language, short-hand and abbreviations were retained.
Responses are presented below in alphabetic order.

Num	Business Uses of GIS
1	Administration of municipal and industrial air, water and hazardous waste regulations
2	Aid to efficient scheduling of sites to inspect (trip planning)
3	Air flow and pollution mapping, analysis, & modeling
4	Air permitting
5	Air pollution monitoring and modeling
6	allowing local governments partners to ID & implement state-wide permitted facilities
7	allowing the general public to be notified of permit application in specified area
8	Analysis (informal so far) of geographic distribution of permits inspections.
9	Analysis of point and non-point source impacts on surface water
10	analyzing monitoring data (adding land use, soils, etc. context)
11	Assessing contamination extent
12	Assessing field staff assignments
13	Assessing risk to receptors from contaminant releases
14	Assessing water quality - determining impairment status of waters of the state
15	Assisting with development of remote sensing image analysis for wetlands
16	Biological Monitoring - Streams, Lakes, Wetlands
17	Calculating low flow statistics for streams and rivers
18	Collecting and testing water/biological samples for assessing water quality of Mn lakes, streams and groundwater
19	Collecting and verifying spatial locations from SF Section sites to send to MPCA Outcomes Division
20	communicating environmental monitoring data
21	communicating potential environmental impacts due to projects
22	Conducting enforcement of state laws and rules pertaining to pollution control
23	Conducting remediation
24	Coordination surface water monitoring efforts
25	Creating Maps/Tools for Public Communication on Environmental Topics

26	Creating site maps and visual site illustrations for summarizing information to self, fellow staff, and for maps for public meetings
27	database of the location of WWTP discharge points
28	Determining discharge limits for wastewater treatment facilities
29	determining property areas
30	developing clean-up plans, known as TMDLS, for polluted waters
31	displaying monitoring and assessment data geographically
32	Displaying program information county by county
33	documenting locations of pollution sources and contaminated sites
34	Documenting petroleum site locations.
35	DWSMA
36	Educating ourselves, partners, stakeholders, and public on watershed issues
37	Emergency responce to spills of haz. materials
38	emergency response
39	Emergency Response
40	Emergency response for natural and man-made disasters
41	Emergency response to environmental emergencies (floods, haz-mat spills, etc).
42	emergency response to hazardous materials spills
43	emergency response to natural disasters
44	Emergency response to pollution releases
45	Enabling internal staff to use GIS analytical abilities for a wide variety of programs
46	Enabling the public to access our data and information via GIS on the web
47	Environmental Maps of contaminated land and surroundings
48	Environmental procedures and enforcement
49	Evaluate surface water characteristics such as wetland connectivity and stream order
50	Feedlot Identification
51	Floodplains
52	Generate catchment areas for stream sampling sites
53	Generate land use percents and other human disturbance data
54	Ground water flow maps
55	Guide stormwater site inspections by State staff and local government partners
56	Hydrologic Modeling/Water Quality
57	Hydrologic watershed modeling, lake & stream water quality mapping, analysis, & modeling
58	identifying where potential contamination is located
59	Identifying wastewater dischargers within a TMDL model area
60	Identify threats to water resources
61	Identifying how proposed permits (e.g. ethanol facilities) align with their necessary resources and sensitive waters.
62	identifying waters to be monitored
63	Identifying watershed sources of sediment contamination (for limited use by stakeholders)
64	impaired waters
65	Interactive web map apps to provide access to environmental data by the researchers, consultants, and the general public
66	Investigating spatial trends of pollution to aid in source identification.
67	keeping a database of all lake monitoring locations in the state

68	keeping a database of all stream monitoring locations in the state
69	Locate contaminated sites in relation to other relevent information
70	locating stormwater discharges and linking to waterbodies for env. permitting
71	Location of petroleum leak sites
72	Location of regulated facilities
73	Locational information for beach water quality data
74	Making project specific maps for public use
75	Making project specific maps for staff use
76	Managing regional workloads
77	Managing surface and ground water resources
78	Mapping and analysis to support public assistance (e.g. household hazardous waste) and education programs
79	Mapping how samples and environmental monitoring results compare to Superfund project areas.
80	Mapping impaired water bodies and overlapping jurisdictions
81	mapping locations of electronics recycling operations in MN
82	mapping locations of recycling collection points
83	Mapping permit sites
84	maps of impaired waters
85	maps of watersheds
86	mobile source concentrations
87	Monitoring samples at Superfund Sites
88	My specific business area currently does not use GIS
89	new business locations for recyclables
90	Other business uses by other portions of the MPCA
91	other sensitive features
92	permit maps
93	Permitee Locations
94	Planning for basin management
95	Planning for watershed restoration and protection efforts
96	Planning inspections
97	planning water quality monitoring coverage
98	Planning/training for emergency responses to environmental emergencies
99	Pollution prevention
100	potential sources of pollution
101	potential transportation hubs for movement of recyclables
102	Preparing Total Maximum Daily Loads (TMDLs) for MN surface waters
103	prioritizing reviews and inspections based on location and discharge to water bodies
104	Protecting Air Quality
105	Protecting surface water and groundwater
106	Provide interactive maps to assist in site investigation
107	Provide interactive maps to explore site and site area history.
108	provide maps and site info to field crews
109	providing information to the public about air and water quality by geography
110	providing information to the public about locations of emissions/discharge points
111	Providing information to the public about pollution sources and releases
112	Providing information to the public on environmental conditions

113	Providing interactive maps and data to the public through our Environmental Data Access and What's in My Neighborhood websites.
114	Providing interactive maps showing location of regulated facilities
115	Providing interactive maps showing location of water categories (impaired, trout stream, etc)
116	Providing interactive maps showing monitoring data
117	Providing interactive watershed maps to staff for use at internal/external meetings
118	Providing maps for public information related to Lake Superior beaches
119	Providing maps showing location of facilities in proximity to program interests
120	Providing maps showing location of facilities, sectors for program decision making
121	providing maps to field crews on handheld GPS units
122	Providing maps to LGUs for development around closed landfills
123	Providing public with information about pollution sources/sites
124	Public and private ground water/well information from the Department of Health
125	regulated facilities
126	Restoring impaired waters
127	Selecting and managing wetland monitoring site locations
128	selecting monitoring site locations
129	Selection of sites
130	showing locations of spills, toxic sites, superfund sites, etc.
131	showing special event locations for Get the Lead Out tackle exchanges
132	Sites and features locational data
133	Spill prevention and management
134	Stormwater management - low impact development
135	Stormwater permit applicants and reviewers--identify special waters, impaired waters, other waters affected
136	Stormwater permits--review of Plans and Specs, industrial and construction sites
137	Studying contaminant distribution at statewide or local level [Total Maximum Daily Load (TMDL) studies, for example]
138	Tanks, and wells associated with petroleum leak sites
139	TMDL watershed studies
140	Track permits for various activities and assess impact on environmentally sensitive areas
141	Tracking air quality
142	tracking changes in land use
143	tracking environmental improvement implementation activities
144	Tracking ground water quality
145	Tracking inspection data
146	Tracking land remediation
147	tracking monitoring activities by site
148	Tracking monitoring wells at Superfund Sites
149	Tracking sampling locations (i.e. wells, borings, etc.) at Superfund Section sites to help facilitate site reviews and risk evaluations
150	Tracking sediment quality
151	Tracking surface water quality
152	Tracking the location of ground water contaminant plumes
153	Tracking trends in environmental quality

154	tracking water quality in streams and lakes
155	Viewing/analyzing environmental data from contaminated sites
156	Wastewater analysis and reporting
157	Water monitoring mapping and analysis
158	Water quality data for surface water bodies
159	Water quality models
160	Water Quality Monitoring Station Locations
161	Water quality protection strategies
162	Water Quality Reaches
163	Watershed analysis
164	watershed modeling

2.14 Legislative Coordinating Commission

Date of interview: July 24, 2008

Conducted by: Michael Terner, Applied Geographics, Inc.
Terese Rowekamp, Rowekamp Associates, Inc.

Interview participants: Lee Meilleur, Manager

Agency GIS Overview

The GIS Manager and his staff provide all GIS and IT services for the LCC (approximately 30 staff), as well as GIS support for the full Minnesota Legislature. A mix of ESRI, Caliper and open source software and databases are used to maintain legislative district boundary GIS data files; to produce maps and documents as needed to support redistricting efforts every ten years; to provide ongoing research and mapping support as bills are proposed and move through the legislative process and to respond to occasional special mapping requests.

GIS Program & Capabilities

- Two full-time and one half-time (i.e. intern) staff members provide all GIS services to the full state Legislature, as well as broader IT and web-site support for the LCC.

- ArcGIS Desktop for map production (2 floating licenses of ArcInfo, 1 each floating license of Spatial Analyst and Network Analyst), Maptitude for redistricting, Postgress for databases, MapServer for web applications.

Services and Support Provided

- Redistricting support.

  o When redistricting was last done following the 2000 census, Maptitude was used by various legislative committees to produce individual redistricting plans. Because the cartographic capabilities of Maptitude were limited, each plan was output to a Block Equivalency file (a text file listing each precinct and its district assignment in the plan). These files were received by the LCC and used to create maps showing each redistricting plan's proposed boundaries. The maps were then posted to an LCC-created web-site for review by interested parties.

  o When the redistricting process is repeated following the 2010 census, Lee expects the LCC to be involved in a similar manner, providing a way for the various proposed redistricting plans, which are created by the individual caucuses, to be available to interested parties.

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- o As part of the preparation for each census, the LCC participates in the Block Boundary Suggestion Program (BBSP) of the U.S. Census Bureau. This program attempts to match precinct boundaries with census block boundaries so that census data can be easily aggregated to precincts for use in redistricting.

- Research and mapping for legislative bills.

  Whenever an examination of geographic data may pertain to a proposed bill, the LCC may be asked to obtain the appropriate data and produce supporting maps.

  Recent examples include:

  - o Maps of arsenic poisoning and elevated lead blood levels were overlaid with socio-economic data to better understand the potential impacts of legislation that would alter the Pollution Control Agency's permitting process.

  - o Lee served on a task force to determine the best way of collecting foreclosure information. Data was collected from counties, sometimes in GIS format, other times as addresses that were then geocoded (using TLG streets, TIGER streets, or web-based geocoding services). The resulting data were then mapped for use by legislators.

  - o Maps showing protected lands that were acquired using LCMMR funding.

- Special requests by legislators.

  - o Occasionally, a legislator will request a map showing various resources within his/her district.

- Legislative atlas.

  - o A legislative atlas is currently under development, which shows senate, house and congressional district boundaries with election results on a base map.

Data Provided

- Legislative district boundaries are provided through a public download web-site to all interested parties.

GIS Data Requirements & Issues

- Sometimes specific requests require data from other organizations. Usually, public data is obtained using the means available to any public user, for example public GIS download web-sites (e.g. DNR's Data Deli, LMIC).
- Occasionally a project requires non-public data, and Lee works directly with the organization to obtain data. Most of the time the data is readily shared. Sometimes there are minor issues (for example, getting MnDOT's bridge data for maps required going through MnDOT's Homeland Security office). Rarely, the sister agency is less cooperative in providing the data and LCC cited an example of recent difficulties in acquiring needed data from the PCA.

- The LCC requires access to current municipal boundaries and is strongly supportive of efforts to keep these data current in light of the 300-400 annexations that take place annually.

Business Requirements for GIS

Services and Support Needed

- Easy and rapid access to GIS data as needed (some of which may not be public data) from other organizations.
- Access to GIS expertise through user groups for information sharing (best practices, technical info). LCC currently participates in the State Agency GIS (SAGIS) group, however, given that this group has expanded to include many county and metro users it has gotten too big, and this has diluted its value to LCC GIS staff. LCC also participates in the local MapServer user group.

Future Plans

- LCC hopes to make the legislative boundary data available as a consumable map service. LCC strongly supports state agencies providing GIS data using map services, including the development of a centralized index of available map services. LCC would prefer map services in WMS format.

Other GIS or Enterprise Comments and Observations

- The LCC potentially provides a mechanism to help get GIS in front of more legislators in a practical way, hopefully increasing the awareness of the importance of GIS and the willingness to fund GIS efforts

Links

The LCC's GIS Homepage is: http://www.gis.leg.mn/

This site includes links to available maps and the data download pages.

2.15 Metropolitan Council

Date of interview: June 18, 2008

Conducted by: Andrew G. Buck, Applied Geographics, Inc.

Interview participants:
Rick Gelbmann, GIS Manager
Paul Hanson, Community Development
Dave Hinrichs, CIO
Steve Kloiber, Environmental Services Manager
Mark Kotz, GIS Database Administrator
Jason Podany, Metro Transit Transit/GIS Planner
Mark VanderShaaf, Director of Planning & Growth Management, Community Development
David Vessel, Transportation Planner

Please note that a complete census of the Metropolitan Council's organizational utilization of GIS was not possible within the constraints of a 2 hour meeting, and as such this write-up does not attempt to comprehensively document the agency's GIS efforts. Rather, this write-up attempts to characterize the major commitments to GIS that MetCouncil has made with a specific focus on the agency's perspective and ideas for the development of an enterprise GIS for state government.

Agency Overview

- Metropolitan Council is a regional planning agency and the Metropolitan Planning Organization (MPO) for the 7 metro counties in the Twin Cities area where there are 2.5 million residents. The Council operates the regions largest transit operation as well as the regions sanitary sewer treatment and conveyance system. The majority of the 3700 Metropolitan Council employees work as bus drivers and sewer system workers.

- The Metropolitan Council is also the primary financial (through fee for service projects, IT support and staffing) and administrative sponsor of MetroGIS, an organization that promotes and facilitates geospatial data sharing in the Minneapolis-St. Paul Metropolitan area. The council provides 1 full time coordinator, approximately 1.5 FTE of additional technical expertise to support MetroGIS and an annual budget for data and services.

- Met Council's GIS activity (not the same as MetroGIS) is centralized within Information Services (IS). There are users with GIS skills in many departments.

- The Metropolitan Council coordinates and collaborates with local metro area governments to acquire current, accurate geospatial data efficiently with minimal systems burden on the provider. This data is standardized and made available to local government as well as "up stream" consumers, such as state government.

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GIS Program & Capabilities

The Council's GIS mission statement is: Maintain responsive, collaborative and innovative approaches to providing GIS services and web strategy, to support efficient operations and informed decision making. GIS has a staff of 10 employees.

The GIS Work Unit focuses on 5 areas:

1. **Support**. Support the use of GIS throughout the Council and develop access to GIS through software and web based GIS products.

   - Power Users 25
   - Basic Users 30-40
   - Occasional Users 50-100

2. **Data**. Create and process GIS data for use by Council GIS users and for use in Council maps and products.

3. **Products**. Produce maps, graphs, tables, images and applications using GIS data to support Council planning and operational functions.

4. **Web**. Develop and maintain Web based GIS applications that help the Council communicate to its stakeholders.

5. **MetroGIS.** Provide staff support for the MetroGIS initiative. MetroGIS promotes GIS data sharing among government organization in the region. MetroGIS does not directly support business operations. Its role includes many activities:

   - Foster collaboration among organizations that have capacity to sustain regionally developed solutions to support common geospatial needs
   - Strategic planning, outreach and leadership development
   - Standards/ best practices development, and data distribution mechanisms
   - Influence adoption of public policy
   - Performance measurement
   - Development and enhancements of web mapping applications
   - Limited data development

- A variety of ESRI, Google, Microsoft, and Open Source software tools are used by Metropolitan Council.

- Siemens Automatic Vehicle Location (AVL)/GPS technology is used on all MetroTransit buses. The transponder signals vehicle location once per minute. This information is used for monitoring operations and for integrated schedule adjustments. The expense of the AVL unit provides a challenge to including other transit vehicles (e.g. Dial-a-Ride: small handicap accessible buses).

- Hastus scheduling software is used to integrate transit route geography with schedule information. This information is used for analyzing, reporting and providing schedule information in spatial formats.

Services and Support Provided

- Metropolitan Council's GIS supports MetroGIS in providing data downloads, online map viewers and online WMS map services via DataFinder (www.datafinder.org) and is a node of the National Geographic Data Clearinghouse and of the clearinghouse network supported by LMIC. The Council distributes all its publicly available GIS data through the DataFinder site.

- "Make a Map" is an interactive mapping application on the MetCouncil web site. It uses Geocortex's Internet Mapping Framework (IMF) tool in conjunction with ArcIMS.

- Mapping and Spatial Analysis support for various agency functions.

Data Provided

- The Metropolitan Council has collected **parcel data** through an agreement with the 7 counties of the metro region. Attributes are standardized and upon agreement to license terms, the parcel data is redistributed to local government and academia throughout the country.

- The Metropolitan Council maintains generalized **land use** data on a 5-year cycle based on ortho imagery, county parcel attributes, and other data sources.

Potential Center of Excellence Functions

- Several MetroGIS activities could be used as a model for centers of excellence:
    - Outreach and coordination
    - Data sharing and collaboration (including aggregation of local data sets).

Constraints

- Lack of funding

- Lack of staff expertise and/or staff time: An additional full time Technical Coordinator and expanded web expertise is needed to support Council GIS and MetroGIS's expanding scope. Otherwise, the ability to respond to changing stakeholder needs is at risk.

- Lack of access to good/ required geospatial data

- Limited number of available floating ESRI licenses.

GIS Data Requirements & Issues

- The Met Council needs an efficient way to collect and organize data for use by the entire region. A portal application would integrate many GIS activities on one site.

- The need for monitoring events over time requires the management of **time series data**. For example, there are 300 water monitoring sites that, for over a decade, have collected millions of measurements (flow, temperature, quality). This volume of data and unanticipated uses suggest the exploration of new data access methods, such as web services.

- Collecting information about **bikeways** at the regional level is very difficult. This non-traditional geospatial data is managed differently in each locality. Tools should be built and made available to local government to allow for the mapping of an integrated bikeway system. Bike routes should also be incorporated into Mn/DOT projects.

- Access to small area demographic data would allow for more detailed growth forecasting.

- MetroGIS has a limited data development capacity. Metro Council collects a variety of data within the various business units and standardizes it for use throughout the Council and for use by MetroGIS stakeholders.

Data Sharing

- The Council's GIS maintains a central data repository for MetroGIS and distributes data externally. There are over 200 data layers (produced by 10 different organizations) cataloged with metadata in the **DataFinder**, a searchable ISO node of LMIC's GeoGateway.

- The **DataFinder Café**, an interactive tool for viewing and downloading GIS datasets, supports over 600 data downloads each month.

- The Council's GIS host numerous **web services** including OGC's WMS and WFS as well as ESRI map services as part of its support of DataFinder and MetroGIS.

Business Requirements for GIS

Transit: Support transit and paratransit route planning, modeling, scheduling, customer itinerary planning (e.g. Online Transit Trip Planner Mapping), ADA access, marketing activities, transit operations, and police dispatch.

Regional growth management: Development monitoring, population forecasting, and growth management; Research, influence and communication about the region's land use development; Regional park acquisition, planning and funding; Urban service boundaries maintenance.

Environmental Protection: Surface water monitoring and modeling; Maintaining environmental records; Analytical support for aviation planning and environmental issue management (e.g. noise); Natural Resource Atlas; Using ortho photography to assess lake conditions.

Infrastructure Management: Plan, build, maintain, monitor, and manage sewage conveyance and wastewater treatment facilities.

Housing. Distribution and monitoring of the region's Livable Communities Grant Program, administration of low-income housing programs, provide social services, foreclosure prevention.

<u>Services and Support Received</u>

- LMIC imagery and geocoding web services

- Data and web services from the Department of Natural Resources and the Pollution Control Agency.

- **Road data**. MetroGIS maintains a contract with The Lawrence Group (TLG). The license allows for redistribution to federal agencies (e.g. census bureau), state agencies and metro area governments at no cost. Mn/DOT's road data is outdated by 3-6 years. There is no official data exchange with Mn/DOT. TLG data does not contain information about the number of traffic lanes; Navteq data is used for transportation congestion modeling.

- Training from ESRI, Rowekamp, internal sources.

<u>Future Plans</u>

- Create and implement new integrated transportation/land use forecasting models that will determine growth by jurisdiction and TAZ.

- Expand interactive mapping and other web based GIS products, services and applications.

- Work closer with the **12 counties surrounding the 7-county metro area**. Growth forecasting and transportation planning (e.g. car and van pooling) may expand beyond the 7-county area. **Improve interoperability** with jurisdictions that adjoin the metro area.

- Expand Metropolitan Council's geospatial **reach beyond sharing data** to include sharing application and related infrastructure.

- MetroGIS is working on a **regional geocoding service**.

- Collaborate with non-government organization (NGO) interests to address shared information needs.

- Next Trip is a planned enhancement for the existing on-line transit planner tool. Riders waiting at a bus stop can use their phone to view the **scheduled arrival time** of the next 4 busses.

- The Metropolitan Council recognizes the need for unit level **address points**. Cities are generally the authority for address data. An application is planned for collaborative data development for use by communities that do not have GIS capability. The address standard will be based on the national address standard.

Other GIS or Enterprise Comments and Observations

- One challenge for the Metropolitan Council is learning the right approach to sharing geospatial services. Tools such as LMIC's GeoServices Finder can help users to find services. Mission critical applications demand 24x7 reliability of the services offered. Building trust in those services requires additional tools and documented service level agreements.

- Web technology improvements are likely to greatly improve efficiencies within the GIS enterprise. As web services become routine, the lines between systems and applications will continue to blur. This presents challenges and requires new ways of working with Information Technology support.

- Investments should be made in the state's GIS infrastructure that encourage collaboration and buy-in from local governments. The results of participation need to be tangible.

- A legislative mandate that provides legitimacy is needed for the MGIO to be successful in Minnesota.

- The MGIO should be a resource that explores new technology (e.g. combining AVL technology with cell phones).

- Access to the state's GIS data could be consolidated through one clearinghouse with a standardized set of access mechanisms regardless of where the data is stored.

- All of the state's GIS resources should **not** be in one central organization.

- The state's GIS initiatives need predictability (e.g. the current agency funding of ortho imagery is irregular.

- There should be forums at multiple levels to encourage interaction and cooperation among GIS professionals in the state (e.g. technical users group, GIS management, etc.).

Links

- Metropolitan Council's interactive mapping web pages and information about GIS at the Council: http://gis.metc.state.mn.us/index.asp

- MetroGIS's current business plan: http://www.metrogis.org/about/business_planning/2008-2011_businessplan.pdf

- MetroGIS DataFinder is a one-stop-shop for discovering geospatial data pertaining to the seven county Minneapolis-St. Paul Metropolitan Area: http://www.datafinder.org/

2.16 Department of Corrections

Date of interview: August 1, 2008

Conducted by: Terese Rowekamp, Rowekamp Associates, Inc.
                              Fred Logman, Department of Administration

Interview participants:
Dan Storkamp, Director of Information Technology
Deb Kerschner, Program Manager
Lon Erickson, Chief Information Officer

Agency Overview

- There is essentially no current GIS implementation in the department. In addition, there is an acknowledged lack of awareness of what GIS really is, how it could be used, and where to effectively implement it within Corrections.

GIS Program & Capabilities

- The department currently has no GIS software or dedicated staff; there is limited interest in fee-based access to GIS software and services.

- When completing a one-time project that examined the likelihood of sex offenders to re-offend in the same neighborhood, offender addresses and school locations were mapped using Google.

- A legislative request to identify potential relocation sites for level 3 sex offenders required finding areas at least 1,500 feet from another offender that were also at least 1,500 feet away from the closest school. This project was outsourced.

Data Provided

- Occasional requests for GIS data, mainly from counties, are met by providing data files that include addresses. Any mapping of the data is done by the county.

Constraints

- Corrections staff have a sense of the "intriguing opportunities" that GIS could provide to the department. However, the current **budget** environment imposes limitations on pursuing those opportunities.

GIS Data Requirements & Issues

- Due to the quantity of offender and incident data that is address based, a departmental GIS implementation would very likely require a state-wide centerline file for geocoding purposes.

Data Sharing

- Offender and incident address-based databases within the department are not currently being shared with (nor are requested by) other state agencies. These data are inherently sensitive and there would be data practice limitations if they were to be provided in the future.

- Multiple databases in the department store addresses, which are not necessarily current or consistently entered. Therefore geocoding those addresses will be more problematic. In addition, addresses are not necessarily synchronized across databases, i.e., when an address is updated in one database, it is <u>not</u> automatically updated in another.

Business Requirements for GIS

Services and Support Needed

- A definite need would exist for help in all aspects of understanding, implementing and utilizing GIS within the department should the department decide to pursue GIS.

Future Plans

- The Office of Special Investigations would like to use GIS analysis tools to examine data relationships as an aid in fugitive search and apprehension efforts. This would involve geocoding a variety of address-based data.

- A 3-dimensional analysis of incidents within a facility could help in evaluating the impacts of a policy change in the facility. An example would be mapping and comparing the locations of fights within a prison before and after the introduction of double-bunking.

- The department supervises probation in 55 Minnesota counties (about half of those counties have local supervision of juvenile probation). Mapping of offenders, identified by required level of supervision, would potentially provide logistic planning benefits in the following ways:

  o Plotting efficient routes for offender visits.

  o Coordinating routes between agents by identifying situations where an isolated offender can be more efficiently assigned to an agent in an adjacent district who is already making visits in the same geographic area.

- There is potential interest in overlaying probation data with socio-economic data.

Other GIS or Enterprise Comments and Observations

- Corrections staff have contacted LMIC previously to discuss to better understand how GIS may be relevant within the department and to get a high level overview of LMIC's operation. There is a recognized lack of understanding of GIS generally, including how to approach getting started with GIS. As was stated in the interview, at times they don't even know which questions to ask. Corrections would benefit greatly from being mentored by an experienced

agency with a mature GIS implementation, and if GIS is pursued at a future juncture when need justifies it and resources are available they would be interested in such a relationship.

- Corrections staff summarized their situation as "need help, have no money".

2.17 Department of Labor and Industry

Date of interview: June 17, 2008

Conducted by: Andrew Buck, Applied Geographics, Inc.

Interview participants:
Cindy Valentine, Chief Information Officer
Penny Grev, Director, Benefit Management & Resolution, Worker's Comp. Division
Thomas Anderson, Executive Director, Construction Codes and Licensing Division

Agency Overview

The Workers' Compensation division is one of the two major business areas discussed during the interview. Workers' Compensation, in essence, is the insurer for employees who are injured on the job and work for employers who do not carry insurance. Accidents are investigated, claims are processed, and disputes between employers and employees are mediated.

The second business area discussed was the Construction Codes and Licensing Division. This division is responsible for oversight of the construction trades. Various jurisdiction rules apply depending on the size of the project, the trades that are involved and local municipality capacity. Work areas include:

- Regulation of manufactured home builders, dealers, and installers in the State. The department will eventually regulate the placement of these homes that are not located in city jurisdictions.

- Review plans and conduct inspections for new construction or major renovations to state-owned buildings; school renovations over $100K and state licensed facilities such as nursing homes and hospitals.

- Inspections for smaller projects are sometimes outsourced to this department by some cities in the state. Out of 800 local jurisdictions 550 operate an inspection office but outsource the actual inspections to the state.

- Plan review for all commercial plumbing projects, except for 30 cities where this state activity is outsourced to the local authority.

- All electrical inspections are conducted by 7 area representatives throughout the state who supervise/ monitor 81 contract inspectors who issue approximately 150,000 permits/ year and perform about 300,000 inspections/ year. There are 20-30 cities that conduct electrical inspections. For instance, Minneapolis electrical inspections are conducted by Labor and Industry, but St. Paul conducts their own.

- Issue 120,000 licenses for all residential contractors and building officials. An additional 20,000 1099 independent contractors will soon be added.

- Issue licenses and perform inspections on all boilers, high pressure piping, elevators/ escalators/ trams, amusement rides and boats for hire.

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- Enforcement of regulations on all inland waters not under agreement with the United States Coast Guard - roughly 20 of the largest lakes.

- Response to natural disaster such as wind storms, tornado and floods. Inspectors determine the amount of damage to a structure and apply a placard that rates the structure on a scale of 5 categories from hazardous to fit-for-use.

GIS Program & Capabilities

Labor and Industry has virtually no GIS capability. GIS is viewed as a potential management tool that has numerous uses throughout the department. There is a strong desire to use GIS technology; however, there are numerous constraints that limit implementation.

Constraints

- Lack of funding.
- Lack of staff expertise.
- Lack of access to software.
- Lack of access to good/ needed data: The identification of the owner/ producer of needed datasets is often difficult. There is a lack of standards regarding data. When a desired data set is found, it is often difficult to convert it into a format that is easy to use for L&I needs.

GIS Data Requirements & Issues

Labor and Industry requires access to numerous spatial and non-spatial data sources that are available in other agencies. Finding the data is often difficult.

- Authoritative administrative boundary files.
- Information on State Owned facilities such as park buildings and utility towers (usually with no street address) mostly from DOT and DNR.
- Hospital and school permits issued to trigger inspections and plan reviews. Code Record data (fire safety) is also required.
- State fire marshal (DPS) records for maintenance. Sometime the state fire marshal will issue orders on a building that was constructed differently from the original plan.
- State architect has many valuable records about state owned buildings. Much efficiency can be gained by streamlining access to this data.
- Elementary and secondary schools data from DOE.
- MNSCU (Minnesota State Colleges and Universities) has useful information on post-secondary educational buildings. However, not all buildings have an address.

Labor and Industry has several datasets that it owns and would like to make it easier to share. For instance, information about boiler locations would be useful to a number of public safety agencies.

Business Requirements for GIS

- The task of **locating worksites needing inspections** is time consuming. Providing a capability to use GIS to research and find inspections locations could significantly improve inspection efficiency.

- The use of GIS could improve the **analysis of data** gathered during workers' compensation activities. Types of analysis include:

  o Find regions within the state where employers tend not to have insurance

  o Types and locations of injuries and residential locations of injured employees

- **Location analysis for labor and industry offices.** There are 7 regional rehabilitation offices throughout the state. There is a small office in Duluth that is shared by multiple divisions (e.g. OSHA). In addition, many contract representatives work out of their homes at times traveling to employer sites and injured employee's homes. GIS could be used to analyze work activity to determine optimal office locations and to decide the cost benefits between rental and home offices.

- **Resource allocation planning.** GIS could augment the ability to identify and group spatial location, including:

  o Tracking the progress and monitoring the activity of contract inspectors

  o Managing workload (several nearby inspections versus fewer locations over a larger area)

  o Planning unannounced inspections (perform multiple inspections in one area rather than making multiple trips.)

- **Address validation.** Tools are needed that can identify the jurisdiction that an address belongs to. For instance, in a typical year over 300 electrical inspections refunds are issued for inspections that were performed in jurisdictions not covered by the state.

Services and Support Needed

- The need for reliable information about businesses locations is required. This information need is partially supported by data from the Department of Employment and Economic Development that identifies the entities that pay compensation to individuals.

- Access to good base map data, via an on-line viewer would enable numerous business processes to research, locate and visualize workplaces, job sites, and home locations.

- Access to directions and routing functions are an additional, but less significant need.

- Access to good base map data overlaid with L&I data, such as employment locations or geocoded employee claims, would allow for spatial analysis of data and would a better view into business operations.

<u>**Future Plans**</u>

- As part of the D2E program, L&I is the product of the combination of 5 separate agencies. There are 5-7 different databases to support all of the current business processes. The department is reviewing solutions for one enterprise grade management tool that will support the entire agency. A GIS component to this system is seen as a minor need for this application.

Other GIS or Enterprise Comments and Observations

- Access to well documented and authoritative data owned and developed by other state agencies is the single most need for Labor and Industry.

- L&I would like to be able to choose what they need/want from a catalog of data and services available. This is unlikely to be a service they fill themselves.

- A capable on-line data viewer that uses standardized base data and allows L&I to add additional data layers (e.g. employee injury locations) is a relatively simple application that could have broad impact and produce many efficiencies to the organization.

- There are other uses for GIS technology unanticipated by L&I. Once GIS is readily accessible, there will likely be many new uses discovered. Operations management and legislative communications are two areas where future uses might be discovered.