You've heard the term, maybe you've met the IT/GIS team, and you've seen the brochures. But what is a GIS? Basically, a Geographic Information System (GIS) is a framework of technology that supports the integration of other capabilities. You won't be using a GIS by itself because it doesn't do more than visualize information and produce mapping products. But when you integrate a GIS with other capabilities—information management, e-government technologies, and model simulation/data analysis—that's when you see the real potential behind the framework of a GIS.

GIS data is meant to be shared—customer service people need it, engineers need it, decision-makers need it, and, ultimately, the public needs it. And, as with most toolsets, there are different levels of capability with GIS tools—different ways to deploy, or implement, a GIS and to share GIS data. Here are a few of the GIS tools you can use and some ways you might use them:

| Maps-Antfarm | (For external access: IMS.ci.grand-rapids.mi.us) A basic-level tool supported by ESRI ArcIMS (Internet mapping services) that allows users to view many kinds of information and share that information with others. For instance, the Planning Department can use this tool to create mailing labels for all the residents in Grand Rapids. City staff can also create simple maps and conduct limited analysis through this tool, which requires very little training. If you know how to use Windows, you can use this tool very easily. |
| Internet Mapping Service | Another basic-level tool available on the Internet to both internal and external users that allows users to share information as they view sets of data relative to a particular entity. An entity (for instance, the City of Grand Rapids or the state of Michigan) places information on a service online; as users need that information, they visit the service and view the pertinent data there. For example, the U.S. Department of Transportation (DOT) is looking at the crumbling infrastructure of the United States, and they are trying to determine how federal grant monies can best be served. The U.S. DOT staff would visit the state of Michigan's infrastructure data online at the Michigan DOT service to view all the data about our infrastructure. That information would help them decide where the federal grant monies would be allocated. |
| ArcMap | A medium-level tool that allows users to do complete spatial analysis. For instance, if the Fire Department wants to locate all the industrial properties that have hazardous material storage within a quarter mile of a school, they would use ArcMap to analyze those spatial locations and create a map with that information. Or, if Neighborhood Improvement has an Access database, they can join it with tables (in a different file format) using ArcMap and pull all that information together for other purposes. This tool requires more advanced training. |
| Geocoding | A more advanced tool that allows users to estimate the location of a point on a line and then place that point on a map. For instance, if Traffic Safety wants to map all the traffic signs they maintain, they can mass geocode them using all the addresses for those signs. The traffic signs might not be in the exact spatial location, but they'll be pretty close. This tool requires extensive training. |
| Extension Products | High-level tools offered by ESRI (such as ArcGIS Spatial Analyst and ArcGIS Geostatistical Analyst) that allow users to perform complex spatial modeling and analysis. For example, using Geostatistical Analyst, the Environmental Protection Department can assess the environmental risk of spills to ground water and surface water flows into streams and the Grand River. With Spatial Analyst, the Planning Department can determine which areas in Grand Rapids are zoned for commercial development and have a high water table on a steep slope (greater than 15 percent). While there have only been a few occasions for City IT/GIS staff to use these tools, the potential for planning and analysis using extension products is tremendous. These tools require extensive training. |
If you think those tools are worth a try, get ready for the next level as you model reality. GIS, in its most powerful form, allows you to strategically plan for the future based on the reality you model today. The true purpose of a GIS is to model real-life events (“what-if” analysis) before they actually physically take place.

Deploy a GIS, and suddenly you’re looking into the future. Using a powerful, high-level tool called a spatial data engine (SDE) geodatabase, users can analyze relationships spatially and model reality through a more intelligent visual representation. You’re seeing not only where things are and how they interconnect, but also how they will behave over time, so that you have a true snapshot of your project before it’s even constructed! Check out these real-life examples of a GIS at work:

**Reality Check #1: Road Closures**

Planning for road closures before any construction or repair work begins can save many people—taxpayers, City staff from many different departments, commissioners—a lot of headaches and grief. Through traffic modeling (SDE geodatabase), City staff can work together to create a map that shows all the attributes of every street needing repair or replacement—this street is a one-way street with two speed bumps, while this street has a four-way stop sign and two cul-de-sacs. Then staff can determine the best detour route based on the roads available, while at the same time ensuring that if other streets in the vicinity need to be closed for other repair work, there is still a viable detour route for all drivers. Once this map is created, City staff and even the public can have access to it, so citizens can know ahead of time what roads are closed.
**Reality Check #2: Housing Nuisance Incidents**

The City is ready to tackle the problem of housing nuisance incidents (trash in the alleyways, overgrown lots, graffiti, undermaintained properties, etc.). There are separate records of all the nuisance calls to the City in the past five years, but City staff need to be able to see where those incidents are the most common so that they can phase the work to be done and then apply grant monies to the different phases. Through GIS extension tools, City IT/GIS staff can join the housing nuisance complaints to the parcels, geocode them, and then give each point on the map a weighted factor, which creates different densities on the map. Using this map, City staff can proactively plan which neighborhoods to concentrate maintenance/rehabilitation efforts on first (according to the densities on the map), as well as determine phasing and funding priorities.

---

**Reality Check #3: Stormwater Modeling**

How about projecting the behavior of the stormwater system in a new subdivision or commercial development before the system is installed? Through GIS and stormwater modeling software, City staff can model reality by making it rain and having the stormwater run off both pervious and impervious surfaces to see how the structures in the system will behave. They can see where the water will flow and at what points it will speed up or slow down. Then they can model plant growth and changes in the environment to see how all these factors will affect the water quality. Assigning these kinds of intelligence to the parts of the system shows them how the system will “behave” over time, and they can plan now for things that might not happen for months or even years in the future. The result is an incredibly viable stormwater system that will serve the new development well for many years.
Are you ready for the next level?

Call Paul Klimas at the number below for more information on training opportunities and directions to the next level of GIS.

Paul Klimas, GIS Manager
phone (616) 456-4205
pklimas@ci.grand-rapids.mi.us

October 2003