Delivering GIS Benefits with a Limited IT Budget

Effective project management is the key

When access to GIS data, maps, and applications is broadly available throughout an organization, we call it an enterprise GIS. Organizations intrigued by the idea of deploying GIS enterprise-wide often have concerns about the work (and costs) involved. Is there a particular way to go about it? Where do you start? What if you can't afford a consultant?

For answers to these questions and more, Suzanne Boden of Esri Training Services turned to Dave Peters, manager of systems integration at Esri. Peters spent most of the 1980s with the US Air Force, working on aerospace systems integration projects. In former lives, he was a physicist, pilot, and engineer. During his 20-year tenure at Esri, Peters has worked on system design projects with numerous clients and has become the acknowledged expert on system architecture design for enterprise GIS operations. In this interview, Boden asked Peters about different aspects of implementing an enterprise GIS.

Boden: Is enterprise GIS cost prohibitive for organizations with limited IT budgets?

Peters: I would think not. We implement enterprise GIS to improve business efficiency and effectiveness. The benefits of implementing GIS throughout the enterprise far outweigh the cost. These benefits have been demonstrated over and over again by organizations both big and small.

If you have a limited budget, you can take smaller steps forward; over time, you will see the same benefits accrue. Today, hardware and software costs are significantly reduced, driven by the increase in processing capacity and performance for both servers and networks. This opens a variety of opportunities for small business automation.

Proper planning is the key to success. Understanding the technology and getting it right at the beginning reduces cost and improves the effectiveness of any IT deployment. Effective project management can deliver GIS benefits within a limited IT budget.

Boden: An organization has decided to implement an enterprise GIS. How much time should it plan to invest in the system design process?

Peters: I feel strongly that the system design process should be an integral part of GIS planning—and too many times it is not. Dr. Roger Tomlinson's book *Thinking About GIS* (4th edition, Esri Press, 2011) addresses the importance of GIS planning and estimates about 5 to 7 percent of the first year's overall GIS budget as a typical planning investment.

Most of this planning focuses on clearly understanding your business needs—what information products and data resources make your business work, what your business workflows are, what GIS information products should be developed for your user community, and when. The organization's GIS and IT staff need to take the time to understand the environment and appreciate how GIS can make a difference in their business.

Boden: Your recipe for a successful enterprise GIS deployment includes four key ingredients: communication, planning, project management, and performance milestones. What do organizations risk if they don't follow the recipe?

Peters: If organizations don't follow lessons learned by those who have gone before, the risks can be high. Good communication between the GIS user community and the IT support staff is critical and not always easy to establish. There are clear relationships between user business needs, system processing loads, and required hardware specifications—and these relationships are important to understand.

Planning is where you put these relationships together. Getting it right before you start spending money on the solution reduces implementation risk and overall cost.

Good project management is needed to implement the plan and manage changes to the plan that impact cost, budget, performance, and the ability of the final solution to satisfy business requirements.

Performance should be an integral part of your project plan, with milestones identified to validate compliance throughout the implementation process. The Capacity Planning Tool [CPT] is designed to help project managers understand performance constraints and implement GIS operations that satisfy user productivity needs.

Boden: In the foreword to your book, *Building a GIS [Esri Press, 2008]*, Esri president Jack Dangermond calls you a "teacher and an inventor of creative solutions." Can you give an example of a creative solution you engineered?

Peters: My focus is to help Esri customers build successful GIS operations—to make a difference where it counts (at the bottom line). To be successful, customers need to understand how to build systems that make their users more productive—understand their user needs, the GIS software technology that can make a positive difference, and the IT infrastructure required to make it happen.

Over the years at Esri, I've worked on a number of projects to get the information out to organizations through system architecture design consulting services: the *System Design Strategies* technical reference document, the *System Design Strategies* training course (an Esri instructor-led course), the *System Architecture Design for GIS* seminar presented each year at the Esri International User Conference, the Esri Press book *Building a GIS,* and the CPT.

The CPT is a set of tools shared as an Excel workbook that automates the system architecture design analysis that would normally require a skilled system design consultant. The CPT helps answer many system performance questions such as

- What are the steps to selecting the right platform solution?
- What system do I need to support my peak user loads with this workflow?
- What network capacity do I need?
- How does my existing infrastructure impact remote site user productivity?
- How can I understand my existing GIS operational system performance capacity?
- How can I model and manage system performance for my enterprise GIS operations?

The CPT identifies user input requirements and shows the information we need to answer your design questions. It also provides the final IT hardware and network solution—this makes the CPT something you can use to better understand your environment. It is updated regularly and available on the Building a GIS online resource center. We use the CPT to model our understanding of the technology. You can use the tool to manage enterprise GIS operations.

With all the solutions listed above, our purpose has always been the same: to share with customers real solutions that help them build successful GIS operations.

Boden: You are, in fact, a teacher. You developed the *System Design Strategies* training course and regularly present it to Esri customers. Where does training fit into the system design process?

Peters: Understanding the technology is the first step to building a successful enterprise GIS. The training class teaches a communication framework for GIS business users and their IT support staff counterparts. They learn how to represent their specific user productivity needs and clearly identify the IT hardware systems required to meet them.

When building a GIS, the GIS/IT systems integration management team needs to understand how they can all contribute to system performance and scalability—how to get the most of their GIS investment. This is what the training course is all about.

GIS managers need to understand how to reduce system deployment risk, improve user productivity, and spend their development dollars wisely, and many times they are asked to show their management how this can be done.

IT managers need to understand how GIS is making a difference—what the software technology does, how it performs, system configuration best practices, data administration strategies, network and hardware performance constraints, and platform configuration and sizing requirements that make GIS work within their organization.

GIS programmers need to understand how to build applications and services that satisfy user productivity needs.

Data administrators need to understand how to manage the variety of GIS data resources and deployment formats for optimum performance and scalability.

The CPT is fully integrated with the course; it is used throughout the course to teach how to build and manage successful enterprise GIS operations.

Resources for Building an Enterprise GIS

System Design Strategies Wiki
The latest place to learn about Peters' system design methodology
wiki.gis.com/wiki/index.php/System_Design_Strategies

Enterprise GIS Resource Center
A rich source of technical information for IT professionals on system architecture, security, and performance
resources.arcgis.com/content/enterprisegis/10.0/about

Technology Topics: Enterprise GIS
A good resource for managers and others looking for an overview of how enterprise GIS can help achieve business objectives
esri.com/technology-topics/enterprise-gis/index.html

Instructor-Led Training Courses
esri.com/training