



# INTEGRATED GIS— ANOTHER LEVEL OF BENEFITS FOR LOCAL GOVERNMENT

*The evolution from map-centric, departmentally focused GISs to enterprise GIS integration offers local governments significant operational and public-service benefits, but it's not easy to achieve.*

**I**ntegrated GIS refers to the ability to serve as a “backbone” that supports a host of other systems and applications across the enterprise. Presently, most GISs in local governments aren’t fully integrated with other enterprise systems. The focus has been on the initial implementation and conversion of data, and the systems have largely been used by “power users.”

Because the initial cost of a GIS is high, the implementation time period is long, and the actual users are limited, it has been difficult for many local governments to justify new levels of funding after the initial purchase. As a result, GIS has “fallen from the radar screen” in the budget process. GIS integration, however, offers the opportunity to get it back on the radar by leveraging historic investments in GIS and taking the benefits to a larger audience.

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# Creating Value

What can integrated GIS do for local governments? By providing a spatial data “picture,” GIS integration adds another dimension of capability to a variety of systems, including permitting, assessing, inspection and maintenance, work orders, public safety, and citizen-relation management (see Figure 1).

Based on the experience of some cities and counties that have accomplished GIS integration, the following are areas in which GIS integration provides value:

## Permitting

Most jurisdictions have a permitting system, and many of the commercially available permitting systems can interface with GISs or at least exchange data. Combining GIS and permitting systems allows for address creation and maintenance as well as parcel and boundary information important to the permitting process. Permitting systems in some localities also are linked with financial and document-management systems, allowing for faster turnaround times.

## Citizen-Relation Management

Most local governments have a citizen-action or complaint center that takes calls or e-mails and coordinates the response to various issues. Several cities have built their action line as a GIS application, and other localities have integrated GIS into existing applications.

GIS allows a call taker to locate an issue and enlist a variety of tactical information. The spatial information also can be added to a dispatch or work order to provide coordination with field workers.

## Assessing

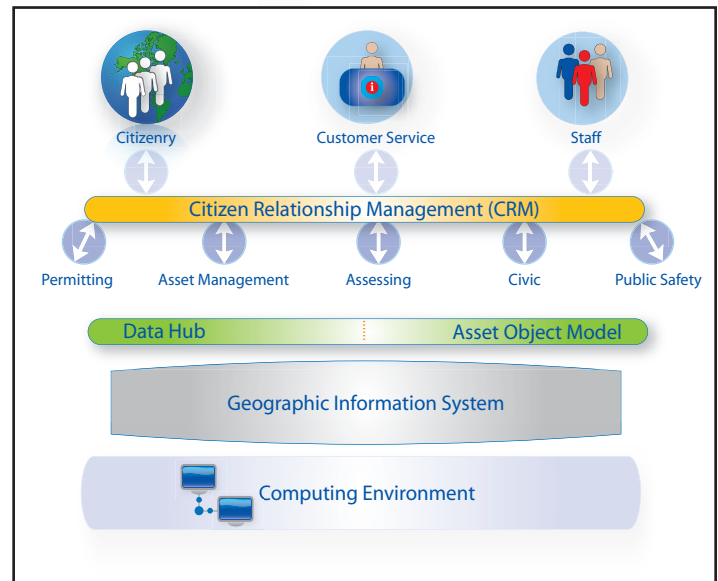
The addition of GIS capabilities in conjunction with computer-aided mass-appraisal systems helps manage the appraisal process by reducing field inspection times. GIS integration also helps select comparables and manage protests.

## Addressing

Many local governments don't have good addressing, which can lead to a variety of problems in service delivery. Typical issues include multiple addressing systems; dated, missing or inaccurate addresses; and a lack of good centerlines for locating addresses. GISs provide addressing tools and the ability to maintain high-performance central addressing. Many other systems (including permitting, assessing, planning and billing) can benefit from GIS data integration, so the “best” addressing is available to all users through multiple applications.

## Asset Management

GISs can facilitate asset management in local governments. Commercially available asset-management applications often are constructed as GIS applications or provide for a GIS interface.



**Figure 1. GIS integration adds another dimension to a variety of systems, including permitting, assessing, inspection and maintenance, work orders, public safety, and citizen-relation management.**

## Public Safety

Many localities have developed interfaces among incident systems and GISs to provide crime analysis, and these interfaces allow such information to be readily usable. In addition, homeland security can be enhanced via GIS. Such software often is interfaced or written on top of GIS technology, which also has been interfaced with document-management systems to provide pre-fire plans and inspection reports.

## Web Mapping

GIS has been integrated with many Web sites to enhance offerings to the public, partners and internal staff by providing extensive geographic information and a reference point for inquiries.

## Historical Limitations

Historically, local government has been slow to move toward integrated GIS for several reasons:

- GIS software wasn't originally developed for enterprise use.
- Due at least partially to the software's lack of enterprise capabilities, most localities implemented GIS on a departmental basis. Thus, GIS generally is focused on departmental objectives, with enterprise objectives being a secondary consideration. Such departmental focus limits the ability to act in unison to achieve a broader user base and shared applications.
- Enterprise architectures for sharing applications and data were time consuming and expensive to develop prior to the abundance of enterprise application-integration tools currently available.

In sum, GIS didn't typically evolve as a shared or enterprise system. That reality has hindered the focus on, and capability for, integration.

## Integrated Projects

During the last decade, many local governments have revisited and revamped their initial GIS implementations, including Portland, Ore.; Mecklenburg County, N.C.; Philadelphia; and Honolulu. These jurisdictions have greatly expanded their GIS user base, and they benefit from leveraging historic GIS investments.

### Portland

The city of Portland GIS is internationally recognized. During the last decade, Portland evolved from strictly departmental GIS to enterprise GIS capabilities.

The transition to a “corporate GIS” from individual and distinct systems came when the city pioneered a spatial data warehouse, “GIS Hub,” as a means to integrate and share data from individual systems. The solution incorporated a variety of third-party software products and ESRI’s ArcGIS 9, Geodatabase, Oracle, ArcIMS and SDE.

The advantages of GIS Hub are numerous. Integrated with building-permitting functions, GIS Hub allows users to quickly access site maps, street layouts, development plans and other jurisdictions’ databases.

In addition, more casual GIS Hub users can access data previously unavailable due to incompatibility. Thus, information sharing via the GIS Hub has simplified the completion of various projects, such as development processing.

By sharing applications and data among city bureaus, regional agencies and the public, Portland greatly expanded its GIS users. In 2005, the city’s “PortlandMaps.com” site received more than 240,000 hits per month (see Figure 2).

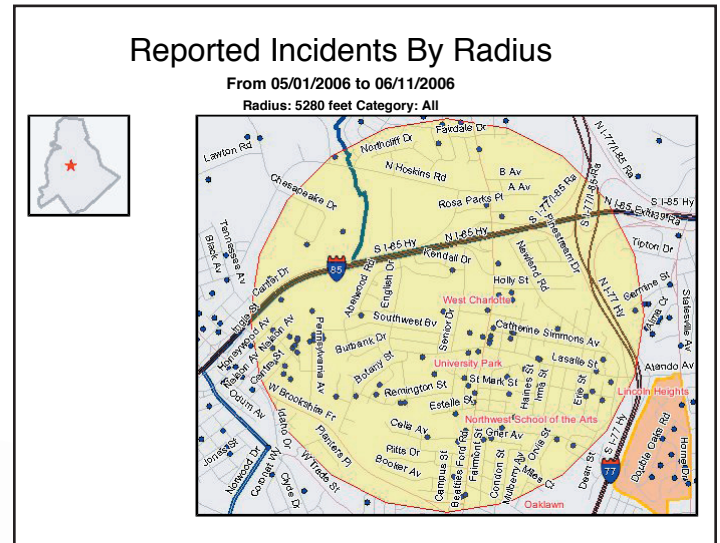


**Figure 2. The PortlandMaps.com GIS Web site received more than 240,000 hits per month in 2005.**

### Mecklenburg County

Starting in 2004, the Mecklenburg County police department leveraged GIS to create an ArcIMS intranet and Internet site, including a Crime Information System that allows users to see reported incidents and calls for service by location.

Incidents can be thematically mapped by date, and reports are generated by date and location. The application uses ArcIMS 9.0, ArcSDE and Oracle 9i, and it’s written in VB.NET (see Figure 3).



**Figure 3. The Mecklenburg County police department leveraged GIS to create a Crime Information System.**

## Laying a Foundation

How can local governments accomplish more with GIS technology? Foundational requirements for integrated GIS include the following:

- Enterprise GIS data sharing
- Enterprise computing architectures and tools
- Integration capabilities
- Business-case analyses
- Support of users and management
- Strong leadership

### Enterprise GIS Data Sharing

The notion of enterprise GIS implies that GIS data can be shared across the government enterprise. Enterprise GIS features the ability to readily share data, systems and applications across an organization.

Although enterprise GIS isn’t a requirement for integrated GIS, it makes it easier to facilitate and support integration. Typically, jurisdictions doing more with GIS integration have an enterprise GIS.

## Enterprise Computing Architectures and Tools

An enterprise computing architecture (and tools capable of supporting GIS integration with other systems) is essential. There are a range of products that facilitate the storage and exchange of data among systems, and these products vary in price and performance.

It's important to select an architecture that matches users' needs and the team's maintenance capabilities. Many local governments already have these tools and can extend their use to integrated GIS.

## Integration Capabilities

Developing and maintaining an integrated GIS requires particular skill sets that may not exist in the organization. For example, expertise is needed to specify and develop integrated applications or purchase and implement third-party products where possible.

In addition, dedicated staff is needed with the expertise to support and maintain the systems and applications. Although some of the expertise may be obtained externally, it's critical to build sufficient inhouse capabilities to support (or at least manage the support of) applications over the long term.

## Business-Case Analyses

A business-case analysis specifies user requirements and determines priorities and justifications for each of the integrated applications. The business case also is used to prioritize and "cost out" each application.

## Support of Users and Management

All of the local governments utilizing integrated GIS have done their homework with management and users to support individual applications. In fact, this is a good place to start the integration initiative—gain and leverage the backing of users and management to support integrated applications.

## Strong Leadership

In general, it takes strong leadership to move an organization to the next level of GIS. Someone in the organization needs to take the lead to achieve integrated GIS.

Given the potential for another level of benefits, it seems logical that GIS will be a key focus for many local governments in the immediate future. Such focus on integration will let GIS live up to its potential and assume a mainstream role in enterprise computing.

## Learning from the Utility Industry

Observing the electric and gas utility industry during the last five years would indicate that GIS integration has resulted in significant benefits through leveraging historic GIS investments. For example, intelligent GIS networks make it possible for outage-management systems to know which service points are affected during an outage. When a circuit fails, the locations can be used by a customer-information system to interact with customers.

Utilities, similar to local governments, provide location-based services, and they were early adopters of GIS technology to provide mapping capabilities. GIS was seen as a replacement for manual mapping, and it was justified in terms of faster and better products in addition to labor savings.

Utilities spent the initial implementation period converting data and enabling mapping capabilities primarily in "back-office" functions such as engineering. During the last several years, however, utilities have broken out of the back office and begun integrating GIS as a "backbone" for a variety of systems, including the following:

- Outage management
- Facility design
- Work management
- Customer-information systems
- Mobile workforce management

Currently, GIS integration is the standard in most investor-owned utilities in the United States. Most of these utilities are large, but GIS integration is beginning in smaller utilities. European, South American and Canadian utilities also are driving toward this standard.

The GIS business case in utilities now is based on the value of multiple systems integrated with GIS vs. the "pure value" of GIS technology. GISs no longer are viewed as standalone systems, but as an ingredient to a variety of systems.

Clearly, utilities prefer systems that have a "picture" of spatial information to enhance location-based data vs. the "no picture" approach, and, as such, GIS has been given an expanded role in utility organizations.

## About the Author



Bart Elliott has over twenty years of experience in the implementation of Information Technology in a public sector environment, and has managed over 60 major GIS implementations for governments/public utilities. His background includes direct experience working in city government. Bart holds a Bachelors of Business Administration and Political Science and a Masters of Public Affairs—Urban Administration and Public Finance.