

Using ArcIMS to Solve Enterprise Needs

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How can GIS be leveraged to address the diverse needs spanning an entire organization? Is there a way to use our GIS data assets to reduce redundant tasks, and improve staff efficiency, customer service, and decision making? A suite of ArcIMS powered solutions has been implemented at Sacramento County and answers these questions. The ArcIMS solutions serve as a GIS portal through integration with several other information systems, including document management, maintenance management, permits, and an enterprise-wide shared property database. The Web-based solutions, developed by GeoPrise.Net, present and integrate enterprise data including parcel based tax/assessment, sewer/transportation infrastructure, water resources flooding call center, and capital improvement project data.

Introduction

“Biggest bang for the buck” and “one-stop shopping” are two popular phrases which colorfully, but accurately, describe Sacramento County’s web-based enterprise GIS. Sacramento County’s GIS has evolved from a back room, high-end workstation tool, to a relatively low-cost, enormously productive desktop tool available on every County department computer. The web-based applications support a wide variety of business needs, drawing on data accessed from many departments throughout the County, yet provide a common, user-interface that is easy to use and rich in functionality.

This goal was not reached without a good deal of intra-departmental silo-busting, as well as a dynamic data-sharing model, and a persistent focus on the GIS unit’s mission. This paper describes the steps and technology that realized this goal.

The Challenge – Data Inaccessibility

Imagine a citizen coming to a public counter asking a few questions about some property in the Sacramento area. The departmental staff person asks for the parcel number in question. Understandably the citizen doesn't know that off the top of his head, so the staff person goes to the mainframe system and punches in the street address, and the parcel number and some basic property information is displayed. The citizen asks what the zoning code means, so staff goes to the binder with the land use descriptions to help with this request. He then asks if there are any special environmental conditions present on the property, so the employee makes a call to the Planning department representative who then goes to a huge map book to look for hand-written notes on that parcel. The same person also goes to a file cabinet for related documents, and locates some photography to answer other questions.

How much time did this all take? This scenario was a common one. Next imagine the same staff person having all that information at his fingertips on the same public counter. Or imagine that citizen getting all that information without even coming to the County office. Because of political and technological limitations, the latter goal has been deferred. However the first goal, of having all this data at every department desktop has been implemented in a cooperative effort between Sacramento County GIS and GeoPrise.Net.

The Mission – Data Accessibility

The central GIS's long-term mission has been the publication of widely used data in an accessible and east-to-use format, while the back-room, high-end workstation GIS efforts have been delegated to smaller departmental GIS units. The two approaches each have value, however, the central GIS's role leverages the enormous amount of geographic data throughout the County. Besides putting this data on everyone's desktop, the integration of data also give the departmental GIS units more access to data.

To support the mission, four objectives had to be realized in sequence:

- Data standardization
- Data integration
- Data sharing
- Flexible technology

Data analysis in the early stages of County GIS revealed two things: some data items were used in many departments, even though departmental staff insisted it was their data and they could manage it as they say fit; and data items that were common, were often processed with different levels of accuracy, precision and format. Even something as simple as a parcel number was so differentiated that it made data sharing very frustrating.

The GIS unit was instrumental in creating a countywide data model of all property-related data. This clearly identified how the data were linked throughout the County. It was also the first step in creating a mechanism to share data.

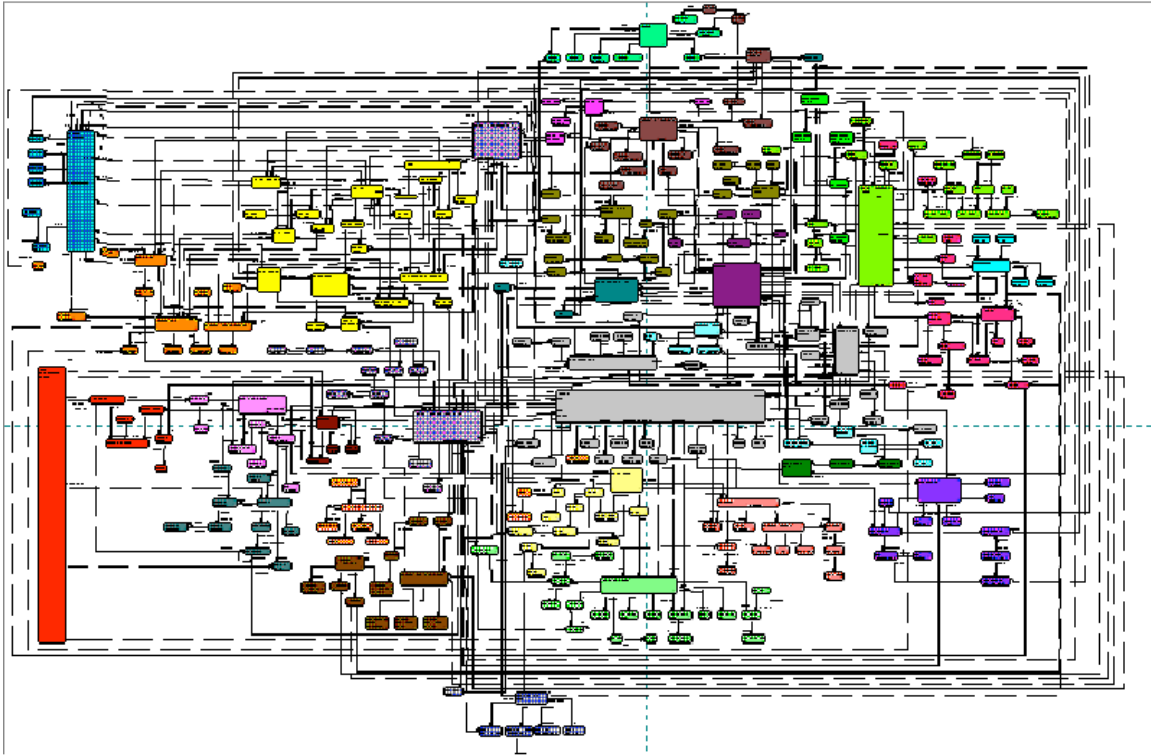


Figure 1. Sacramento County Property Entity relationship Diagram (ERD)

The GIS unit also published a spatial data standard and an address standard to support data integration. Sacramento's spatial standard emphasized a high level of relative accuracy. This for example would allow utility lines in a right-of-way to graphically be placed correctly with respect to each other. The unit's standard of moderate absolute accuracy also allowed for data created in different departments to overlay one another well.

The address standard followed the U.S. Postal standard, and was fairly modest in its requirements. But because it was one of the most common data keys in the County, the standard now allowed data to be linked together with less manual intervention.

The next step in the evolution of integrating data was the design and implementation of a mechanism that minimized data redundancy, and maximized data currency. Again, GIS realizing the widespread value spearheaded a group to build a Property Shared Database (PSD). With the proliferation of developing systems, the data sharing that was being pulled together, was causing a geometric explosion of data connections.

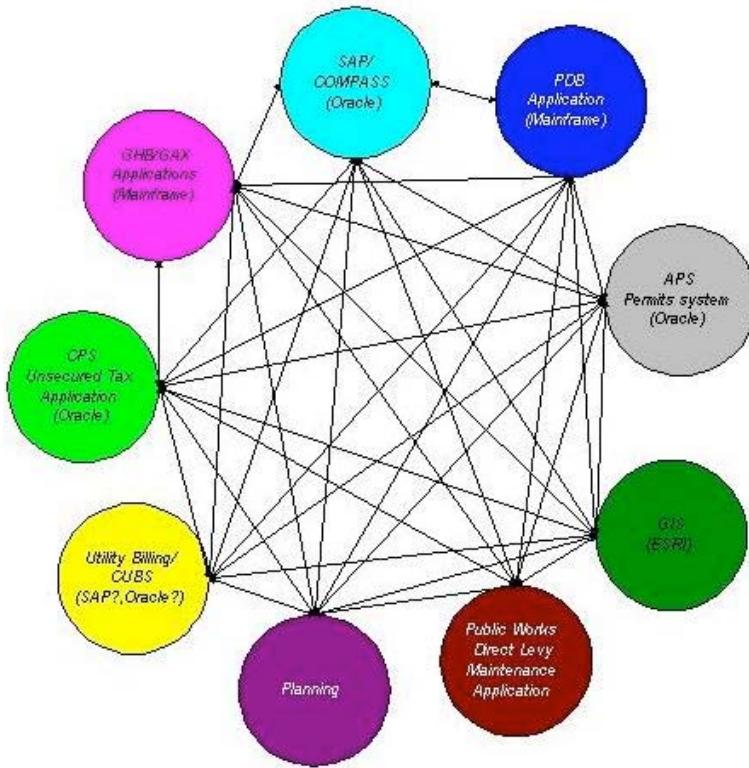


Figure 2. Data sharing before Property Shared Database (PSD)

While realizing the reality of single-purpose departmental applications, many with propriety database structures, the PSD was implemented to facilitate data sharing. By the summer of 2003, nearly half the entities described in Figure 1, are housed in PSD. Its major subject areas include:

- Parcels
- Ownership
- Permits
- Landuse
- Districts
- Property Characteristics
- Spatial Data (SDE)

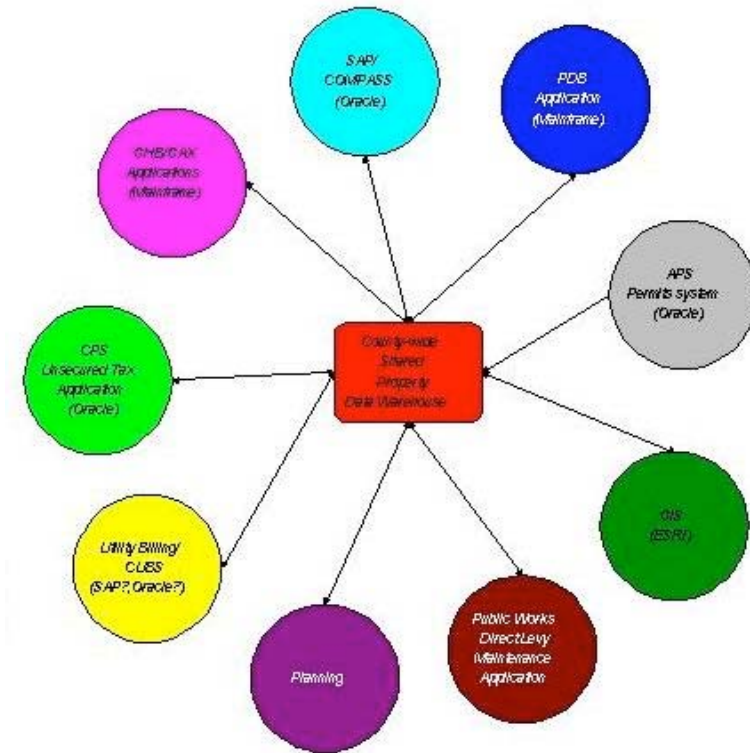


Figure 3. Data sharing through PSD

Data from departmental systems are posted to the PSD on varying schedules, from real-time to weekly. Data can be queried from PSD by any system in the County. And this gold mine of data, coupled with the natural integrative capabilities of GIS was an incredible asset, predestined to be on every County desktop.

The Enterprise Solution – GIS Intranet Applications

The PSD does not provide all geographic data in the County. There are still other facility and document data that can have value in a GIS. Additionally, an application that publishes those data in a productive and integrative manner was needed. To be useful, the application had to have several characteristics:

- Easy to use
- Inexpensive
- Single interface

- A drill-down architecture
- Support the enterprise concept

The solution chosen was an ArcIMS application, using ASP and MicroSoft.NET technology connected to Oracle and SQLServer, a document management system, and an array of imagery. The web interface would be available to everyone through their internet viewer, without the higher cost of GIS software on every desktop. Although the startup and server costs were moderate, the per desktop cost was minimized, particularly in light of the rich data availability and utility.

GeoPrise.Net software was used to underpin the whole application series. Additional customization was required to meet county specifications. Although they each have a separate emphasis, basic GIS functionality, such as buffering, identify, multiple selection options, and pan/zoom, are the same in every application. The first applications were chosen to meet the widest set of needs, as well as reflect the progression of the some of the departmental GIS databases. They were:

- Parcel Viewer
- Project Coordination
- Facilities Viewers
 - Water Quality Viewer
 - Transportation Viewer
 - Water Resources Service Request Tracking System

All of the applications look and respond in much the same way. Typically only the query and data detail pages are dissimilar. They all have a drill-down approach, where basic information is displayed first, then additional pages are displayed to meet specific requests.

The first two applications support many departments countywide and truly put into practice the Enterprise concept. The Parcel Viewer integrates data from several departmental databases, including the PSD. Besides basic parcel and ownership data, it also displays historical, district, utility, permit, and property characteristics data. It can display from a selection of countywide color and black and white orthophotography. One of the most beneficial capabilities of this and the other applications, is the ability to link directly to scanned documents and maps in the FileNet document management system.

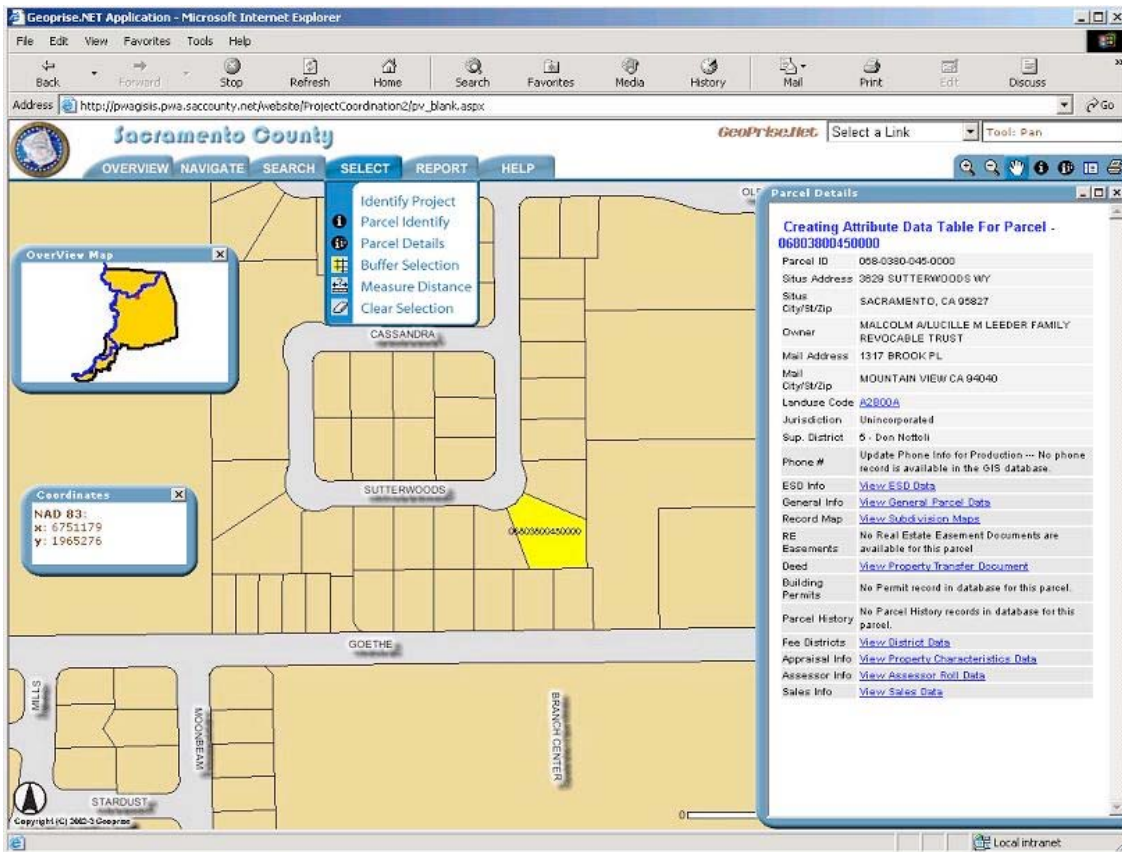


Figure 4. Parcel Viewer

The Project Coordination application allows for coordination of right-of-way projects such as sewer lines, street lights or digging projects, to minimize disruption of street traffic. It sends email to impacted department officials to warn of potential conflicts. It also allows for the sharing of street trenches.

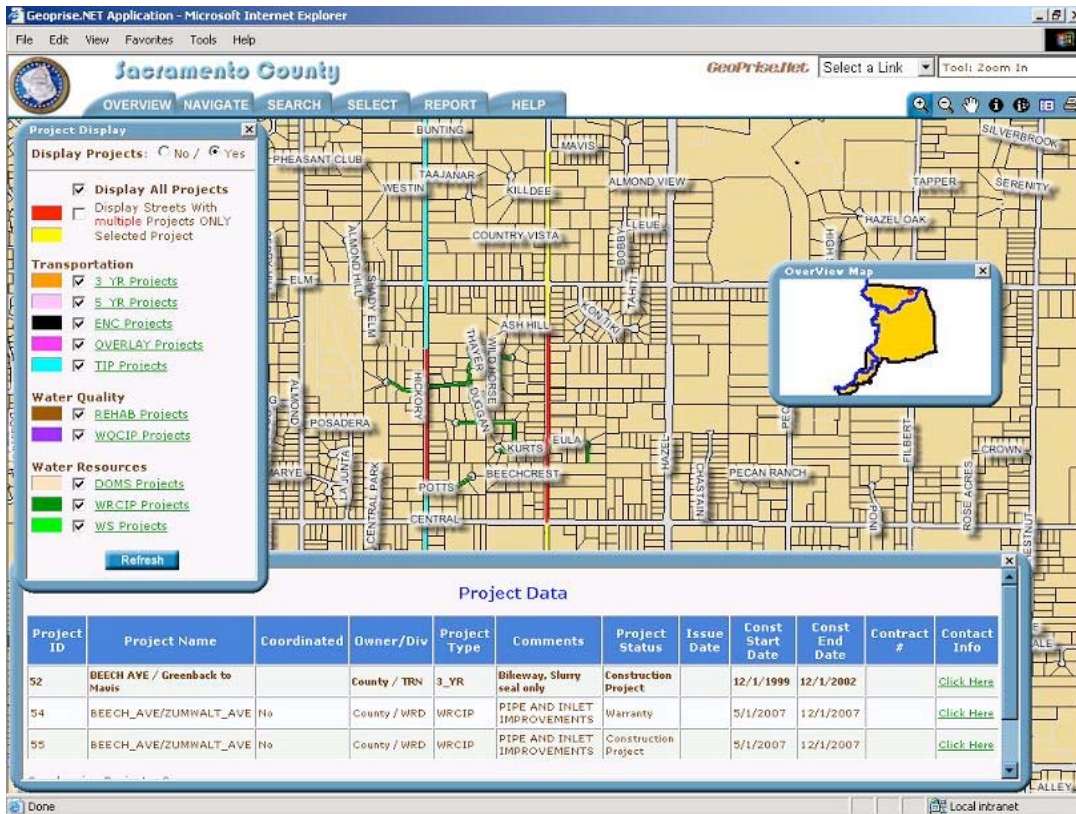


Figure 5. Project Coordination

These two applications have the most widespread use, however they have been complemented with additional intranet applications. The facilities viewers are the first of these applications implemented to-date, followed in the near future with a thematic mapper, and a basic GIS analysis tool.

All of these GeoPrise applications take advantage of the .NET technology that supports tighter security, more reliability, better performance and code reusability, and are totally integrated with ArcIMS. This technology can also easily link to a variety of databases.

Conclusions

Although this endeavor can be viewed as a technological success, one shouldn't underestimate the value of interdepartmental cooperation and the forward-thinking of many individuals. The financial and political realities of any business can dampen enterprise-wide opportunities. Sometimes the actions of a few can have a considerable benefit in realization of a goal.

The integrative nature of the applications also can have a downside. The more real-time the data access, the more susceptible the applications are to the reliability of individual departmental systems. If one database is down, then the application cannot display that

information. An alternative to this approach is the periodic download of departmental data.

A well-constructed, intuitive system can be made more useful when the underlying data has been standardized and designed for enterprise-wide use. And conversely, the wealth of enterprise data is made more valuable when it is brought to everyone's desktop in an affordable, easily managed web-based application.

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