



imagine NEWS

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Lower Cost Ideas for Building an Enterprise GIS

By Brooks E. Kelley

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Over the past decade there's been a lot of discussion, and to some degree *hype*, about the concept of "Enterprise GIS." In brief, enterprise GIS is all about making GIS data and functionality available to staff throughout an organization or "Enterprise". Unfortunately, to many the term "Enterprise GIS" has become synonymous with "expensive GIS", often conjuring thoughts of large, technically sophisticated, and expensive systems used by large multinationals and Fortune 500 companies. This, however, need not be the case as there are many reasonably priced tools and processes that can be successfully used to efficiently move organizations towards enterprise-wide utilization of GIS.

This article will highlight several low-cost ideas for deploying GIS data to non-traditional GIS users throughout organizations. Enterprise GIS concepts such as data movement and distributed applications will be explored via real world examples from several Michigan governmental and non-governmental organizations. While individually none of these truly constitutes an enterprise GIS per se, they nonetheless demonstrate certain core themes of the enterprise concept - those being the centralized management and widely distributed use of GIS data and functionality by both GIS professionals and,

more importantly, others within organizations in a manner in which users often don't even realize they're using GIS.

COME AND GET IT

The **Michigan Center for Geographic Information (CGI)** has largely made a name for itself by providing an absolute cornucopia of relatively high quality data *free to anyone at anytime* via their website www.michigan.gov/cgi. This data is not only used throughout state government but also by local governments and private industry. Perhaps more importantly, its data has also been used to jumpstart many a county and local government GIS over the past two decades. More than anyone, CGI demonstrates that if an organization makes information available to its enterprise (which with specific regard to this organization is essentially the entire State and its citizens) members will figure out new, innovative, and useful ways to use it.

While it must be pointed out that CGI exemplifies a data distribution system writ large, all you really need to distribute your data is a centralized distribution point accessible to members of the enterprise. This could be a web or FTP site (which your organization may already have; hosting services are also inexpensive these days) or even a read-only shared drive or folder on your organization's network. So, put your data out there and encourage colleagues to come and get it. For example, make parcel, address point, or street centerline data available to other departments. You may be surprised by how

Who's Doing What in GIS and Spatial Technology



LEELANAU COUNTY

Population: 21,119

Geographic Coverage: 341 square miles (883.186 km²) consisting of 11 townships and 3 villages

Number of Staff: 4, Planning Director, Equalization Director, Planner, Mapping Technician

Budget: \$45,000 for 2006 for contractual services, purchase of software, hardware, special maps, etc. excluding payroll and benefits

PROGRAM STATUS

In 1988, Leelanau County established an information system plan and a year later, purchased a standalone GIS, along with a digitizer and plotter. The system was upgraded in 1995 and 1998. The County changed to an AutoCAD and ArcView system some years later and currently uses these two programs to run its mapping program.

Prior to 1988, all maps were generated by hand on mylar and duplicated one at a time on a blue-ray machine. This old system was time consuming and took a big effort just to prepare basic maps for townships and villages, with little detail on the maps. The Planning Department still utilizes a blue-ray machine for old mylars and aerials, but would like to eventually get all of these historic maps digitized and eliminate this archaic copying system. The department has recently completed a grant application to fund such a project.

The mapping system has evolved greatly since the first plan was implemented. The early setup changed over the course of several years to include various departments which shared the data and information through the computer network structure. In order to achieve this level of communication, the first step was to digitize all the base map mylars into the computer system – a process that took about two years to complete. Once finalized, the Equalization Department entered parcel splits onto the maps, starting in one township and rotating through all 11 townships and three villages. This same editing process is carried out today. Following that initial work, ArcGIS licenses were purchased to allow key departments (Planning, Equalization, Treasurer, and Register of Deeds) access to the mapping data.

The County realized the importance and value in sharing the map data and searched for a way to reach more citizens with this public information. Three computer kiosks systems were purchased and data was added through a small grant from the Michigan Coastal Management Program. Although now outdated, the kiosks were placed in a township hall and two libraries where citizens could access data. The kiosks had to be updated on a scheduled basis, which created a time lapse between actual records on file at the courthouse, and the latest information on the kiosk. Eventually, these were abandoned and funds were sought to develop a website.

Those funds were obtained when the Planning Department took the initiative to apply for an ITIC grant (Information Technology for Intergovernmental Cooperation) – a demonstration project begun by the Michigan Council of Local Governments. This project was led by the Land Information Access Association (LIAA) of Traverse City. It was funded by the C.S. Mott and W.K. Kellogg Foundations and private foundations to demonstrate how emerging information technologies could support greater intergovernmental cooperation in land use planning through information sharing, computer-based analyses, and public participation. The match for the grant, provided by partners in the project, totaled \$60,000, with the Grand Traverse Band of Ottawa and Chippewa Indians (Tribe) contributing nearly one-half the match amount. Partnership agreements were secured with all 11 townships, three villages, all public schools, the Tribe, and a few non-profit organizations. In return, approximately \$170,000 in hardware and software was received and distributed to the partners.

One of the key steps in the mapping process was tying the map data, addressing, and parcel maps into the newly integrated 9-1-1 system. Throughout the ITIC project, LIAA worked on a software program that would link all of the necessary data together and display it on a screen for 9-1-1 dispatchers. The telephone number was tied to the property address, which

LOWER COST ENTERPRISE GIS *continued from page 1*

useful they find it.

Concept: Provide easy access to GIS data throughout the enterprise!

Cost: Free (shared drive or folder) to low (hosted web or FTP site) to medium (web or FTP site).

PUSH IT

Like many Michigan counties, **Chippewa County** maintains several core GIS datasets within its Equalization Department. These data include jurisdictional boundaries, address points, and a fully addressed street centerline layer, among others. This data is of tremendous value to several other departments, most notably Central Dispatch AKA 911. However, because this department is located in a separate building in a different town, movement of this data from Equalization to Central Dispatch has been an issue in the past. This isolation is compounded by the fact that the data is maintained by Equalization in one format and projection/coordinate system and used by Central Dispatch in another.

Today the County uses InfoGeographics' GeoConnector product to, among other things, automatically 1) extract information from Equalization's centralized personal geodatabase, 2) convert it to shapefile format, 3) rename a few fields, and 4) transfer it over the County's WAN to the Central Dispatch office every afternoon. Once there, a relatively simple JavaScript-based ArcGIS macro is executed to "unproject" the data which is then copied to CD and transferred to Central Dispatch's off-network CAD (Computer Aided Dispatch) workstations where it provides 911-integrated map support to the organization's critical day-to-day operations.

Concept: Deliver data where and when it's needed in the proper format!

Cost: Low (software and custom macro)

POWER TO THE PEOPLE

Charlevoix County GIS supplies County departments, local units, and businesses with periodic GIS updates via CD-ROM media. However, instead of simply delivering raw data to these local units, Charlevoix County also supplies them with integrated assessing data and copies of ESRI's *freely distributable* ArcReader software. First, the County uses GeoConnector to extract, summarize, and merge assessing data stored in BS&A's Equalizer database with the County parcel layer. This information, along with other core GIS layers such as orthophotos, as well as an assortment of CGI and other *free* data, is then copied to a series of CDs. A published map file (*.pmf) created using the County's copy of the ArcGIS Publisher extension is also included along with the *free* ArcReader software install.

When a user receives the CDs, using the data is as easy as 1-2-3. First, the user installs the ArcReader product and data on their computer. Then the user starts the application and finally opens the single *.pmf file and, voila, an instant, low cost, interactive mapping solution! While the user does not have access to more sophisticated analytical capabilities such as buffering or geocoding, they can – with just a few minutes of training – pan, zoom, and identify features as well as find features using attribute information such as parcel

numbers and produce simple output. This is what exactly what most users need and want to do!

Concept: Deliver data and the ability to use it!

Cost: Low (software and custom install)

TAKING IT TO THE STREETS

Distributing GIS data and applications over the web is a highly effective method of increasing the utility of GIS to an organization or community. However, commercial map serving software are often relatively expensive and sometimes difficult to configure. And while the price is right for certain public domain alternatives, setup and configuration can be even more difficult than the commercial products they mimic. This is not to dismiss all state-of-the-art Internet mapping software as overpriced or unnecessarily complex but to simply point out that often times getting an interactive map on the web is the most important priority. The **Mason Ludington Brownfield Assessing Project** provides a good case study.

Put simply, this project provides a map-based inventory of brownfield redevelopment sites in Mason County through a standard web browser using Scalable Vector Graphics (SVG). The site was constructed by first creating a map layout using ArcGIS and then exporting it to HTML/compressed SVG format using uismedia's *low cost* MapView SVG ArcGIS extension (www.mapviewsvg.com). Using the extension's export wizard, one can add basic map interaction tools like zoom, pan, and measure, as well tools for feature identification and image hyper-linking. Other GISish functionality includes a fully functional table of contents, overview map, and bookmarks. Visitors to the site can then use freely downloadable SVG viewer plug-ins from Adobe (for Internet Explorer) and Corel (for FireFox) to add the necessary client-side functionality to their web browsers. For an example, see www.infogeographics.com/Brownfields/TakeTwo.htm

Concept: Deliver data and functionality in an easily understood environment!

Cost: Low (software and hosted web site) to medium (software and web site)

CONCLUSIONS

Again, while it may be a bit of a stretch to refer to any of these individual examples as "enterprise GIS", they nonetheless demonstrate certain core themes of the enterprise concept. This concept advocates making GIS data and functionality available to a significant portion of the enterprise, in a relatively familiar and ease-to-use environment, where the GIS know-how and expertise resides largely out of sight or behind the scenes. And while there are many exciting, often expensive, enterprise-class software solutions available, many enterprise-like activities can be done on the cheap. Look around! Talk to your colleagues! In addition to those presented above, other low-cost enterprise GIS type applications are being created daily by IMAGIN members and other GIS professionals throughout the State.

For more information, contact InfoGeographics Senior Consultant Brooks E. Kelley at (231) 995-8266 or bkelly@infogeographics.com

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was tied to the parcel number and all of the accompanying information in the database. The system identified the parcel, highlighted it and brought it onto the screen. This greatly aided the dispatcher in sending out information to the appropriate department and personnel for response. In the event an address cannot be located or identified, the system can narrow down the area to a 1 mile (1.61 km) section of road. This enables the dispatcher to obtain additional information from the caller and pinpoint their location. This original software was a test pilot that worked so well, it was quickly incorporated into the mapping system. The ITIC project was officially completed in the fall of 2003 and concluded with a kick-off celebration to announce the new website.

The 2000 aeriels were added to the system with the assistance of the consultant who scanned the aeriels and put them into a digital format for use on the system. The aeriels were flown in April of 2000 by Abrams Aerial Survey Corporation of Lansing. In April of 2006, the Missouri based company Image America flew digital orthos of the mainland and four islands. The black/white aeriels were completed with a 6 inch (15.24 cm) resolution, 1:1200 (1"=100') Map Scale, 1:9600 (1"=800') Photo Scale Digital Orthophotos, and ground control, at a cost just under \$30,000. Both sets of aerial data are online at www.leelanau.cc and can be used in conjunction with other parcel data information to view, analyze, measure, and print out maps.

NEW PROGRAMS AND ACTIVITIES

In the summer of 2006, an update to the website was completed which now provides a more user-friendly format and access to tax records and recorded documents. Since the kick-off, the website has recorded over 1.2 million hits with the map pages being the most popular area, averaging over 14,000 hits per month in 2006. Also high on the list of top 10 pages for the site are property searches and recorded deeds. Leelanau County also incorporated online services into the upgrade, and set up a paid membership to the site for use by companies in checking property title, tax history, and other property verification.

One concern that has been ongoing since the parcel maps were first digitized is the accuracy of the original maps. Numerous maps were re-digitized and corrected after determining the original mylars contained discrepancies. In 2004, the County's GIS Users Group reviewed this issue and concluded that grant dollars should be sought for GPS work on the remonumented section and corner points. A Coastal Zone Management (CZM) grant of \$20,000 was received for conducting work on First Priority Points within 1000' (304.8 m) of the Lake Michigan shoreline. Two grants received from the

Member News

Antrim County hired Blake Terhune, who is a graduate of Grand Valley State University, as the County's new GIS Technician. His responsibilities include tax mapping, address maintenance for 911, sales study maps, acreage study maps, and other miscellaneous duties. Blake can be reached at terhuneb@antrim-county.org or (231) 533-6320.

The **Federal Emergency Management Agency** (FEMA) has completed the re-delineation of the **Oakland County** flood hazard areas as part of FEMA's Map Modernization project. The new Flood Insurance Rate Maps (FIRMs) that display this data became effective on September 29, 2006. In an effort to provide citizens with easy access to the new flood hazard data, Oakland County has created a Flood Hazard ArcIMS site, available at <http://land.oakgov.com/ims/fema>. The site contains digital boundaries of the new flood hazards areas, as well as links to electronic files (PDFs) of the official FIRM maps created by FEMA.

Oakland County Application Services is seeking qualified, enthusiastic candidates to fill 2 positions: GIS User Support Specialist and GIS Project Manager. Information about the positions is available at www.oakgov.com/jobs.

Did You Know?

Historian Roy Dodge identifies over 1,500 "ghost towns" in Michigan, almost half of which are located in the Upper Peninsula. A ghost town might be a former city or village, a former post office site, former logging or mining camp, or closed railroad station. Some ghost towns are still known place names or have even revived with suburbanization. For more fun with ghost towns, see Dodge's Michigan Ghost Towns (3 vol.) Oscoda, MI: Amateur Treasure Hunters Association, 1970-1973.

From the President



REMEMBERING BILL ENSLIN

On Tuesday, October 17, 2006, the Michigan GIS community lost an innovator, a mentor, and a friend. William "Bill" Enslin died after a sudden and vigorous resurgence of his cancer. His enthusiasm was irrepressible and infectious, and he brought that attitude to every aspect of his life.

Whether it was travel, or wine, or gardening, or Spartan basketball, Bill approached each with zeal, and took challenges and setbacks in stride.

Bill shared his enthusiasm with others. Over more than three decades at Michigan State University, Bill trained countless students and coworkers, most of whom went on to other geospatial careers in Michigan. Bill always believed that better information, in particular better geospatial information, leads to better decision making, and that the key was to empower others with the tools and training to understand and solve problems geographically. Through C-MAP, LandScan, and Michigan Map Image Viewer, Bill helped make geospatial information accessible to local and county governments across Michigan. Bill also contributed his energy to IMAGIN and Land Information Access Association (LIAA), "both committed" to goal of making geographic information available to the people of Michigan.

In Bill's memory, IMAGIN has initiated a Founders' Fund for GIS education in Michigan. These sorts of things take some time to initiate, but IMAGIN's intent is that the fund may be used in a variety of ways - scholarships, workshops, travel funds - that would promote the continued development of GIS in Michigan. Contributions are currently being accepted by mail at the IMAGIN address (on back cover). Please indicate "Founders Fund" in the memo line.

One of the common threads through creation myths around the world is a great flood. Within the Judeo-Christian context, that's Noah and his ark, but similar stories exist in widely diverse cultures. A recent article in the *New York Times* (Meteor theory's impact: Cosmic blows could occur more frequently, by Sandra Blakeslee; November 14, 2006) sheds some light on this commonality and illustrates the value of freely available data to address a question of Biblical proportions.

By way of summary, a group of self-described "misfit" earth scientists from around the world have been using GoogleEarth to scour coastlines around the world looking for "chevrons." These features, such as the Fenambosy chevron in Madagascar, are composed of sea floor material and fossils fused with metals typically formed by cosmic impacts. What makes them more interesting is that these chevrons are frequently very large – Fenambosy is over 600 feet (approximately 180 m) tall – and relatively far inland, frequently several miles/kilometers. These chevrons are postulated to form when large megatsunamis caused by meteor strikes make landfall. However, the megatsunami that these scientists believe form the Madagascar chevrons would have been more than 10 times larger than the tsunami that struck Banda Aceh two years ago. The chevrons have an orientation, and when several point to a common location the researchers then use sea surface altimetry (a satellite-based radar system) to identify the anomalies in the Earth's gravitational field caused by an impact crater. Because of the slightly lower gravitational pull over the crater, sea level is ever so slightly higher. The results of this research indicate that "catastrophic" meteor impacts occur much more frequently than was previously thought – perhaps every couple thousand years rather than every ten to twenty thousand years.

The impact of this research directly addresses our understanding of humanity's place on the planet. More importantly for geospatial folks such as ourselves, this existential question is being addressed with very basic GIS and remote sensing technologies – GoogleEarth is available to virtually anyone with an Internet connection. Sea surface altimeter data is available from NASA directly or in reformatted forms from universities and other sources. It is also a tribute to the innovation possible when data are freely available and accessible. I doubt anyone at GoogleEarth or NASA envisioned their data being used to identify paleo-meteor craters. But because the data - and in the case of GoogleEarth, the software – were free, these researchers were able to gather the evidence to question what was, to astronomers, settled fact. The hypothesis appears well-founded and testable. All that's required are sediment samples from the areas identified as impact craters.

WHO'S DOING WHAT continued from page 4

Tribe totaling \$38,000 provided additional funds for GPS work on Second Priority Points (interior). Five proposals were received in response to a Request for Proposals and the firm of Gourdie Fraser, Inc., of Traverse City was selected to complete the work.

The CZM grant project was completed in 2006 with all data delivered in hard copy and digital format, loaded onto the mapping system, and utilized to correct section maps. An amended contract with Gourdie Fraser, Inc., was then approved in order to obtain GPS on additional "Second Priority Points", which will assist in correcting more maps. Adjustment of these base maps to a more accurate level will help in the entire mapping process – from base maps, parcel identification and new splits, surveys, and location of buildings during 9-1-1 calls. Calculating acreage will be more exact for equalization purposes and establishing taxable and assessed values. There are still many sections throughout the County where the remonumentation and GPS work have not yet been completed.

LESSONS LEARNED/RECOMMENDATIONS

County staff credit much of the program's success to the partnership with the Tribe, and acknowledge it has been extremely beneficial to the County's plan for detailed and accurate mapping. The Tribe has provided several 2% allocation grants for GPS work, aerials, mapping, and purchase of hardware such as a new plotter. The two governmental units also have a data sharing agreement in place to share information and resources. An additional benefit of this data sharing has been the willingness on the part of the Tribe to come under the tax parcel numbering system and addressing. This has been a co-operative effort and has resulted in one system for parcels and addressing to be used throughout the County. Obviously, sharing data and the mapping information has resulted in a great benefit to the citizens, and those who have partnered with the County on projects.

Leelanau County recognizes the commitment and cost they have put into this information system plan, and the need to continue the correction process in order to maintain the most accurate information possible for the municipalities and citizens to access. Continued corrections to the system will enhance and add to this extensive mapping program.

Leelanau County Planning Director Trudy Galla can be reached at (231) 256-9812 or tgalla@co.leelanau.mi.us

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Although sea bed samples have been available for a few of the identified crater sites, several of the most pronounced (and thus presumably most recent) have not been cored. This group of "misfit" earth scientists is having a hard time convincing the National Science Foundation to fund the coring and acoustic profiling necessary to confirm and date some of the largest craters, including the one associated with the Fenambosy chevrons off the coast of Madagascar. Although resources for such expeditions are certainly limited and proposals must be prioritized, some critics suggest the astrophysics community is blocking this project to avoid upsetting the status quo.

But at least one researcher at Los Alamos believes the date to be May 10, 2807 BCE. He arrived at that date by evaluating 175 flood myths globally, 14 of which mention a full solar eclipse, such as can be calculated to have occurred in that area on May 10, 4813 years ago.

IMAGIN President Steve Aichele can be reached at (517) 887-8918 or saichele@usgs.gov

**THE CALL IS OUT!
Don't miss this professional
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Every year, several individuals are recognized for their contributions to the field of GIS at the IMAGIN conference. Nominations are requested for the following awards to be presented at the 2007 Conference:

The **Jim Living Geospatial Achievement Award** is presented to an IMAGIN member in recognition of exceptional career-long dedication and commitment in the field of GIS/Geospatial Sciences.

The **GIS for Everyone Award** is given to an organization that does an outstanding job of making GIS data or analysis available to either organizations or to the public.

GIS Education and Outreach Award is presented to an individual or group that promotes an innovative GIS activity or educational project using GIS/Geospatial Sciences.

Criteria and submittal information is located on the IMAGIN website (www.imagin.org/awards). All nominations must be submitted to the IMAGIN office by March 23, 2007.

Recipients will be recognized at the 2007 IMAGIN Conference awards banquet.

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Our members are committed to improving the quality and availability of digital data necessary to make good use of GIS.

We believe that cooperation and open communication are necessary to achieve these objectives.

Steve Aichele, IMAGIN President

Tara Holmes and Matt Malone,
Co-chairs/Services and Benefits Committee

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