Regional Project Coordination Using ArcIMS

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How does a government agency provide real time project information and service to employees and the public? How can GIS be leveraged to manage project coordination from cradle to grave? An ArcIMS software-powered solution implemented at Sacramento County is the Web-based PC-ROW (Project Coordination in Right-Of-Way) application that helps to answer these questions. The Web-based tool developed by GeoPrise.Net allows a user to create and maintain project data as well as produce maps of planned, current, and completed projects. Application benefits include increased customer service, communication and coordination among government agencies, developers, utilities, and the public, and reduced business operating costs.

It’s 8:05 a.m. and you were supposed to be at work five minutes ago. Twenty people are waiting on you to arrive with Krispy Kreme doughnuts for the morning meeting. You’re almost there when you notice the signage on the street ahead: Road Closed, Detour. A once direct and well-maintained thoroughfare on your driving route has been excavated yet again to accommodate another construction project. Furiously, you wave your arms in the air as a mini road rage tirade ensues. It wouldn’t be so bad if this scenario hadn’t played out the exact same way just a couple of months before. You are now once more the hapless victim of a breakdown between the 3 C’s: communication, coordination, and cooperation.
The Challenge

Here at Sacramento County, we too faced the difficult undertaking of efficiently coordinating ongoing roadway construction projects. County supervisors were incessantly flooded with calls from constituents demanding to know why their precious tax dollars were being channeled to support uncoordinated endeavors. Then, one fateful day, one of the supervisors himself noticed that a recently overlaid residential street on his home commute had been trenched once more, and a new project had begun. Realizing that there must be a better and more efficient way of doing business, GIS was tasked with developing and implementing a countywide solution to this ongoing problem.

The Players

Initial assessments and departmental needs analyses identified three primary players (and the projects for which they held responsibility) within the Public Works Agency integral to the success of any right-of-way management application.

They included:

- Transportation
  - Transportation Improvement Projects
  - Street Overlays
  - 3-yr/5-yr Street Trenching Moratoriums
With these participants on board, we set forth in our effort to gather all appropriate data, both spatial and tabular, needed to commence our endeavor.

**Data Acquisition and Creation**

In the beginning, we opted for a rather simplified, yet efficient, data model upon which to base our application.

After careful consideration, we selected street network centerlines as the spatial component upon which to relate all project data elements. Street centerline segments were chosen over a more discrete spatial data type for the following reasons:

- **Familiarity**
  For years, internal as well as external agencies have utilized and incorporated the Sacramento County GIS land base/street centerline network into their daily workflow and have grown familiar with the data structure. More recently, the Sacramento Area Council of Governments (SACOG) and various participating agencies sanctioned the land base and street centerline network as the common data set upon which to base all current and future regional data layers.
Integration
Familiarity and confidence in the accuracy of the County basemap have spawned numerous applications within, as well as external to, the County, and the street network centerline ID has become one of the most common attributes upon which other tabular data objects are based.

Accuracy/Accessibility
The street centerline network is updated monthly to reflect changes and additions to the County land base as well as to incorporate early entry subdivision elements and therefore provides for an up to date, stable, and consistent environment to serve as a basis for further data creation.

One limitation of utilizing street centerline segments as the basis for our application was the inability to specifically identify smaller scale roadway projects. For example, those projects occurring at particular street intersections would be identified by all four corresponding centerline segments, and projects taking place at a certain distance along a route would be identified by the entire corresponding segment, rather than by a specific and perhaps more descriptive event locator. We concluded, however, that for the intents and purposes of our user’s needs, that the benefits of this approach far outweighed the costs.

With the cooperation of the aforementioned participating County departments, we next collected the tabular data needed to populate the project data table (housed in Microsoft’s SQL Server) as well as spatial representations of project boundaries (provided in hard copy plots, AutoCAD, and shapefile formats) necessary to generate the link data object.

A Fledgling Application is Born
Created in ArcIMS version 3.0, our rollout application, known as SEROW (Street Excavation in the Right of Way), opened the door for unprecedented coordination and cooperation among County entities. Some of the features of this initial application included the following:

- Querying/rendering of project data by County department, project type, start/end date
- Additional querying/rendering of areas where project overlaps occurred
- Instantaneous access to contact information
- Ease in identifying coordination opportunities

While providing never before realized benefits, this initial version was not without its own limitations. Accountability for new project creation still remained with our central GIS unit. This approach added valuable time to the maintenance processes since no new data could be integrated into the application until we received project boundary and contact information, updated and refreshed our spatial data links, refreshed the ArcIMS services, and re-coordinated any errors in this process with the responsible County departments. The older version of ArcIMS used at the time also produced significant
rendering delays, discouraging use for some individuals. In order to establish optimal communication, coordination, and cooperation between all participating entities, we needed to get rid of the “middle man”. Data owners, as the definitive authority for their individual projects, needed to assume responsibility for project maintenance and creation, removing County GIS as an intermediary. In order to accomplish this task, upgrades and enhancements to the application were paramount.

The Fledgling Takes Flight

Our new vision forced us to re-examine our business practices and necessitated the creation of an entirely new relational database. Sacramento County has now partnered with GeoPrise.NET to develop and implement this enterprise solution. While the spatial tie is still based on street network centerline segment ID’s, this enhanced model accommodates fully normalized data objects, incorporates numerous additional data attributes and supports administration functionality necessary for management of project creation and revision.

In addition to database enhancements, application enhancements were also essential. Built from the ground up in ASP.NET, our newest application incorporates the following upgraded features:

- Administrative toolsets for data maintenance and creation - allowing data owners full access to and responsibility for their individual projects
- Instantaneous e-mail notification
  - Automatic triggers fire when newly created project data is found to be in conflict with existing project(s) (i.e. when there is an overlap between spatial location and project beginning/ending dates – indicating an opportunity for coordination)
- Project status tracking to facilitate maintenance tasks and maintain data currency

- Incorporation of inspector information and encroachment permits

At Sacramento County, we have recently deployed the new SEROW Project Coordination module on our intranet so that it is now accessible to anyone with a browser and a network connection.

**Reaping the Rewards**

From the inception of this project, the County has certainly not been hard pressed to recognize the benefits of such a groundbreaking endeavor. The initial start-up and associated development costs have already paid for themselves many times over as we are only now beginning to realize the full potential for increased coordination. Ongoing return on investment has been more than justified. The cost for an associate-level engineer to fully maintain all projects within the SEROW database for one year’s time is approximately $10,000. Compare that to the cost of preventing one unnecessary cul-de-sac resurfacing at $20,000. Even this seemingly small-scale example more than justifies our expenditures. Savings realized by Sacramento County on large-scale projects are even more profound.

**Critical Success Factors and the Road Ahead**

In order for us to continue to be successful in our undertaking, we must remain ever vigilant to foster communication, coordination, and cooperation among all departmental partners. As we look forward to a full Internet deployment and regional collaboration, we need not lose sight of what is right in front of us. Our application is only as strong as the data upon which it is based. Now that all data owners have assumed responsibility
for their individual projects, updates to the database can happen instantaneously, providing immediate availability of information for collaborative purposes.

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