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A Golden Opportunity: Truly Integrated 3D GIS

Illustrating the efficiencies in integrating data, GIS and BIM

WHITE PAPER:

LOCATION INTELLIGENCE

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ABSTRACT

MODERNIZING A PUBLIC SPACE CAN BE DIFFICULT – BUT THOSE ISSUES ARE COMPOUNDED WHEN THE SPACE INVOLVED IS A NATIONAL TREASURE. WHEN A TEAM SET OUT TO CREATE A SPECTACULAR REGIONAL GATEWAY BETWEEN THE ICONIC GOLDEN GATE BRIDGE AND THE CITY OF SAN FRANCISCO, THEY FACED NUMEROUS CHALLENGES – AND NEEDED TO ANSWER TO AN ARRAY OF STAKEHOLDERS WITH VARIED INTERESTS.

THIS WHITEPAPER USES THE PRESIDIO PARKWAY REDEVELOPMENT PROJECT AS AN EXAMPLE OF HOW PLANNERS, ANALYSTS, DESIGNERS AND DEVELOPERS CAN OVERCOME OBSTACLES AND EXPEDITE REDEVELOPMENT PROJECTS USING A NEW APPROACH: TRULY INTEGRATED 3D GIS.

THROUGH THIS EXAMPLE, IT HIGHLIGHTS HOW ANALYSIS, PLANNING AND VISUALIZATION TECHNOLOGY PRODUCED BY TOMTOM, AUTODESK AND PITNEY BOWES CAN HELP ORGANIZATIONS MINIMIZE IMPACT ON BIOLOGICAL, CULTURAL AND NATURAL RESOURCES; RESPECT LOCAL NEEDS; AND PROVIDE FOR SAFER, MORE EFFICIENT TRAFFIC CONDITIONS AND A MORE LIVABLE AND REENERGIZED COMMUNITY.

SAN FRANCISCO'S CHALLENGE: BUILDING A MORE CONNECTED COMMUNITY

Re-envision. Redevelop. Reconnect.

The Golden Gate Bridge is a not only a well-known tourist attraction, it is a critical part of the San Francisco commutation infrastructure. At the south end of the bridge lie two popular attractions, the Presidio of San Francisco and the Golden Gate National Recreation Area, one of the nation's largest urban parks.

Previously, the nearly 120,000 vehicles that traveled each day between Marin County and San Francisco over the Golden Gate Bridge proceeded along Doyle Drive, a road not nearly sufficient to handle this daily traffic. Coming off the bridge into the Presidio, four lanes merged into two, creating significant congestion while effectively isolating the Presidio community from the rest of the city.

In re-envisioning Doyle Drive as the new Presidio Parkway, the redevelopment team set out to modernize the roadway, improve traffic flow and reconnect the Presidio area to the rest of the city. At the same time, they needed to preserve the Presidio's sensitive ecosystem and expand upon the appeal of the area as a tourist attraction. New parks, greenways and a new Golden Gate Museum were to be included in the proposal.

Ordinarily, a massive project like this one would be addressed with different systems and tools for data input and integration, project planning and analysis, design, presentation and management. And, because of a lack of interoperability and compatibility between the many technologies used at each stage, the project team would expend a vast amount of time and energy transitioning from stage to stage and tool to tool across the entire process.

Now, by creating a seamless integration between data, GIS and BIM, many process points in complex projects like this one can move faster while enabling more informed decision making.

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Integration step-by-step, and end-to-end

During the first stage of any major redevelopment project, the focus is on data—lots of it—and Geographic Information Systems (GIS) are the tools of choice for the necessary planning and analyses.

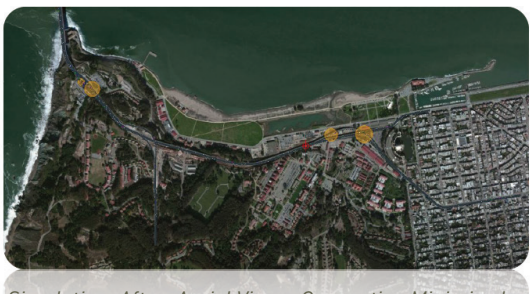
Step 1: The right data

For example, the Presidio Parkway redevelopment team needed to start with a full understanding of the traffic issues along the current roadway. Interactive traffic data populated into GIS technology could quickly render a clear view of the prime trouble spots.

Simulation: Before, Aerial View – Congestion Points Indicated in Yellow

Step 2: The right roadway analysis

This same combination of data and technology would enable the team to easily run intricate before-and-after traffic-flow simulations based on proposed re-routing and development. Utilizing data inputs from leading sources of traffic and geo-data as well as data from local sources could provide a breadth of perspective. Placing this data within a rich analytical GIS environment would help to more efficiently determine the optimal placement of the roadway and additional infrastructure, and to provide seismic and traffic safety improvements while greatly reducing congestion.



Simulation: After, Aerial View – Congestion Minimized

Step 3: The right site for the new museum

In San Francisco, with a proposal for the roadway redevelopment in place, the next step would be to determine the best site for the new Golden Gate Museum. Like most major site selections, this intricate planning process required combined analyses of terrain, lot sizes and undeveloped spaces; environmental and socioeconomic factors; population density and demographics, proximity to schools, community assets such as parking; and vicinity to adjacent highways and hotels. To minimize construction costs, the site needed to be relatively flat. To minimize risk and environmental impact, areas such as prime agricultural lands and flood plains needed to be avoided.

Here again, the project could be expedited by combining and integrating a rich selection of local and GIS data to provide a robust foundation for this planning and analysis. This data could be presented using series of heat maps. Layered together, these would enable community planners, civil engineers and architects to efficiently assess potential sites in the context of the full range of location requirements by enabling them to review elevation and terrain, aerial and satellite imagery, GIS data on roads and utilities, and 3D models of buildings and other structures.

WHEN GIS DATA, PLANNING AND ANALYSES FEED DIRECTLY INTO AN ADVANCED BIM DESIGN SOLUTION, LENGTHY DELAYS CAN BE AVERTED.

A Critical Transition: From Planning to Design

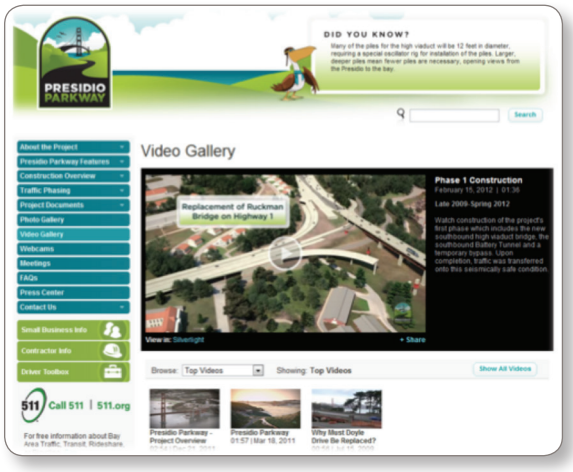
The more that planning and analysis can be automated, data can be integrated and visualizations are made clear, the more rapidly projects can move from planning to design and presentation. However, this shift is where most major municipal projects stall most dramatically, either because projects shift to interactive 3D visualization at this point, or because they don't.

- In typical civic development planning situations, the stakeholders are presented with vital information in a static 2D environment. While cost-efficient to produce, 2D imagery makes it difficult to communicate design intent—and, their presentation typically begins with these words: "Imagine if you will..." Given a set of blueprints or 2D PowerPoint slides, stakeholders, from civil engineers and architects, to community members and government officials often "imagine" something different. This makes gaining buy-in time consuming and fraught with confusion and conflict.
- Projects at this stage also typically shift from GIS to BIM. Waiting for renderings from BIM systems can enable project teams to present stakeholders with detailed imagery and powerful visualizations in 3D. However, from a workflow perspective, the typical GIS/BIM transition is not automated—nor are the data and other inputs easily integrated. Moving data, analyses and plans from one to the other becomes a project in and of itself.

When GIS data, planning and analyses feed directly into an advanced BIM design solution with no data conversion required, these lengthy delays can be averted.

Step 4: Making it easy to review and understand planning and designs

In San Francisco, redevelopment planning meetings were conducted using a website, http://www.presidioparkway.org. The site was populated with metadata; and, it presented 3D videos of exactly how the project would look at various stages of construction. These "fly-by" videos offer viewers 3D renderings of the project from an aerial perspective. Even static views are enhanced: icons and titles provide explanations of key considerations and design features. Videos like these leave nothing to the imagination—they enable stakeholders to view precise images. And these views become all the more powerful when they can be considered from different angles and noted for discussion.



The Presidio Parkway Website
Go to http://presidioparkway.org/video/ to see simulation videos and more.

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Step 5: Enabling annotation and collaboration

Integrated GIS can now enable on-the-fly planning changes to be instantly rendered in detailed 3D design. This, in turn, can enable stakeholders to annotate and collaborate as they review the planning and design options. And, by putting this information online, the models could be accessed regardless of location via the cloud.

For the Presidio Project, for example, mobile-enabled versions of the designs could enable team members and stakeholders to stop, zoom, pan and move around the model as they "flew through," adding virtual pushpins and notes to share questions and comments along the way.

Step 6: Keeping it real

Interactive, collaborative, video renderings are powerful in their own right. But the on-the-fly design capabilities that these 3D models enable are perhaps the most powerful aspect of the seamless integration of GIS and BIM capabilities.

With integrated GIS, every 3D-visualization can be built on real data starting with the underlying digital elevation and terrain modeling, adding in real-world imagery, layering in GIS roads and utility inputs, then adding story-boarding for 3D viewing. And, whenever a team member wants to test a modification of any aspect of the design, they can subject the proposed modification to a full battery of engineering constraints.

For a project like the Presidio Reconstruction, stakeholders with aesthetic concerns, concerns about economic impact, noise reduction, or any other matter, could post their question, and the GIS/BIM integration would enable an expedited, engineering-based response.

"Optioneering" – making "what-ifs" real in real time

With a planning solution that enables them to work smarter at every step, redevelopment teams can now "Optioneer" new scenarios when suggestions and questions arise throughout the design process. They can enter what-if scenarios into the design technology, have those what-ifs tested in the context of project overall, and subject those scenarios to engineering constraints. This enables teams to automatically see how the scenario would play out in a real-world context, in real-time. It adds tremendous efficiencies during review, buy-in and approval presentations.

A MONUMENTAL PROJECT WITH MONUMENTAL RESULTS—UTILIZING INTEGRATED GIS FOR GREATER EFFICIENCIES EVERY STEP OF THE WAY

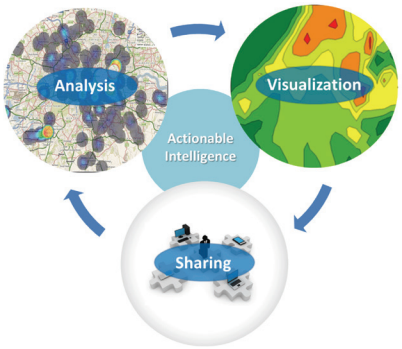
A comprehensive solution: extraordinary results

The Presidio Parkway Redevelopment Project team produced a re-envisioned roadway and area redevelopment proposal that will ultimately create:

- A spectacular regional gateway that respects the natural contours of the surrounding area and complements the unique environment of San Francisco and the Presidio, a national park.
- New direct access to the Presidio and enhanced views.
- A more centralized location for transit connections.
- Enhanced pedestrian connections within the Presidio.
- Reduced light and noise intrusion at the park's Crissy Field.

The city's new design meets high standards for environmental stewardship that go beyond regulatory requirements, and includes structural upgrades that provide tremendous improvements. Using Context Sensitive Design the overall public works project meets the needs of users, neighboring communities and the environment.

This was a monumental project—with monumental results. And now, when teams undertake projects like this one, they can utilize integrated GIS for greater efficiencies every step of the way.



TomTom, Pitney Bowes and Autodesk

Leading data, GIS and BIM solutions providers TomTom, Pitney Bowes and Autodesk have combined forces to integrate the power of GIS and location intelligence with BIM modeling.

Pitney Bowes is a leading provider of customer communication technologies. A $5.3 billion company with 29,000 employees, Pitney Bowes serves large corporations, the public sector and small-to-medium-sized businesses in more than 100 countries. A recognized leader in location intelligence, Pitney Bowes provides geocoding, mapping and spatial analysis expertise via their MapInfo and Spectrum solutions.

Autodesk, Inc., is a leader in 3D design, engineering and entertainment software. Customers across the manufacturing, architecture, building, construction, and media and entertainment industries rely on Autodesk software to design, visualize, and simulate their ideas before they're ever built or created. Since its introduction of AutoCAD software in 1982, Autodesk continues to develop the broadest portfolio of state-of-the-art 3D software for global markets.

TomTom is a leading provider of navigation and location-based products and services. TomTom maps, traffic information and navigation technology power automotive in-dash systems, mobile devices, web based applications and government and business solutions. Headquartered in Amsterdam, TomTom has 3,500 employees worldwide and sells its products in over 35 countries.

View this video to learn more about the extraordinary collaboration that enables complete interoperability and compatibility between GIS and BIM technology. Or, visit www.mapinfo.com.

To learn more about the Presidio Parkway Redevelopment Project, visit *http://www.presidioparkway.org.*

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