

GIS NEWS

Summer 2001

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MEETINGS & EVENTS

July 9-13

ESRI International Users Conference. San Diego, CA. For more details see ESRI's website: <http://www.esri.com/events/uc/index.html>

July 18

Dakota County GIS Users Group meeting. For more information check the GIS website at www.co.dakota.mn.us/survey

Produced Quarterly by GIS Staff

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GIS 101

What is Thematic Mapping? by Mary Hagerman

It has been said that a picture is worth a thousand words. A map communicates in much the same way. Thematic mapping is the process by which a cartographer attempts to convey a message about a particular geographical phenomenon by portraying it spatially on a map.

Something is geographical if it can be associated with a location. Population is geographical, because people exist at a location; they live in cities, zip codes, and at street addresses. Traffic accidents are geographical, because they occur at a specific location. Therefore, these phenomena can be mapped.

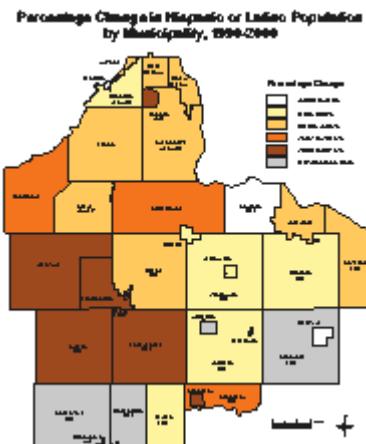
A thematic map consists of two components, the base map, and the map theme. The base map is the usual map fare; roads, lakes, rivers, and political boundaries. They serve as a reference framework for the map theme. The map theme is the main focus of the thematic map, its message.

A thematic map attempts to show a single topic. This is often a statistic of some kind like a rate, ratio, or percentage. It is something that is counted or measured, like average rainfall or median household income. These are examples of quantitative themes, but a thematic map can be qualitative as well. Qualitative maps show types, or categories, such as vegetation type, religious denomination, or political party affiliation.

Whatever the theme, be it qualitative or quantitative, the cartographer must portray it in a manner that is consistent with the message he/she is

trying to communicate. The cartographer will want to include only information that is essential to the map's theme, so as not to clutter the map or garble its message. If the map is to show the average number of automobiles per household, it is not necessary to include automobile type. However, if the purpose of the map were to show a trend toward mini-van ownership, then automobile type would be fundamental.

The cartographer must also decide the best geographic units for mapping the theme. A thematic map can show areas, like counties or states; lines, such as roads; or points, such as cities or address locations. The theme will be some quality or characteristic of the unit, for example, the unemployment rate of states, or the traffic volume of roads.



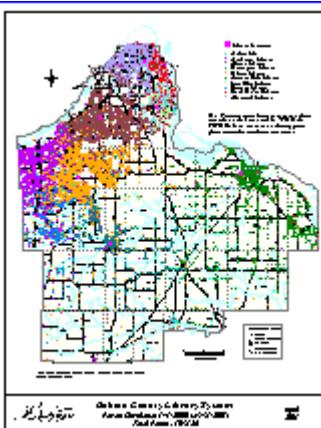
Thematic mapping is the cartographic process of using a map to communicate some geographic concept or distribution. The cartographer determines what to include on the map based on the map's theme, or intended message. The theme can be qualitative, showing what kind, or quantitative, showing how much, or to what extent. The cartographer's goal is to map the data accurately and in such a way that the intended message is communicated clearly. 

Department Spotlight

Using GIS to Identify Library Service Areas by Julie Daugherty

Dakota County Operations Management and Dakota County Library Systems have begun the process of analyzing patron usage at individual libraries. Why is this important? It will tell the County which libraries are being used the most and where those library patrons live. This is valuable information to have when trying to identify if certain libraries are being used beyond their capacity. That is also the first step in knowing if library service areas reflect actual library usage. Consequently, the process assesses whether or not service areas should be re-evaluated and if there is a need for a new library. The results can help library officials identify if and where a new library should be located based on patron location and usage.

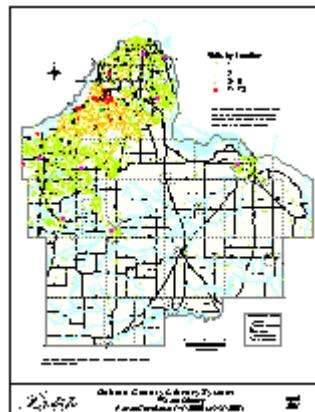
GIS plays a crucial part in this analysis process. Recently, library officials provided GIS staff with data that identified patron visits to Dakota County Libraries. This data included a date of the visit and the address of the patron. GIS staff were then able to geocode the data and create maps that identified where patrons live and which library, or libraries, they were visiting.



Patron visits geocoded and categorized by facility visited

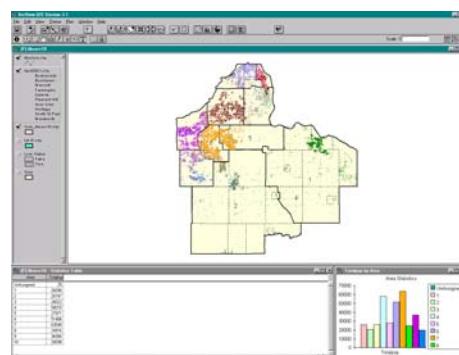
GIS staff were also able to create maps

from this data that identified frequent users of the libraries and where they live. This data was aggregated from the number of visits per address.



Map with usage per address

Additionally, the current library service areas and the 2000 Census data were combined in ArcView with ESRI's Districting Extension. The Districting extension was created by ESRI in order to assist agencies with the redistricting process using 2000 Census data. It allows users to create a set number of districts, or in the case of the Library, service areas, and analyze Census Data based on those areas. As the service areas are changed and manipulated, the summarized census data changes accordingly.



Library Data being analyzed with Districting Extension in ArcView

To complete the analysis of library patrons the Library Service Areas were converted into shapefiles and opened in an ArcView project along with the 2000 census blocks. The Census data were then summarized to show total population for each library service area.

The results were then saved as a "Plan". Each plan may be edited and saved under different names so that different scenarios may be examined. If it is determined that additional service areas are needed, additional Plans can be created. Those additional plans can be created with an unlimited number of service areas. The data can then be examined under a number of different scenarios using the various plans.

By overlaying the geocoded addresses of patrons onto the current service areas, Administrative Planning staff and Library staff are able to identify the trends of where patrons live and which library they are using. This is valuable information when evaluating if service areas are appropriate and if a new service area or an additional library is warranted.

This study is still in preliminary stages and no decisions have been made. When analysis is completed, findings and recommendations will be made to the Dakota County Board of Commissioners and the Dakota County Library Board. Questions regarding the study may be directed to [Ken Harrington](#) at 651.438.4542 or [Bill Asp](#) at 651.688.1533. Questions regarding the Districting Extension in ArcView may be directed to [Julie Daugherty](#) at 952.891.7086. ☎

Desktop GIS

CensusCD 2000, Version 1 by Todd Lusk

"The most recent U.S. Census was taken in the year 2000, right? So where is the data?" The short answer to that question is: "It's coming."

In March of 2001 the Census Bureau

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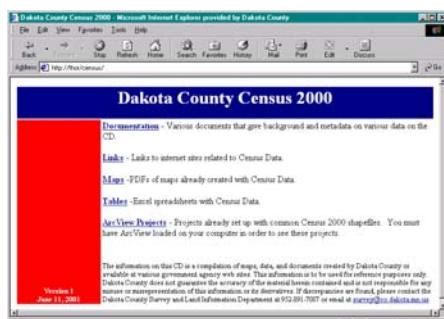
released the Census 2000 Redistricting Data Summary File for the State of Minnesota. Since that time the Dakota County Survey and Land Information Department has been working to develop a "CensusCD" containing census data.

The goal of the CD is to provide Dakota County staff members with access to the often-overwhelming amounts of data available from the U.S. Census. As new Census data become available the CD will be updated to reflect new releases.

The current version of the CD contains some redistricting data, total population counts, and race data at the census block level.

The CD is laid out using an HTML, or web-based, interface. It contains a collection of PDF maps, Excel spreadsheets, Word documents, and ArcView Projects which have been assembled by the Survey and Land Information Department from various sources.

By inserting the CD into a CD-ROM drive the front "Welcome" page should automatically open. If it does not, simply navigate to the CD-ROM drive and double-click on the file called "welcome.htm".



The "Welcome" page provides an interface which allows the user to navigate easily through the CD. Located on the page are links to the following categories: "ArcView Projects", "Documentation",

"Links", "Maps", and "Tables".

The "ArcView Projects" page contains a collection of ArcView projects which have been assembled by GIS staff. Much of the same data located on the "Tables" page are also available from these projects. Unique to the ArcView projects is the adjusted TIGER 2000 Census Block shapefile. As more data is released new projects will be added and older projects updated. The "Documentation" page contains documentation on the various data types and sources. It also contains information for the processes used to create some of the various types of data.

The "Links" page contains links to various Census-related websites that GIS staff have found useful. Included on this page are links to American FactFinder and the U.S. Census web site, among others.

The "Maps" page contains a collection of maps, in PDF format, that have been created for various purposes. Some of the maps contained in this folder were created for use by other departments while others were created only for informational purposes.

Lastly, the "Tables" page contains mostly Excel spreadsheets which contain the Census data. Much of the same data that exists in these tables is also contained in the ArcView projects. The data contained in these tables are available on various levels of aggregation. Data is available at the census block level, the municipality level, the Dakota County Commissioner district level, and by voting precinct.

For users on the County network an ArcView Extension has been created to connect to the TIGER 2000 Census Block file. The extension can be accessed by starting ArcView,

going to File → Extensions and checking the box next to "Dakota County Census2000 Data". The data available on the CD is also accessible through the Survey and Land Information website on DakotaNet (http://dakotanet/survey/SurveyandL_andInformation.htm). Simply click on the "Census 2000" link.

For more information about what is contained on the CensusCD, how to obtain a CD, or to make comments on the CD, contact the Survey and Land Information Department at (952) 891-7087 or by email at survey@co.dakota.mn.us. 

Tech Talk

Basic Cartography by Randy Knippel

Maps are a graphic representation of geographic features. They are commonly accepted as a means of conveying or analyzing different aspects of our world. *Cartography*, or the science of making maps, defines many criteria, rules, and best practices to ensure that maps can be interpreted properly.

GIS provides tools to allow anyone with sufficient technical knowledge to make maps; however, these tools can be applied in many different ways, and there is no guarantee they will be applied properly or most effectively. Many resources are available to increase your knowledge of cartography. A bit of research on the Internet or at the library can produce many books, some dealing specifically with the implications of GIS. Some general guidelines, however, can help prevent major problems and produce maps of a reasonable quality.

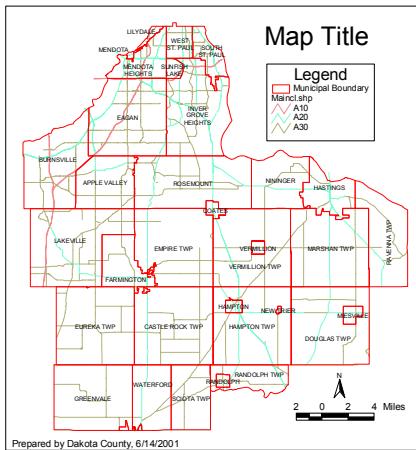
A map should have a clear focus and

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convey that focus in an artistic, visually pleasing manner. Color should be used sparingly and deliberately to enhance the map focus. Map components should be balanced and organized symmetrically. Text and symbolization should be used consistently.

Every map should contain several components including a title, legend, scale bar, north arrow, and printing date. Also, data sources should be referenced, especially if obtained from a source external to your organization.



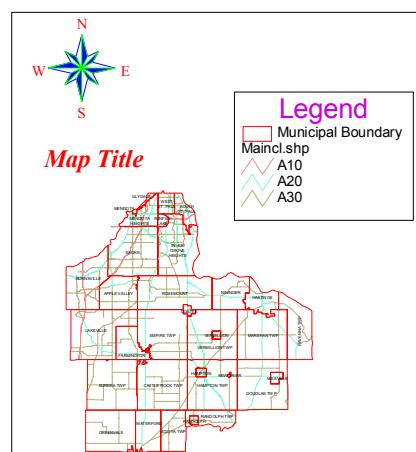
Good example of a map using standard components, symmetry and balance.

You can also include map insets, tables, charts, or other graphics that enhance the focus or readability of the map. Emphasis should be given to the map detail first followed by the title, legend, insets, north arrow, scale bar and references in order of decreasing emphasis. Emphasis can be a product of size, color, and weight, or a combination thereof. The components should also be organized in such a way that they are easily found by the map user.

The size of the final map or the relative size at which users will view it should dictate the amount of visible detail and sizes for the various map components, as well as text and symbol sizes. Don't include

information on the map that will not be visibly apparent at the intended size at which it will be viewed. At the same time, don't use symbol and text sizes that appear too large or detract from the map focus.

Text on a map should generally be limited to one font for all miscellaneous text, including the title and legend. The map detail may use more fonts; however, variations on a single font, such as size, weight, or italics, are more advisable. In general, all text should be black, although there can be exceptions such as names for water bodies and rivers in blue.



Improper emphasis, lack of balance and symmetry, poor use of color and text, and missing scale bar and references.

Color can have very important associated connotations. Generally, 'hot' colors such as red and orange are used to signify negative characteristics and 'cool' colors such as green and blue signify positive characteristics. People tend to have unique color preferences; therefore, use caution when selecting colors for a map. You may find better acceptance for soft, cool pastel colors than bold hot colors. Multiple distinct colors should be used for distinguishing multiple distinct features or data classes. Shades of a single color should be used for classification or data ranges.

	Bad		Class I
	Moderate		Class II
	Good		Class III
	High		21 - 30
	Medium		11 - 20
	Low		0 - 10

Examples of proper use of color connotation.

In general, a map must be treated as an artistic product while maintaining accuracy. It can be a powerful tool for conveying a complex message. The adage "A picture is worth a thousand words..." is very true in this case. However, the interpretation of the message is left to the map user. Every effort must be made to ensure that message is clear and unambiguous.

DID YOU KNOW?

How are the compass rose and the prime meridian related? by Joe Sapletal

The first, now-standard, 32-point compass rose was drawn by Portuguese mapmaker Pedro Reinel (fl. 1485-1535). The compass rose had a fleur-de-lis indicating north and a cross on the east pointing towards the Holy Land.

In addition to the compass rose, Reinel also drew the first latitude scale on the prime meridian in 1506. Zero longitude was located in the Portuguese Madeira Islands for 300 years until the English achieved dominance. Sailors used both standards until a European conference in 1884 ratified the placement of the prime meridian in Greenwich, England.

*Dakota
COUNTY*