Managing GIS 2
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What Is GIS?

Making decisions based on geography is basic to human thinking. Where shall we go, what will it be like, and what shall we do when we get there are applied to the simple event of going to the store or to the major event of launching a bathysphere into the ocean’s depths. By understanding geography and people’s relationship to location, we can make informed decisions about the way we live on our planet. A geographic information system (GIS) is a technological tool for comprehending geography and making intelligent decisions.

GIS organizes geographic data so that a person reading a map can select data necessary for a specific project or task. A thematic map has a table of contents that allows the reader to add layers of information to a basemap of real-world locations. For example, a social analyst might use the basemap of Eugene, Oregon, and select datasets from the US Census Bureau to add data layers to a map that shows residents’ education levels, ages, and employment status. With an ability to combine a variety of datasets in an infinite number of ways, GIS is a useful tool for nearly every field of knowledge from archaeology to zoology.

A good GIS program is able to process geographic data from a variety of sources and integrate it into a map project. Many countries have an abundance of geographic data for analysis, and governments often make GIS datasets publicly available. Map file databases often come included with GIS packages; others can be obtained from both commercial vendors and government agencies. Some data is gathered in the field by global positioning units that attach a location coordinate (latitude and longitude) to a feature such as a pump station.

GIS maps are interactive. On the computer screen, map users can scan a GIS map in any direction, zoom in or out, and change the nature of the information contained in the map. They can choose whether to see the roads, how many roads to see, and how roads should be depicted. Then they can select what other items they wish to view alongside these roads such as storm drains, gas lines, rare plants, or hospitals. Some GIS programs are designed to perform sophisticated calculations for tracking storms or predicting erosion patterns. GIS applications can be embedded into common activities such as verifying an address.

From routinely performing work-related tasks to scientifically exploring the complexities of our world, GIS gives people the geographic advantage to become more productive, more aware, and more responsive citizens of planet Earth.
Introduction

These articles are reprinted from "Managing GIS," a regular column in ArcNews written by members of the Urban and Regional Information Systems Association (URISA) focusing on GIS management issues.
We have all lived through the past two years of shrinking budgets and staff and wondered whether GIS still matters in 2012. “Of course it matters,” is your first reaction. It must be those that don’t understand GIS that place these burdens upon us to do more with less, as if we are master magicians. But still, how does one go about proving that GIS still matters? By succeeding.

Just because our resources have been reduced doesn’t mean we are entirely hamstrung. There are still opportunities available to us as GIS managers to grow geospatial technology. During these fiscally unsure times, our GIS enterprises can benefit from some healthy pruning and allow us to refocus and think about new and innovative paths for us to explore. Here is my road map:

1. **Clean out the clutter.** This step hurts—I don’t deny it. It’s time to ditch all those old files and manuals you haven’t used in a decade. This will help you reevaluate what is important to your operations and what is just eating up your resources. I have had the same office space for the last 18 years, and the only time I ever purged was when I was pregnant with my twins 4 years ago. So, when news broke of our offices moving, I was struck with dread. Moving is one of the most stressful events one can experience—and for many of us, our offices are a second home. Embracing the idea of thinning out my stash of Solaris manuals and ancient versions of ARC/INFO discs was the best thing I ever did. Be honest—how many of you still have them sitting in a cabinet, just in case we need to go back to command-line editing? Not only did this purging help me realize what I didn’t need anymore, but it was a walk down memory lane, reaffirming what I have accomplished over the years by myself in that office. It also provided a chance to reflect on how far we’ve come. Recycling all the old equipment felt good too. I now have a nice tidy setup for my fleet of tablets where my old dinosaur of a digitizer once stood. During this process, don’t forget to go through all those ancient digital files also—the cost associated

2. **Fine-Tune Operations.**
   - Files—digital and paper
   - Manuals
   - Media
   - Equipment
   - Decide what to keep, archive, recycle, auction, toss out

3. **Focus on Data.**
   - Refresh your data warehouse
   - Reconnect with data sources
   - Create good metadata for your catalog
   - New data brings new opportunities

4. **Networking.**
   - Training, conferences, and user groups are key locations to gain a fresh perspective
   - Make connections and collaborate on projects by pooling funding
   - Sharing services can expand your GIS

Here is a road map to an innovative, clean/mean local government GIS.

GIS Matters in 2012!
Kathryn McSorley, GIS Specialist, Bergen County, New Jersey
with backup systems and disaster recovery for documents that have been replaced can add up quickly.

**Fine-tune your operations.** Think of this as preventive maintenance. Taking the time to make sure your essential services are working optimally will pay off when things pick up again. Once you have a clean slate and are devoid of clutter, take a look at your workflows and try to identify any changes that should be integrated. If you're unhappy with your process to update your parcels, now's the time to make it better. With staff reductions occurring throughout organizations, this is the perfect time to identify and implement those workflow changes. We simply cannot do the same jobs the same way. Take a close look at your servers and see if they are configured to work together in the most efficient way. Few of us have the luxury of unlimited server capacity and unlimited bandwidth, so a careful analysis of these can help pinpoint areas that need attention. You never know what you might discover when you get deep down into your databases and examine the logs. Working with smaller staffs, people are pulling double- or even triple-duty—IT guru, GIS analyst, and SQL admin all rolled into one! It's easy to overlook some of these settings when you're busy switching hats, and you could end up with a runaway log file that consumes most of your free disk space. Now might be the time to get some outside help in getting some of these performance issues addressed. You can help yourself by setting up a calendar of reminders for these tasks to keep your operations on track and your GIS a well-oiled machine.

**Focus on data.** In busy times, it's hard to keep tabs on all the rich data sources out there. Make this a priority when projects are put on hold. Reach out to your local data warehouses to ensure that you have all the most current data available for your area and that it has properly documented metadata. On this point, I have a confession. I am a metadata flunky. I teach all my students about the importance of it, but when it comes to keeping metadata up-to-date, I am a flop. Perhaps 2012 will be my year to redeem myself to my esteemed colleagues who have patiently and fervently preached the values of good metadata. Truly though, data is what drives our GIS, no matter what we use it for. If you want to immediately increase the value of your GIS, tapping into new sources of data can open countless new avenues for applications and usage by your organization. Nothing shouts success better than a brand-new, shiny web app with cool new data!

**Networking is an investment in your GIS future.** When you network extensively with other departments, you can develop an action plan to follow when resources become available, and you will identify ways to pool money for projects that are mutually beneficial. This may seem like an obvious step, but in a budget crunch, we see our travel and training budgets get vaporized. This can stifle some opportunities to network. Staying home isn't the answer. You need to network more and see more examples
of GIS at work. Conferences, either national or regional, offer an incredible value in a tight economy, because they draw people together in a learning environment that fosters the exchange of ideas. Local user groups are also a great way to start extending your connections to work on collaborative projects. Shared services is an approach that is gaining popularity in New Jersey. As a method to reduce redundant costs, municipalities will pay another government entity a fee-for-service for GIS that is customizable to the municipality. This can bring in a revenue stream for a GIS department that has made significant investments in hardware and software and helps offset personnel costs.

So, after you’ve cleaned your office, revamped your workflow diagrams, spruced up your data catalog, and met some creative thinkers who make you want to step on those boxes you’ve been in all your life, enjoy the feeling of accomplishment and success. Your actions during these uncomfortable times will prepare you with a GIS that is efficiently tuned, thoughtfully designed, and ready to hit the road at high speed when the economy turns the corner.

About the Author

Kathryn McSorley, GISP, is the GIS specialist for the Bergen County, New Jersey, Department of Health Services Environmental Division. She graduated from Boston University with a bachelor of arts degree in urban and regional geography and earned her master of arts degree in geography from Hunter College, City University of New York. In 2010, her work on an innovative mobile environmental health application was recognized with an Esri Special Achievement in GIS Award. She is the past president of the Mid-Atlantic Chapter of URISA (MAC URISA) and conference chair of MAC URISA 2012. She is an adjunct lecturer at Fairleigh Dickinson University and a busy mom of three.

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I work in a basement. I bet many of you probably do, as well, or at least don’t have windows. How do you figure out if it is raining outside at lunchtime? I go to isitraining/Columbus (enter your own city—it’s awesome), and it gives me a simple answer in giant letters: Yes or No. Congratulations, you just “did” GIS. But notice that when you go to the site, there is no map or GIS logo, and it is not a rich Internet application full of flashy things. Even if it does some amazing spatial analysis and data gathering, to the consumer, it simply answers the question.

While this example is of something that is lighthearted and fun, albeit extremely practical, the take-home lesson for our profession is that we can have even more impact effecting change and influencing the world if we hone our skills as spatial communicators.

As the world’s population is becoming more geographically literate (knowingly or unknowingly), expectations of us as spatial knowledge providers have risen. To meet these demands and facilitate spatial thinking, we must not only be able to deliver accurate, timely data but also provide it in a way that is easily found, consumed, and understood on any device.

We have been responding to these challenges by growing our skills in GIS tradecraft, data storage, and web technologies, all making great, new solutions possible. While providing these solutions, we need to remember to find balance in system design, application design, data uses, and cartography. For if the solution is not inviting, fast, and easy to use, our customers may simply move on.

The following are selected Zen-based sayings, with our interpretation of them as strategies that we follow toward GIS communication enlightenment in our work at the City of Dublin.

In all things, success depends on previous preparation, and without such previous preparation there is sure to be failure.

As we set out to develop new web applications, we quickly found that we had not scheduled enough time to focus on building our base. There were so many questions, each with many answers. How many servers should we have? How many services? Should services be cached or dynamic? What about security? How do we best ensure good performance? We were thoroughly confused.
To move forward, we had to find a balance between learning and doing while overcoming our fear of making a wrong choice. Using this balance and newfound courage, we focused on planning and building not only a technical infrastructure but also a cartographic infrastructure. To guide service creation, we considered how we wanted to visually present and group our data to create consistency among our applications, maximize server resources, and minimize service management. These activities have allowed us to spend more time focusing on what we are trying to communicate with our final products.

**Water which is too pure has no fish.**

When we began developing services and applications, we were excited to have web applications that finally utilized our live data. This was the highly detailed, accurate, and up-to-date data we had been trained to collect and maintain, and of course, we wanted our customers to see it.

We found a problem, though. For most of our applications, the level of detail maintained in the main data store was simply not necessary, and using it was having a negative impact on application performance. The lower performance drove away customers. We were left with a clean pond with no fish.

To speed things up and bring users back, we had to let go of the idea that the "pure" data was the best data. We do this by utilizing a presentation-tier data store. The data residing here has been cleansed of unnecessary fields and indexed, and it’s had its geometries generalized. For example, there is no requirement to serve our street centerline as intersection-to-intersection segments, so we simply merge them by street name and functional class, creating a much more responsive feature class.

**Eliminate what does not matter to make more room for what does.**

There is great development and sharing going on in the GIS community, especially when it comes to widgets for web applications. We quickly ran into the trap of adding cool new tools to applications for no other reason than that they were cool new tools. We found that this quickly confused and alienated our customers. We now follow a strict rule that if a tool is not required for an application, it does not exist in that application.

Simplicity can also pay great dividends when applied to basemap creation. Removing decision points from the customer, such as

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An example of a tool designed to quickly answer a question.
when to turn on/off certain layers, eases the user experience. We manage layers and symbology for over 15 layers utilizing scale levels, leaving the customers’ focus on more important aspects of the application.

The application level is the most visible area where we try to enforce simplicity. We do have a business case for having a traditional web GIS application. When creating it, it was done so with this strategy in mind, and even though it is full of data and tools, we try to minimize the clutter. More effective are what we call "maplications"—our version of focused applications.

No snowflake ever falls in the wrong place.

To effectively communicate, we must act as the gentle wind acts on a snowflake and guide our customers to the place they need to be. Rather than directing customers to the GIS home page, we try to incorporate our maplications into the appropriate city web page. We see the maplication as just another supporting piece, like an image or chart, to an existing story. Our goal is to have appropriate applications appear contextually during any customer experience with the city’s web presence. For example, if they are visiting the main website, they may find more intricate data and tools than if they are visiting our mobile site. If they are on the road construction page, they will find the road construction maplication rather than a list of street names and dates.

See with your eyes, hear with your ears. Nothing is hidden.

For annual street maintenance, there is a very simple way for residents to gauge the impact of projects on their neighborhoods.

While we try to guide our customers to the appropriate application and then guide their experience by making some decisions for them, sometimes it backfires. For this reason, we have placed a higher value on budgeting time to spend with customers during the design process and after release. We watch, we ask questions, and we encourage criticism.
During these sessions, we try to remove ourselves from our GIS role and think even more like the customer. A helpful question we ask ourselves is, "Would my mother understand this?" We also try to get input from customers that do not know much about GIS.

No flower ever sees the seed.

We try to create applications that help people become spatial thinkers and better decision makers. If we do our job correctly, they will be greeted by an application that is inviting, informing, and easy to use. They may never know they are using GIS.

This is hard for us as GIS professionals; for years, we have been trying to explain what we do and all the great benefits of our robust systems. Now, we are trying to train ourselves that we will probably be most impactful if we can remove jargon and buttons and if we can just roll with it if people call a map a picture or an intricate GIS web application a map. Of course, if they ask, feel free to blast them with a stream of acronyms and technical jargon that would make the GIS forefathers blush.

Conclusion

Our customers’ demands are simple—they want to be able to find without looking, understand without learning, and do it all fast. We can satisfy these demands by building our base, releasing some of our long-held notions about data and techniques, create reusable resources, show only what is needed, tell a story, and listen to feedback. Good luck, and GIS be with you. Now, it's time for lunch—I wonder if it's raining.

About the Author

Brandon Brown is the GIS administrator for the City of Dublin, Ohio, where he has worked for the past eight years. Previous experience includes three years as an analyst/programmer at the Auditor's office of Lucas County, Ohio, and a short but wonderful time at Livingston County.

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Airdrie, Alberta, Canada, is a small city located just north of Calgary. The city covers an area of 33.1 km² (12.8 square miles), is home to 43,155 residents, and employs 374 full-time staff. On staff are two GIS specialists and one GIS technician who provide the core support for the city’s corporate GIS system.

History of Growth

The past 10 years have been dynamic and exciting for the City of Airdrie, as it has experienced high rates of growth through periods of both economic boom and collapse. For example, the lowest rate of population growth experienced over the past decade has been 4.54 percent (2010), while the highest rate has been 11.65 percent (2009), and the findings from the 2011 municipal census determined the city’s population growth to be 8.37 percent year over year. To further illustrate the growth being experienced, the total population increase in Airdrie since 2001 is 22,747—a 111 percent increase. Similarly, the dwelling counts have increased by 10,768—a 156 percent increase since 2001. In contrast to these statistics, many growth planning professionals consider a population growth rate of approximately 2 percent to be a sustainable growth rate.

Dealing with the Challenges of Unsustainable Growth

The current period of unsustainable growth in Airdrie began in 1997. Around that time, GIS became an acronym that city staff started to come across frequently, and by 2001, the city finally decided to invest in this new technology. This decision was made as it became increasingly obvious that GIS could enable the city
to make more accurate business decisions and assist in dealing with the population and development growth that was being experienced.

The implementation phase of GIS at the city was initiated in 2001 and completed in 2003. Since 2002, the city has been using Esri technologies to support its GIS and is currently a subscriber to the Esri Small Municipal and County Government Enterprise License. At that time, however, GIS faced its first major operational concern—who would own it? There were many departments interested in GIS at the city, but finally, after much debate, corporate leadership determined that GIS would be a tool that could support the entire organization and therefore decided that GIS would sit in the information technology (IT) department. This wasn't a decision supported by everyone in the organization, but in light of the dependency of GIS on IT and its related infrastructure, this is, in actuality, the best place for it.

Following the implementation of GIS at the City of Airdrie, departments were able to justify new GIS-related positions based on Airdrie’s increasing growth issues; however, this posed two major challenges to the GIS team. The first was that many of the individuals hired were ill equipped to offer the GIS support needed by their department, as they had only taken a GIS course or two and didn't fully understand the principles of GIS. The second was that some individuals began working alone in departmental silos without seeking support from the actual GIS team. Furthermore, these individuals began offering support to other departments, which resulted in significant confusion and conflicts with staff. To address this challenge, the GIS team, in collaboration with the rest of the organization, defined roles and responsibilities that all parties were able to agree on in an effort to properly support the city’s GIS needs.

In recognition of the obstacles being faced by departments pursuing GIS initiatives, the GIS team developed a new method of customer engagement to be proactively involved, assigning a department to each GIS team member for which they would become the direct GIS support. Originally initiated as a pilot project with the parks department, this new approach started with four dedicated, on-site hours from a GIS specialist. At first, no one was sure how these visits would go, but after only a few weeks, it became apparent that the project could be considered a success, and it was soon rolled out to the rest of the organization. This model was so effective because it allowed the GIS specialist to witness the everyday operations of the parks department and find ways to use GIS as a tool to make those operations more efficient. Another benefit of this process is that it allows adaptability and customization per department. For example, while the parks department works well with four hours per week, the planning department prefers one, whereas public works requires even less time than that, and so on.

The implementation of the service model described above has also created a more organized and efficient environment for the GIS team. By having dedicated departments to support, there
is less ambiguity over who is going to do what and when, which makes for a smoother response to requests. In addition, as demands for GIS resources increase and GIS staff reach their capacity, it is easier to justify the need for more staff and/or consulting dollars, as there is more tangible proof of the work being done. Lastly, all this has increased the team’s customer satisfaction and engagement to a level better than experienced prior to the implementation of this service model.

Managing GIS during a time of growth has been very challenging. One would assume that, during a period of high population increase, obtaining funding would be easy; however, this has certainly not been the case in Airdrie. Since 2001, all aspects of the GIS program have been scrutinized on an annual basis, and the ability to secure adequate funding has relied directly on how effective budget justifications communicate the organizational need for GIS services. These needs are now being better demonstrated in the form of outcomes and deliverables so corporate leaders can clearly understand what they are investing in. Therefore, it is essential for GIS to deliver on its outcomes in order to justify additional resources and maintain corporate support.

An effective GIS program is built on the foundation of knowledgeable and skilled professionals, but it is the dynamics around people management that make staffing complicated. Staffing consists of more than just hiring and firing, as it involves discipline, recognition, rewards, and a strong organizational culture. In regard to the hiring processes, there have been challenges in the recruitment of skilled individuals. This has been mostly attributable to the economic boom in Alberta from 2002 to 2007, which reduced the pool of skilled GIS professionals that was available. Coupled with this, the financial benefits of working in the private sector have often placed the city at a disadvantage when recruiting staff. Unfortunately, this problem persists, but one method in which the city has attempted to overcome this disadvantage has been its commitment to an open and honest culture that fosters personal growth, development, and professional creativity. For the GIS team, this has resulted in only one cycle of significant staff turnover in the past 10 years. Ultimately, if you can make work a fun place to be and demonstrate that each person has the power to make valuable changes, people will want to work for you; at the City of Airdrie, this is where most success can be attributed.

Overall, it may not matter whether you are supporting a GIS in a municipality that is experiencing increasing or decreasing growth and budget pressures, as many of the difficulties facing GIS operations are the same. There remains a continuous need to justify how GIS adds value to the organization. This is a burden that every GIS professional has, and it is the knowledge, skills, experience, and creativity that each of us possess as GIS professionals that will help us meet the challenges of today and the future.
Recognitions

In 2009, the City of Airdrie was the recipient of the URISA Exemplary Systems in Government (ESIG) Award in the Single Process category for its development of the Online Census. In 2010, Airdrie’s Tourist map, created by GIS specialist Jessica Letizia, won first place in the Best Cartographic Design in the Single Map Product category at the Esri International User Conference.

About the Author

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(This article originally appeared in the Fall 2011 issue of ArcNews.)
Let's Exchange Competition for Cooperation
Claudia Paskauskas, GIS Manager, East Central Florida Regional Planning Council

I would like to invite you on a trip back to our childhood. Let's think of the time that we were around two or three years old. Do you remember how the playground rules were back at that time? Lots of children playing with lots of toys. It was so hard to share our toys with somebody else. But then, all of a sudden, a little kid would come from nowhere wanting to play with our toys and keep offering his for us to play with until we finally decided to give it a try. It was always a hard decision to make—sharing our toys and playing with somebody else's—but it was always enjoyable and rewarding doing so because then we had a friend to play with, and things from that point on became way more fun than when we played alone!

Fast-forwarding and getting back to our current time, when we think of GIS collaboration, things are not much different from the playground rules. We have our data, our applications, our techniques, our models, our layers, and our services—our toys. And it's so hard to share them with others for reasons that vary on a case-by-case basis. Sometimes we have unique techniques and we don't want to share that with the competition. Other times, we just don't want to go through the entire documentation process that can take time to be completed. Yet other times, we just forget to scope time in our projects to share the final product with the GIS community via the clearinghouses and other resources, not to mention what it takes to collaborate in terms of stretching our comfort zone, exposing our work to peer evaluation, and many other reasons that we could write an entire new article about. But then your coworker encourages you to attend a local GIS user group meeting, and you listen to that presentation that gives you hints about how to improve your own
Let's Exchange Competition for Cooperation

project. Another situation could be how great it feels networking with other GIS professionals during a conference or during a GIS professional organization after-hours event just because you could help someone else answer a question that had been puzzling them. The point I am trying to make here is that it takes a leadership attitude to enable and accomplish collaboration.

One of the most basic leadership principles emphasizes the importance of individuals taking single steps to create big impacts. A leader doesn’t need to be someone that’s in a decision-making position or have formal authority. A leader is someone who can socially influence others to accomplish a common goal. Leaders come in various shapes and flavors. Leaders are simply messengers of new ways of thinking or transitioning processes or are simply supportive of new ideas and concept development. Leaders often are mentors. Leaders are passionate about what they do. Leaders engage. Leaders share, guide, and facilitate accomplishments. Leaders always strive and shine in what they do. Usually when you teach, you end up learning and knowing way more than that audience you are trying to educate. And that is just one of the beauties of having a leadership attitude.

Some people freeze when the word leadership is said aloud. Others think that being a leader is too much trouble, and they are already busy enough at work to get one more thing added to their plates. A common mind-set when the subject is leading can be easily illustrated in the following question: Why would my county, city, or even self want to collaborate and promote common professional growth in local GIS user group meetings, write articles, or mentor someone when I alone can deliver the highest-quality GIS projects on a daily basis?

One might also wonder why a GIS professional would want to do more than their own daily work. Why would a GIS professional want to contribute time, knowledge, and expertise to GIS professional organizations, local GIS groups, and data clearinghouses, aiding other peers and/or organizations and enabling them to grow stronger?

The problem embedded when someone thinks of these questions is more fundamental than it seems. The reality is that some professionals think they can survive forever by just flying solo. That notion clouds their ability to see the benefits of working and growing together.

By simply not being on the same page, this thinking may have effectively caused several significant duplications of effort and service. Loss of time. Loss of money. Loss of momentum to grow strong together as a knowledgeable GIS community. Loss of the opportunity to make a difference and be part of the solution. That’s what happens when we don’t have the mind-set of collaborating and sharing.

If all sides of our GIS community collectively discuss the common wants, needs, standards, and guidelines, duplication of efforts will not be an issue. Then, through collaboration, we can support
Let’s Exchange Competition for Cooperation

the GIS community during these difficult economic times where budget constraints can unfortunately hinder success. History shows why collaborating is better than competing. When team players, being competitors or not, get together to help communities recover from unforeseen events like natural disasters, everybody wins. The community gets back to its normal life faster, jobs are created, knowledge is shared, and professionals get their skill sets sharpened. It’s a win-win situation. No competition. Just collaboration!

The overwhelming support and participation of many GIS professionals, counties, cities, and organizations indicate that the GIS community would like to continue to work together. Pulling and tugging in different directions does not seem to make sense when we have collaboratively achieved better results shortcutting in project development by simply utilizing data that has been shared. Other successful proof that working together as a solid regional GIS community is worth it is reflected in the relationships built during several GIS functions, such as user groups, GIS Day celebrations, workshops, conferences, and specialized training.

For our GIS community to succeed, we must work together on projects and educational opportunities that make sense. Let us not be mistaken—competition is out there, and it is healthy. However, our spirit of competition needs to be a productive one that only makes us work harder and be that much stronger.

Working as a solid community means that everyone involved gets a little dirty, because we’ll have to work at it. It’s going to be work, but it’s work worth doing. But the greater goal—not personal gain—has to be at the heart of what’s driving us.

Ultimately, building a strong regional GIS community isn’t something that can be accomplished by a handful of people. If something is to get done, it will be by individuals that simply have a passion for some segment of the work that’s to be done.

Maybe that passion is in improving education and mentoring someone, developing grassroots efforts by being a mentor in local schools or maybe supporting the planning and execution of user groups, regional events, and newsletter publications. It could also be by volunteering with GIS professional organizations or even simply sharing data or supporting the development of new, needed data guidelines.

Regardless of the specific area of interest, the important factor is to simply become involved and help be a solution to some of our GIS community’s issues and needs. One action at a time. Being a leader or just following one. Sharing your toys.

The sooner we all realize that cities; counties; organizations; companies; and, most importantly, professionals cannot survive without each other’s collaboration, participation, and understanding, the better off we will all be.
I encourage you to share your toys. Going solo is good, but by traveling the journey together, we can accomplish much more.

About the Author
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Photo credit: Gina Marchica. Credits for the passion to carry on my mission of inspiring GIS peers to give their best and make a difference: the ECFRPC GIS team and CFGIS community, FLURISA, and URISA members.

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As George Bernard Shaw stated in Maxims for Revolutionists, "He who can, does. He who cannot, teaches." This theory may hold some truth, but providing public participation geographic information systems (PPGIS) in an academic environment has similar, if not greater, challenges, since program implementation does not have the force of law or continuous financial support. My experience as a former licensed real estate appraiser and City of Ithaca, New York, GIS planning analyst strengthened my perspective as a former GIS manager at Cornell University and does so currently at the University of New Orleans. GIS technology allows planners to share both neighborhood and municipal data, but not typically within the same environment. This article focuses on how the WhoData (www.WhoData.org) Internet mapping service website moved the PPGIS concept into a New Orleans community data information system that works.

Background
The University of New Orleans Department of Planning & Urban Studies (UNO-PLUS) (www.planning.uno.edu) is part of a city university where students apply planning theory to practice, or "praxis." The need for the planning community to work closely has never been greater than after Hurricanes Katrina and Rita in 2005.

Community-based organizations, as citizen planners, significantly aided the recovery by identifying health and safety needs while prioritizing the cleanup of abandoned or blighted properties. Many local and out-of-state intermediaries, community-based organizations (CBOs), and university partners had good intentions, but the collection of neighborhood condition survey data was not synchronous, coordinated, or shared. In August 2010, the City of New Orleans Planning Commission approved the New Orleans master plan, Plan for the 21st Century: New Orleans 2030, which included a mandate to "establish a formal community data.
participation program (CPP)” that may include a community data information system (CDIS) (City of New Orleans Master Plan, Section 15, 2010). WhoData was not created in response to the CPP but may support the CDIS since it is accessible to all.

Responding to Postdisaster PPGIS
In fall 2006, I served as the GIS team manager for the Association of Community Organizations for Reform Now (ACORN)/University Collaboration, which developed A People’s Plan for Overcoming the Hurricane Katrina Blues for the ninth ward. This neighborhood plan was adopted by the City of New Orleans Planning Commission in spring 2007. Community-university-municipal PPGIS projects are typically customized for a single semester and serve a limited number of community clients. Since UNO-PLUS could not develop a GIS or manage the training needs of multiple organizations, creation of an Internet map service (IMS) was the next logical phase. In fall 2009, a PPGIS collaboration was formed with Neighborhood Housing Services of New Orleans (NHS), the Regional Planning Commission (RPC), and UNO-PLUS to further advance the www.planning.uno.edu website. By design, UNO-PLUS adopted the role of GIS manager of the IMS.

Outlined below are best practice standards that were used by this UNO-PLUS GIS scholar to manage the www.planning.uno.edu website from inception (summer 2009) to the present.

Project Scope/Planning: Identify and Evaluate Priority Public Policy Issues
The WhoData website includes neighborhood data and is modeled after many successful municipal data information systems. Dr. Joseph Ferreira, Jr., et al suggest that a "middle-out" approach combines the benefits of top-down and bottom-up initiatives while largely avoiding their respective pitfalls. ("The Future of Spatial Data Infrastructures: Capacity-Building for the Emergence of Municipal SDIs," 2007). New Orleans residents, investors, and municipal government departments need parcel-level data that identifies areas of blight, recovery, and renewal. However, until now, there hasn’t been a unified approach to collecting the neighborhood condition survey data in a format that can be seamlessly integrated with city data.

Contracts and Services: Establish a Community-University-Municipal Project Scope and Service Contracts
Funding initially hampered server installation, but through the support of the University Computing Center, we were able to leverage the in-house computer support with high-end security, appropriate backup, and ongoing technical support. In fall 2009, GISCorps (www.giscorps.org) provided a generous gift of programming services using ArcGIS. Rafael Ferraro, GISCorps volunteer programmer, worked well beyond his call to duty and brought our dream to a reality on February 1, 2011. The
collaborators were a web development team holding virtual project meetings for more than a year.

It was equally important to find a community partner willing to volunteer with IMS beta testing and share community survey data. We also needed a municipal partner that could provide regional data and suggest protocols that meet with Federal Geographic Data Committee National Spatial Data Infrastructure (www.fgdc.gov/nnsdi/nnsdi.html) standards. David Lessinger, project manager and GIS professional from NHS, and Lynn Dupont, principal planner/GIS coordinator for RPC, filled these roles, respectively.

Team Building: Evaluate the Team Skill Sets and Develop a Plan to Increase CBO Capacity Through Training

NHS, RPC, and UNO-PLUS worked diligently to craft an outreach plan, establish survey data training, develop instrument standards, provide survey map services for in-field data collection, and identify neighborhoods that were in need of support. In spring 2010, organizations that conducted resident-led and volunteer neighborhood surveys discussed interorganization collaboration and data sharing mechanisms. While some of the organizations possessed staff, time, funding, and the technical ability to conduct surveys and implement a GIS, many could not.

As of January 2011, participating organizations include Associated Neighborhood Development, Broadmoor Improvement Association, Faubourg Lafayette Neighborhood Association, Gentilly Terrace & Gardens Improvement Association, Jericho Road Episcopal Housing Initiative, Lowernine.org, New Orleans Neighborhood Development Collaborative, NHS, Phoenix of New Orleans, Project Homecoming, RPC, and UNO-PLUS.

Project and Data Management: Identify Data Requirements, Municipal Services, and PPGIS Staff That Will Support the Project

Negotiating data sharing contracts with CBOs has not been difficult since the WhoData team remains transparent and willing to work with any and all stakeholders. We expect that site customization issues will arise as citizen feedback is obtained after the phase I site release in February 2011. On January 20, 2011, the parcel layer file was released to the public by Denice Ross, interim GIS manager for the City of New Orleans GIS Department. Access to this layer will now allow public and private GIS professionals to openly integrate parcel-level community survey and municipal data within a shared spatial environment.

Reflection

An academic GIS manager must create decision support systems and conduct business in a manner similar to a municipal GIS professional. The project management limitations are the same for those in any GIS environment: lack of time, money, and capacity. These can be minimized by identifying nonuniversity
resources that share a similar vision and provide pro bono, nonproprietary services and implementing a project plan that has a longer trajectory than would be deemed profitable.

As the face of the new New Orleans shifts, so will the needs of the community. The [www.WhoData.org](http://www.WhoData.org) website will make this change more transparent, support citizens, and assist our city officials with developing policies that reflect the shape of a city reborn.

**About the Author**

Michelle M. Thompson, PhD, has been an assistant professor in the Department of Planning & Urban Studies at the University of New Orleans since 2008. Thompson has provided real estate and market valuation services for over 20 years. She received her bachelor of arts degree from Syracuse University in policy studies, her master’s degree in regional planning, and her doctor of philosophy degree from the Department of City & Regional Planning at Cornell University. She is currently the vice president of the Louisiana chapter of URISA and a member of GISCorps.

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Avoiding Last-Minute Metadata Misery
Ryan E. Bowe, GISP, GIS Technician II, Photo Science, Inc., and April H. Davis, GISP, GIS Analyst III, Southwest Florida Water Management District

All GIS professionals have had to read metadata to determine details about the data. And some “lucky” users have had the opportunity to write the metadata. More often than not, this task is not addressed until the end of the project. Just when the end is near, someone usually chimes in with “What about the metadata?”

Everyone dreads eleventh-hour metadata requests. They seem to get tougher every time: the first project required a last-minute Federal Geographic Data Committee (FGDC)-compliant file; the next project mandated completing all optional fields relevant to the dataset. Although few metadata authors are willing to admit it, many are guilty of fixing last-minute metadata requests and then immediately trying to develop amnesia for the entire painful process. The last straw for some might be attempting to use a profile they have never used before. The problem is that no one can predict the future or read minds. Not all the variables will be known until the data you are describing has been completed. When a template is not provided, a metadata author needs a crystal ball to figure out if what they write will be descriptive enough for a user. Excuses will always be plentiful, and writing metadata will always be one of the last steps to completing a project. It’s time to stop developing excuses and start planning for last-minute metadata requests.

Develop a Template
For a governmental agency, standard language for the data’s usage, distribution information, and contact information is probably predetermined, so why not create a metadata template that already has those fields populated? Templates are the most powerful tools to ease the anguish of last-minute metadata requests. They provide a method of introduction to new software interfaces. While the occasional new requirement will arise, existing templates may provide components of sections that will be the same. For example, projections that are frequently used within an organization can be quickly added.

The Southwest Florida Water Management District (SWFWMD) held a metadata workshop with state GIS professionals and various mapping vendors. The workshop focused on developing an FGDC-compliant metadata template for orthophotos, but the same principles can apply to all types of data. In fact, SWFWMD used the orthophoto metadata template to develop a similar template for lidar. The group agreed on specific details that needed to be included in the abstract, source material, logical consistency, and process steps sections. Going through each of the sections allowed the group to decide on the best
Avoiding Last-Minute Metadata Misery

information that would benefit everyone. A template that could be distributed to any GIS firm was created; the result was a document that essentially allows users to simply fill in the blanks. When the metadata compiler opens the metadata template file, the information that needs to be populated is immediately evident. As a bonus, there is no need to worry about contact or distribution information, because this has been prepopulated in the template.

Once a new profile has been accepted by an organization, a template is nearly complete. All that remains is the insertion of some form of tag or comment to denote a field that will need to be updated when the profile is used again. Also, with one round of reviews completed, an organization will have a better idea of how users are utilizing the information provided in the metadata. A list of elements that are frequently requested or potentially difficult to populate can be compiled. Most organizations will produce and document the same types of data on a recurring basis. Templates for each data type could be developed. For example, with orthophotos, it could be as simple as having a template for four-band, half-foot; three-band RGB one-foot; and three-band color infrared one-meter templates ready to edit.

Having difficulties constructing the templates? That could be helpful! Learning more about the standard will facilitate better metadata completion. Therefore, it is best to obtain a copy of the metadata documentation to determine exactly which elements are mandatory and which are optional. Also, using an existing metadata file from your organization will help show what type of information is required and to what detail the metadata should be completed, or even perhaps what information is missing. Data stewards within an organization often receive many inquiries for information about the data. If there is a particular detail that is often requested, make sure it is included in the template. Of
course, not everyone checks the metadata before calling or e-mailing, but at least having the details available gives the data steward a place to direct the user for more information.

Working with the data users within an organization, as well as with the firm producing the data, to create a template is a win-win situation for everyone. It lets the organization identify all the information it would like within the metadata, and it saves the firm creating the data from looking into a crystal ball to determine its client’s exact needs.

### About the Authors

Ms. Ryan E. Bowe, GISP, has been working at Photo Science, Inc., of Lexington, Kentucky, for six years as a GIS technician, as well as an alternate sensor operator. She has her bachelor of arts in anthropology and sociology from Centre College of Danville, Kentucky. April H. Davis, GISP, has been working at Southwest Florida Water Management District in Brooksville, Florida, for five years as a GIS analyst. She has her bachelor of science in geosciences from Mississippi State University and her master of science in geography from University of Florida. Both authors participated in the Department of Transportation Metadata Conference, and Davis led the Southwest Florida Water Management District metadata conference in which Bowe participated.

To learn about metadata creation and editing in ArcGIS 10, see esri.com/what-is-metadata.

(This article originally appeared in the Summer 2012 issue of ArcNews.)
One Saturday shortly after moving into my first house, I awoke to hear a drip, drip, drip sound coming from the bathroom. "Honey," my wife said, "there's a leak in the bathroom sink." "No problem," I replied, even though I had never repaired plumbing before. "I'll git 'er done right after breakfast."

Six hours later, after a bumped head; scraped knuckles; and three trips to the hardware store for tools, fittings, and gaskets, I had "got 'er done." The next time I had a leak, the repair process went much faster, because I applied my previous experience.

I didn't realize it, but I had just progressed through the first two stages of a process capability maturity model (CMM). My first effort was ad hoc and chaotic. I advanced to a repeatable process, recalling and applying steps I had used to fix the problem before.

Homeowners manage complex systems that provide shelter and safety; a means to store and cook food; and a place to rest, socialize, and recreate.

As local government GIS managers, we operate and maintain systems that are more complex than our abodes and represent huge investments supporting a wide range of government business needs. The maturity level of our processes relates directly to the effectiveness of our GIS.

What Is a Capability Maturity Model?

A capability maturity model assesses an organization's ability to accomplish defined tasks. The CMM concept originated with the Software Engineering Institute (SEI), which published Managing the Software Process in 1989 to assess software contractors' ability to successfully complete large software development projects.

The CMM concept has since been applied to system engineering, project management, risk management, and information technology services. A CMM assesses an organization's maturity level based on how it executes individual processes. The maturity levels are usually defined as:

- **Level 1: Ad hoc (chaotic) process**
- **Level 2: Repeatable process**—Based on the previous successful methodology
- **Level 3: Defined process**—Successful processes documented to guide consistent performance
• Level 4: Managed process—Documented processes measured and analyzed
• Level 5: Optimized process—Defined and managed processes refined by ongoing process improvement activities

GIS Development Life Cycle: When Is GIS "Complete"?
GIS development ideally progresses toward full maturity. Often begun as a project to create the "best GIS possible" with limited funds, GIS program development involves frequent compromises. Components of an ideal GIS program are often deferred to go operational quickly and start delivering return on investment (ROI) for the agency. The end of a GIS implementation project does not mean that the agency has a complete or mature GIS.

Managers usually know their GIS could benefit from refinement, but funds, staff, or time for further development are difficult to acquire. Enhancements may be developed as part of GIS operations but rarely on a systematic basis with a desired end goal.

GIS Benchmarking Studies and Maturity Assessments
Benchmarking studies compare an agency's GIS with other peer organizations. They can identify industry best practices, resource and service-level imbalances, and process improvement areas.

Because of the significant time and cost required, benchmarking studies are rare.

Maturity assessments are not well developed within the realm of local government GIS, but the National States Geographic Information Council (NSGIC) is developing a statewide Geospatial Maturity Assessment (GMA).

Why Develop a Local Government GIS Capability Maturity Model?
An old management adage states, “You can't manage what you don’t measure.”

For any local government GIS program, ROI increases as the process capability maturity level of the GIS staff increases. If we accept this hypothesis, a GIS CMM can provide an indication of the ability of local agencies to realize the potential benefits from their GIS investments.

Many of the processes that have had the CMM approach applied in the past are themselves components of GIS. It is useful to think about a GIS operation in theoretical terms, then analyze and measure individual GIS operations against this ideal end state. A GIS CMM allows local GIS operations to gauge their capability and maturity levels against a variety of measures, including

• A theoretical end state of GIS data, hardware, and software infrastructure
URISA's Proposed Local Government GIS Capability Maturity Model

URISA's proposed model indicates progress by an organization toward GIS capability that maximizes the potential for the use of state-of-the-art GIS technology, commonly recognized quality data, and organizational best practices appropriate for local agency business use. The URISA GIS CMM assumes two broad areas of GIS development: enabling capability and process execution ability.

The GIS CMM assumes that mature agencies have well-developed enabling technology and resources and that their processes maximize the effectiveness of their GIS infrastructure. Enabling capability includes technology components, data, professional GIS staff, organizational structure, and other resources and infrastructure. Execution ability is the competence of the staff to use the available capability and provides an indication of the potential for increased ROI.

The enabling capability assessment includes 21 components with a scale modeled after the NSGIC GMA. Because GIS-enabling capability is dependent on resource availability, the GMA scale (with its resource-commitment focus) is well suited to indicate capability.

The execution ability assessment includes 14 components and is modeled after the typical CMM process-based, five-level scale. Because the execution ability of a GIS depends on its process performance, the typical CMM assessment scale (with its focus on process execution) is well adapted to measure ability.

Current Activity and Next Steps

URISA's draft GIS CMM was completed in 2009 by 12 counties and 19 cities in Washington state. Results were presented at the 2009 URISA Annual Conference and at GIS conferences.
in Oregon and Washington in 2010. A three-hour GIS CMM workshop was held at GIS-Pro 2010 in Orlando, Florida. Feedback has been solicited and agencies invited to complete the assessment to expand the base of knowledge about the maturity level of local government GIS.

NSGIC has been informed of GIS CMM development, and there is interest in utilizing local agency GIS CMM assessments to inform state-level GMAs. The GIS CMM was presented to the National Geospatial Advisory Committee (NGAC) in Washington, D.C., in September 2010. NGAC is interested in the development of metrics for the National Spatial Data Infrastructure (NSDI) and sees potential for the GIS CMM, the GMA, and the Coalition of Geospatial Organizations’ (COGO) proposed National Geospatial Technology Report Card to provide the means for measuring development of the NSDI.

The URISA Board has indicated its support of further development of the GIS CMM. Future refinement of the model itself and a means of institutionalizing the model are needed. One suggestion is to use an approach similar to the Green Building Council’s LEED Certification program. For the GIS CMM, this might mean the submission by local agencies of a portfolio with the self-assessment for a peer-based review process to certify an agency’s maturity level.

URISA is currently considering a means of refining the model and developing recommendations for implementing it on a sustainable national basis.

To see the current version of the model, visit tinyurl.com/GISCMM.

About the Author

Greg Babinski, GISP, is the finance and marketing manager for the King County GIS Center in Seattle, Washington, where he has worked since 1998. Previously, he worked for nine years as GIS mapping supervisor for the East Bay Municipal Utility District in Oakland, California. He holds a master’s degree in geography from Wayne State University, Detroit, Michigan. Babinski is the president-elect of URISA, to become president in October 2011.

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Geospatial Society, the GIS Profession, and URISA's GIS Management Institute

Greg Babinski, GISP, Finance and Marketing Manager, King County GIS Center, URISA President

At around the time that this article was published, URISA held its 50th annual conference—GIS-Pro 2012—in Portland, Oregon. URISA—the Urban and Regional Information Systems Association—originated at a time when geospatial technology did not exist. Indeed, as Jack Dangermond recently reminisced (ArcNews, Summer 2012: "URISA at 50: An Interview with Jack Dangermond"), the history of GIS development is linked closely with URISA.

Past

The world of 50 years ago was much different, with a total population of less than half what it is today. Geography as an academic discipline was struggling for relevance, and GIS existed as neither a technology nor a profession. In the early 1960s, Professor Edgar Horwood from the University of Washington, Seattle, established a short course on computerized data mapping. A conference for his course alumni was held in 1963 and is considered the first URISA annual conference, even though the association was not formally organized until 1966.

For five decades, URISA has thrived with a basic formula for conference papers, articles, and courses: how to use new technology X plus spatial data Y for government business purpose Z.

As GIS software and other new technologies matured during the past decades, URISA helped the geospatial community develop and deliver value for society.

URISA’s nearly 50 years of annual conference proceedings—as well as the URISA Journal, the GIS Professional, various books, quick study guides, workshops, and Exemplary Systems in Government (ESIG) Awards—document a half-century’s development of intellectual capital. Hundreds of domains of knowledge have been created by URISA and documented in its publications.

Present

Today URISA remains a vital resource for the GIS community. In addition to GIS-Pro, URISA has a portfolio of specialty conferences (Addressing, Transit, CAMA, Public Health, Caribbean), 20 daylong workshops, and the weeklong GIS Leadership Academy. URISA has 29 chapters (including its first outside North America—in the UAE), as well as a formal affiliation...
with Surveying & Spatial Sciences Institute in Australia and New Zealand.

URISA has a proven track record of launching major new initiatives, including the GIS Certification Institute, the Coalition of Geospatial Organizations, and GISCorps.

Most recently, URISA was instrumental in the development of the US Department of Labor Geospatial Technology Competency Model and took the lead in developing the new Geospatial Management Competency Model. In parallel, URISA published the proposed Local Government GIS Capability Maturity Model (ArcNews, Winter 2010/2011: "URISA Proposes a GIS Capability Maturity Model").

**Future Geospatial Society, URISA, and the GIS Management Institute**

The world is geospatially connected today in ways that it was not 50 years ago. Then, only one-third of the world’s population was urban. Today, according to the UN, for the first time in world history, more than half the world’s people live in cities; within the next 50 years, more than two-thirds will be urban. How will we fit two billion more people into livable cities? Urban is important, and today URISA is as relevant to the future as it ever was.

Technology also presents the geospatial community with new opportunities today. Cheap global air travel, shipping, and telephony, as well as the Internet, did not exist 50 years ago.

URISA's GIS Management Institute: How will the GMI operate?

The Cold War is long over, and the frontier of the developed, postindustrial world advances to provide more people with new economic opportunity. An international approach for the GIS profession is within reach.

Are there new frontiers in URISA's future? Three articles in the summer 2012 issue of ArcNews confirm a new direction that URISA is pursuing. David DiBiase's article ("Strengthening the GIS Profession") suggests that there is a moral imperative for GIS. Another article ("King County Documents ROI of GIS") proves that GIS provides significant financial benefit to society. Lastly,
the Jack Dangermond interview (referred to above) suggests an important management focus for URISA’s future.

At the 2012 Esri International User Conference, URISA announced a new initiative to develop the GIS Management Institute (GMI). GMI will develop resources and services that focus on promoting the advancement of professional best practices and standards for the management of GIS operations.

GMI will build on resources that URISA has already developed, including the GIS Capability Maturity Model, the Geospatial Management Competency Model, the ESIG Awards, and the URISA Leadership Academy. A key component of the GIS Management Institute will be the development of the GIS Management Body of Knowledge (GMBOK).

The GIS Management Body of Knowledge will be the central unifying element of GMI. It will be used to refine the GIS Capability Maturity Model (GISCMM) and the Geospatial Management Competency Model (GMCM). The GMBOK will be a collection of peer-reviewed best practices and standards that can inform geospatial managers and operations to improve the effectiveness of their use of geospatial technology.

GMI will develop programs based on the GMBOK to accredit the capability and maturity of GIS operations against the GISCMM. It will also develop a program to accredit GIS management educational programs using the GMBOK and GMCM. URISA has agreed to work in cooperation with the GIS Certification Institute to advance the future certification of GIS managers.

The management of enterprise GIS operations requires knowledge, skills, and abilities that clearly set it apart from other management domains. GIS operations today are highly complex, are critical for effective agency services, and have been proved to deliver tremendous financial benefits. Central to GMI is the theory that as GIS operational maturity improves, return on investment from GIS increases.

GMI has been designated as a priority initiative. It will become an operational program of URISA. It is intended to be an international initiative with a global geospatial advisory council.

URISA does not intend to turn its back on the broad urban and regional information systems domains that have been important for the past 50 years. They are critical for helping to plan and build the highly urban society of the future. But URISA intends to serve society and strengthen the GIS profession by helping to promote the professional management and effective use of GIS into the future.

About the Author

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