

GIS IN DAKOTA COUNTY: BENEFITS ADD UP

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Counties need to know if the benefits of geographic information systems (GIS) justify their cost. Recent articles and case studies promise marvelous results from GIS: more cooperation in data collection and analysis, better planning and delivery of government services, better service to leaders and citizens - and all as significant cost savings. Most published cost-benefit studies have looked at improved efficiency in producing the normal products of government, and they have found positive results, with benefit-to-cost ratios greater than 1.0. A few studies have looked at the impact of GIS on effectiveness, the ability to do new and important tasks that were not possible before GIS; these studies show much larger benefit-cost ratios.

The best stories about the value of GIS tend to be stories about improved effectiveness, and this is where the best payoff is too. Yet we do not have many complete overviews of the impact of GIS on a county in Minnesota. We decided to look at the impacts of GIS in Dakota County, which has one of the most developed GIS in the state. This work was done by CURA, Center for Urban and Regional Affairs, University of Minnesota.

GIS in Dakota County

Dakota County has invested eight years and \$2.2 million to develop its system, including computers and software, system administration and staff, data development, and applications. The county Highway and

Planning departments have been using the system from the beginning along with cities who partnered in the development of the system. The county Department of Survey and Land Information has helped these and other organizations use the system capabilities, but some have needed to wait until data critical to them was available for the whole county. County-wide coverage of all major datasets was completed about three years ago. An overview of available data follows.

Built to automate and improve the county's land records, the GIS powers to store, view and analyze geographical data have proven to be much more far-reaching. Tangible uses and benefits of GIS have been as diverse as County programs. Most importantly, as the system moves from development into operation, new uses from supporting tax cases to educating children about water quality continue to appear throughout county government. A cost sharing program with cities and the Dakota Electric Association has meant that benefits have been extended to the municipal level and the private sector.

Within the county, twenty-five out of twenty-nine units, eighty-six percent use GIS or request GIS products. Seventeen, or sixty percent, do so regularly. Ten units have their own GIS capability in-house. The table shows the approximate level of GIS use in the county by unit. (See [Attachment A](#) for a table detailing the use of GIS among different departments.)

The Survey and Land Information Department is the main GIS resource within

the county, and creates GIS products for units that don't have their own GIS capacity. Other custom users keep data and write applications for its specialized use. Routine users maintain and use land records data, but mostly do not use it for analysis. New users are currently putting together the capability to do GIS projects themselves. The remaining two thirds of county units have the Survey department create GIS products when they are needed some on a regular basis, some occasionally, some not at all.

We found many different reasons to use GIS in Dakota County. Automated mapping is done by all departments that use GIS, and has had profound effects on departments such as Planning and Environmental Management. Other automated tasks include generating mailing lists for a selected area, scheduling appraiser or probation officer visits, and automated utility billing. Sharing data among departments increases its use, at no extra cost. Better data improves departments, performance, and helps them give better service to the public. Improved communication with clients and the public comes about because county units can make clearer and more accurate maps, and include more relevant information on them. Lastly, public agencies can use GIS to target public action, and can guide that action using new and more powerful analyses.

EXAMPLES OF GIS BENEFITS

These uses are detailed in the following examples, chosen to illustrate the wide variety of GIS use that exists in the county.

Condemnations. Condemnation proceedings often cause property value disputes. The county attorney uses GIS to show the local area with recently sold properties highlighted and selling prices

marked, giving a good picture of fair market value. The maps ability to graphically convey property value fundamentally changes the several dozen condemnation proceedings a year, and has saved the county millions of dollars in acquisition costs.

New Library Siting. Geocoding the library database showed planners where cardholders live, which library they got their card from, and where there were gaps in library service. From this information, two search areas were mapped with land contours, wetlands, commercial and government centers, calculated population centers, and buildings. The search time for the new Lakeville and Inver Grove Heights library sites was cut in half, at the same time that quality of analysis improved.

Transit Scheduling. DARTS, a private transit contractor serving handicapped residents, is using county highway data for automated dispatching and scheduling in its own GIS. At no extra public expense, citizens get faster service and reduced missed pickups.

Highway Mapping. In previous years making a map of the county's road system took up to three weeks of full-time work, but this year the map will only take about 40 hours. And highway changes will now be entered into the GIS as they occur, so a completely up-to-date version of the map will be available at any time.

Pesticide Education. Staff combined the digitized county soil survey with federal data to make maps showing pesticide leaching potential for soils throughout the county. The maps were distributed in cooperation with the agricultural

extension office and environmental education program. The program won a National Association of Counties (NACo) award.

Selling Tax Forfeit Properties. A GIS map showing location and features can automatically be printed out for every tax-forfeit property that hasn't sold in ten years, enabling the county to either approach adjacent owners or come up with another strategy to sell the parcel. This property-by-property approach could not be attempted without GIS.

Assisted Living Planning. Public health staff collected data on facilities and programs for senior citizens at risk of being forced to move into nursing homes. This data was then mapped with overlays depicting race, population, and income, inured to show the areas of need that are not being served. The result, however, is not a single map but a database which can change with future conditions and assist policy decisions.

Mosquito Control. The County and the Metro Mosquito Control District have long collaborated on a waste tire pickup program, but now GIS will be used to increase its accuracy. The Environmental Management Department is combining Mosquito Control data showing encephalitis-carrying mosquito species with data showing population density and land use to find areas at risk of disease, and to enable Mosquito Control to focus its eradication efforts.

Traffic Planning. This year, the Planning department will use land use data from the Assessor's office and road attributes from the Highway department, both available from the GIS, to create a more complex and accurate traffic trip model

than population data previously allowed. In addition, the new model can be tuned as new information becomes available, or changed to reflect a "what-if" scenario, making it a far more valuable planning tool than before.

These examples clearly show that the investment in a geographical information and land records infrastructure has payoffs across the whole range of local government activities.

CITIES

Some Dakota county cities have been part of building the GIS from the beginning, and have also started to see the benefits of the system. Eleven cities participated in the cost-sharing agreement to develop commonly used GIS data, and they also formed a cooperative economic development program with each other, the county, the county HRA, and a group of private companies. These initiatives have encouraged cities to take advantage of the GIS capability being built at the county level. Cities have concentrated their GIS use in making maps, automating billing and taxing records, and creating databases of economic development information. However, some cities have also undertaken innovative special projects:

Apple Valley is drafting regulations for adult businesses. Planners wished to require as large a distance as possible between adult sites, and from protected uses such as school, but had to ensure a reasonable number of sites would be available. The GIS, by calculating the number of sites available under different scenarios, made the choice clear while saving calculation time on an order of magnitude.

Burnsville used its infrastructure database to calculate the annual depreciation of different kinds of sewer pipe. In addition, a residential equivalent unit for storm water was calculated, which varies depending on a property's land use. These calculations were used to support an infrastructure fee on utilities for new development that accurately reflects its impact on the sewer system.

FROM CONSTRUCTION TO EVERYDAY USE

The benefits gained from GIS have not come easily. They cost the county a lot of time and money. Furthermore, the implementation has not always gone smoothly: the bankruptcy of the county's first GIS vendor required adapting years worth of data to a new system, and there are continuing questions about GIS training, data collection, and sharing resources among county units and other jurisdictions. Most county staff say that the system has not paid for itself yet. But the cost savings and new abilities that have been seen so far are long term. Every staff member we talked to agreed that the investment in GIS is sound, and that new benefits from the system will continue to appear. A repeat of this survey in a few years could follow up on the uses of GIS that are just now emerging, and better determine if this assessment is correct.

In the short period in which Dakota County has been promoting use of its new GIS, several benefits have become clear: savings in time and money; an improvement in the value of data; new abilities of public agencies to address problems; and increased cooperation among those agencies. More importantly, as government resources shirk, GIS is increasing their value both human and monetary and allowing public sector to cooperatively address problems. This is the

true benefit, lasting well into the next century, that will prove GIS in the real world.

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Components of Dakota GIS database *(Summary of different layers)*

- Parcels (with ties to assessor and other databases)
- Political & administrative boundaries (census, zoning)
- Contours, watersheds, and flood plains)
- Road centerlines (with address ranges)
- Planimetrics (roadways, structures, rail)
- Water (open and wetlands)
- Soils, geology, and wells
- Land cover and biologic survey

ATTACHMENT A

USE OF GIS WITHIN DAKOTA COUNTY

Department	In-house Use	Request Products	Non-User
General Services Division			
Assessor's Office	Routine		
Capital Facilities	New		
Employee Relations		Occasionally	
Financial Services			X
Information Technology			X
Property Management			X
Recorder's Office	Routine		
Library		Occasionally	
<i>Historical Society</i>		Regularly	
Community Services Division			
Community Corrections		Regularly	
Community Services Planning		Regularly	
Employment & Economic Assistance		Occasionally	
Public Health		Regularly	
Social Services		Occasionally	
Veterans Services		Occasionally	
<i>Minnesota Extension Service</i>		Regularly	
Physical Development Division			
Environmental Management	Custom		
Highway	Custom		
Parks	New		
Planning	Custom		
Survey and Land Information	Custom		
<i>Soil & Water District</i>	New		
<i>Housing & Redevelopment Authority</i>		Occasionally	
Public Safety Division			
<i>Sheriff</i>		Regularly	
<i>Emergency Services</i>		Occasionally	
Other Offices			
<i>Treasurer/Auditor</i>	Routine		
<i>District Court</i>			X
<i>County Attorney</i>		Regularly	
<i>Dakota Electric Association</i>	Custom		

Departments in italics are run by a separate jurisdiction or an elected official

Twenty-five out of twenty-nine organizations – 86 percent – use GIS or request GIS products. Seventeen, or 60 percent, do so regularly. Ten units have their own GIS capability in-house. Custom users keep data and write applications for specialized use. Routine users maintain and use land records data, but mostly do not use it for analysis. New users are currently putting together the capability to do GIS projects themselves. Other county organizations request GIS products from the Survey and Land Information Department when they are needed – some on a regular basis, some occasionally.