GIS Best Practices

GIS for Economic Development

esri

Table of Contents

What Is GIS?

Making decisions based on geography is basic to human thinking. Where shall we go, what will it be like, and what shall we do when we get there are applied to the simple event of going to the store or to the major event of launching a bathysphere into the ocean's depths. By understanding geography and people's relationship to location, we can make informed decisions about the way we live on our planet. A geographic information system (GIS) is a technological tool for comprehending geography and making intelligent decisions.

GIS organizes geographic data so that a person reading a map can select data necessary for a specific project or task. A thematic map has a table of contents that allows the reader to add layers of information to a basemap of real-world locations. For example, a social analyst might use the basemap of Eugene, Oregon, and select datasets from the U.S. Census Bureau to add data layers to a map that shows residents' education levels, ages, and employment status. With an ability to combine a variety of datasets in an infinite number of ways, GIS is a useful tool for nearly every field of knowledge from archaeology to zoology.

A good GIS program is able to process geographic data from a variety of sources and integrate it into a map project. Many countries have an abundance of geographic data for analysis, and governments often make GIS datasets publicly available. Map file databases often come included with GIS packages; others can be obtained from both commercial vendors and government agencies. Some data is gathered in the field by global positioning units that attach a location coordinate (latitude and longitude) to a feature such as a pump station.

GIS maps are interactive. On the computer screen, map users can scan a GIS map in any direction, zoom in or out, and change the nature of the information contained in the map. They can choose whether to see the roads, how many roads to see, and how roads should be depicted. Then they can select what other items they wish to view alongside these roads such as storm drains, gas lines, rare plants, or hospitals. Some GIS programs are designed to perform sophisticated calculations for tracking storms or predicting erosion patterns. GIS applications can be embedded into common activities such as verifying an address.

From routinely performing work-related tasks to scientifically exploring the complexities of our world, GIS gives people the geographic advantage to become more productive, more aware, and more responsive citizens of planet Earth.

GIS for Economic Development

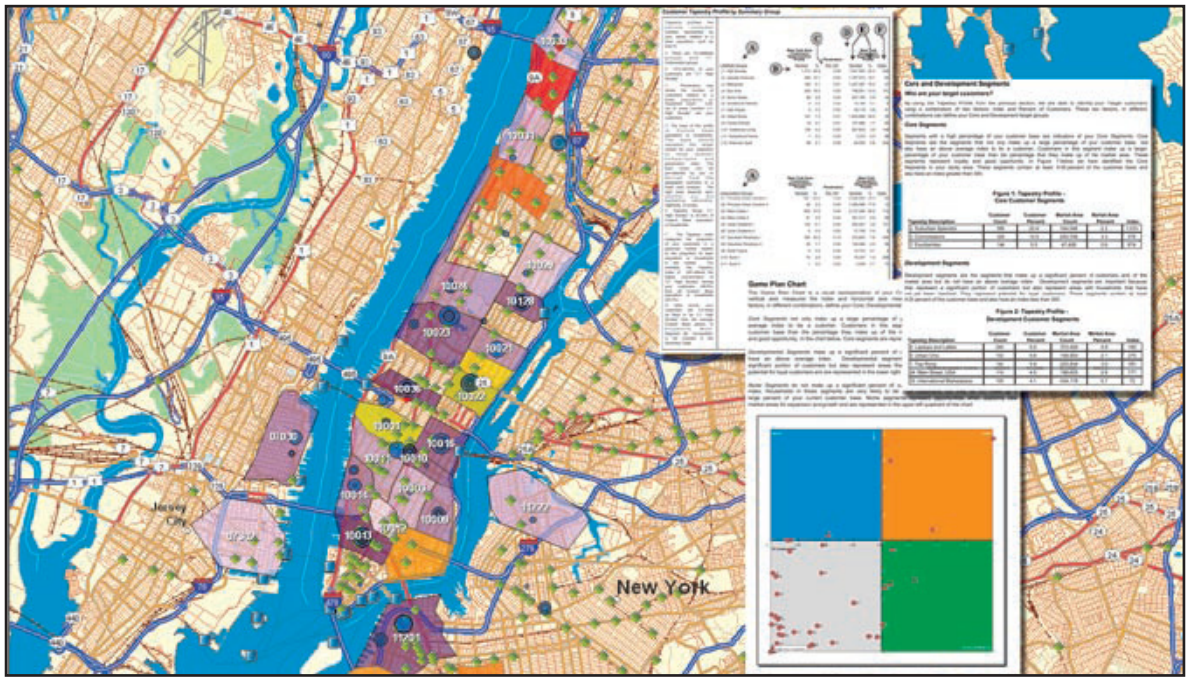
Economic developers need effective decision-making tools that help them conduct analysis, display and disseminate results and make informed decisions about where to locate new businesses or grow existing ones. GIS technology is proven to be powerful and effective in delivering these functionalities to help economic developers sustain economic recovery and growth. GIS tools can provide the necessary platform for visualization, modeling, analysis, and collaboration. The following articles outline these trends and best practices and illustrate how GIS is being utilized as a platform to help economic developers achieve their goals.

Pueblo County, Colorado, Grows Economy with GIS

Principles of Economic Gardening Help Local Businesses Thrive

According to the United States Small Business Association, small businesses have created 60 to 80 percent of net new jobs since the 1990s and employ approximately half of U.S. workers. These facts are at the heart of the economic development philosophy of economic gardening.

Pueblo County, Colorado, has adopted the approach, which focuses on cultivating local businesses rather than landing large companies looking for a cheap place to do business. Instead of making a splash with 1,000 new jobs coming into the community, economic gardeners favor a job here, a job there, for a slower, stable growth pattern. Geographic information system (GIS) technology is a key component in the process.



Pueblo County GIS used GIS to identify customer information in and around specific markets to improve nationwide penetration. This image of the area in and around New York City shows market penetration in darkening shades of purple, customer prospecting from yellow to red, and the amount customers spent in small-to-large blue circles.

"Businesses that are already in town are not fully focused on the bottom line," says Christopher Markuson, GIS manager, Pueblo County. "They're looking to improve business, but they're also looking to do what's right by their employees. We don't want a large company to come in, pay lousy wages, and then leave when the local economy strengthens or the workers demand higher pay."

Markuson learned about the approach from the nearby City of Littleton, Colorado, when he was searching for a way to develop businesses that would not only add to the quality of life in Pueblo County but also continue to support the area during economic downturns. "We were looking at communities that rode out the last recession in the late '90s unscathed," he says. "There were a few, but Littleton was at the top of the list."

The Right Location

Businesses across the county have heard about the GIS department's consulting services, and business owners are scheduling appointments months in advance. Markuson and his small team meet with owners to find out about their concerns, interests, and current efforts, asking questions such as, Do you want to target advertising to reach a specific set of consumers? and Are you looking for a good site for a new location? Then the GIS team analyzes and maps demographic and other data to share with the client.

"We have this interesting reputation around town as folks that are going to give you real, truthful answers to your questions," says Markuson. "We'll tell people, 'No, the data doesn't support your plan to open a coffee shop where there are only 30 potential customers around you. It's just not feasible, and here's the evidence.'"

To get the current, accurate data for its reports and view it spatially, the GIS department uses ArcGIS Desktop, Esri Business Analyst Desktop, Esri Business Analyst Online, and the Esri Business Analyst Segmentation Module.

ArcGIS Desktop supports a wide variety of GIS analysis and mapping, and Business Analyst provides demographic, business, and shopping center data as well as the ability to incorporate in-house data. The analysis gives business owners a thorough understanding of markets, customers, and competition. Markuson uses Business Analyst Online to secure on-demand analyses, reports, and maps over the Web.

"It's really fast and simple," says Markuson of Business Analyst Online. "You can find employment characteristics and average daily traffic volumes; we have a lot of data for Pueblo

County, but not for areas outside it. With this solution, we come up with really good nationwide reports in moments—it's powerful."

A Healthy Harvest

The GIS team in Pueblo County works with many kinds of businesses in the area. It recently helped a local Web-based business that wanted to improve market penetration nationwide. Working together, Markuson, his team, and the business owners developed strategies to increase business in 14 of the company's top markets with advertising across media including television, radio, subway platform ads, and direct mail. They also identified the top ZIP Codes where people live who are searching for their product online and used that information to create Google AdWords and optimize their Web site for search engines. The campaign is successfully bringing in new revenue, and within a month of the campaign, the business created four new jobs.

"It makes sense for us to lend a helping hand to those folks that are already here, make them competitive, and basically give them the tools to expand their trade areas and reach customers more effectively," says Markuson.

Nonprofit organizations are also benefiting from the GIS department's guidance. The Pueblo Community Health Center met with Markuson and his team for less than an hour to discuss an upcoming capital campaign. The team provided a targeted mailing list that resulted in a 63 percent increase in new donors.

"Christopher helped us look through different characteristics for reaching the right donors," says Janet Fieldman, chief foundation officer, Pueblo Community Health Center Foundation.

Big Business that Fits

Though the emphasis in Pueblo County is on growing local business, the GIS department also uses GIS to support efforts to bring in larger companies that the county feels will add to the quality of life for residents. The county recently used GIS to bid for a contract with Xcel Energy to bring a solar energy production facility to the area.

The facility's stakeholders initially believed another area in the state had the best location for solar radiation, but Markuson and his team showed that although the sun isn't as intense as at the other location, Pueblo receives more sunlight per year, on average. Xcel Energy agreed, and the planned facility is projected to bring up to $900 million of taxable infrastructure into the county's property tax base and power over 60,000 homes.

"You can look at databases all you want, but the maps were the things that got the attention of the governor, congressmen, energy companies, and many more people," says Markuson.

The center reached its five-year fund-raising goal of $15,000 in one year. Prior to this campaign, the center purchased mailing lists based on a few demographics such as annual income and assets but had not heavily reached out to individuals because of low return and low donor acquisition. Now that it has better data and analysis, and therefore more success, the center will increase future fund-raising goals.

"It's because they're using the right message, and there's intelligence behind who they're asking for donations," says Markuson. "It wasn't who you'd think it would be—all the local philanthropists. Instead, it was the people that knew somebody who had gone to the community health center for some reason."

The GIS analysis and mapping also show the center where it should be locating services and advertising. "It allows us to decide on the right level of outreach based on the quantity of donors within particular geographic areas," says Fieldman.

A few years ago, the local community college needed to increase enrollment by 5 percent. The GIS analysis provided information it could use to most effectively market the school. The one-year goal of bringing enrollment up 5 percent increased to 17 percent.

"We feel we've been successful in our mission to help businesses grow and succeed," notes Markuson. "To date, we've tracked 58 new jobs emerging from the businesses we've helped grow, bringing over $2.8 million of new revenue into the county. I'm especially thrilled that most of these new jobs pay livable wages—$45,000 each on average—offer benefits, and have little potential to move out of our community in pursuit of a lower-cost alternative."

(Reprinted from the Winter 2009/2010 issue of *Government Matters* newsletter)

Reforming Economic Development and Fighting Sprawl with Effective Maps

Highlights

- With GIS, Good Jobs First has produced many sophisticated studies.
- Nonprofit uses GIS to strengthen its argument that states should rewrite their economic development program rules.
- ArcGIS was used to create a regional impact study of workers dislocated in a plant closing.

Jobs are a red-hot topic these days; public officials are under terrific pressure to create and retain them. As a result, tax breaks and other economic development incentives to stimulate the economy are getting a lot of attention. Unfortunately, such programs are poorly understood and often given loaded labels such as "corporate welfare." Companies threatening to leave are committing "job blackmail," and those that stage multistate competitions are exploiting "the economic war among the states."

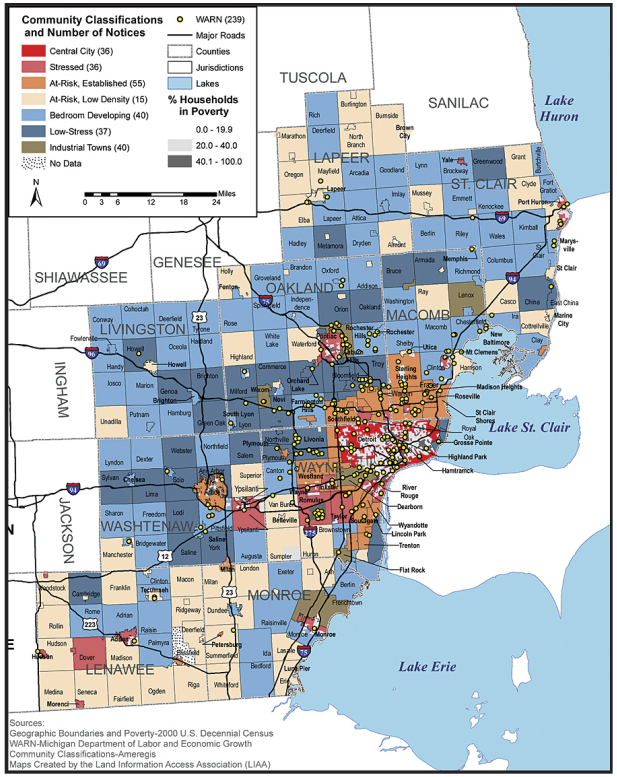
A more descriptive term is job subsidies. But whatever their name, reforming incentives is no small task: the average U.S. state has three dozen programs on the books, costing states and cities an estimated $60 billion a year. They range from straightforward training grants to arcane programs like tax increment financing, enterprise zones, and film production tax credits.

Enter Good Jobs First, an activist nonprofit based in Washington, D.C., that helps grassroots groups and public officials cut through the jargon. Founded in 1998 by Greg LeRoy, it provides research, Web tools, training, and consulting with a staff of eight (including two in New York City, New York). LeRoy had worked on the issue since the late 1970s at two other nonprofits in Chicago, Illinois.

As the executive director of a group for the first time, LeRoy was challenged: how to make the issue crisp and compelling. A fan of Edward Tufte—professor emeritus of political science, statistics, and computer science at Yale University—and a student of how research is presented graphically, LeRoy's first hire was a GIS-trained planning school graduate. Their first study was about wages: Minnesota had passed a landmark reform requiring companies to disclose the pay levels of workers hired in incentive deals.

They stumbled on Anoka, a far-north suburb of Minneapolis, Minnesota, which had filled up an industrial park with 29 companies pirated from Minneapolis and older inner-ring suburbs. LeRoy realized he had struck a data gold mine: subsidized job relocations that could be mapped for a sprawl analysis. Good Jobs First received a copy of ArcView (courtesy of Ralph Nader in 1999) and a study grant from the Joyce Foundation and issued *Another Way Sprawl Happens* in early 2000.

The findings were disturbing and received prominent media coverage: the net effect of the relocations was to move jobs away from poverty, people of color, and transit access. It was the first time company-specific incentive deals had been mapped and analyzed for their land-use impact.



Detroit metro area plant closings and major layoffs, 2001–2004.

Good Jobs First has since produced a string of increasingly sophisticated studies, using Esri products in-house or with partners. The largest is *The Geography of Incentives: Economic Development and Land Use in Michigan.* Funded by the Charles Stewart Mott Foundation, it maps 4,000 deals in seven metro areas and sorts the deals through the lens of Myron Orfield's community typology and other criteria. In a state hard hit by the decline of manufacturing, the most damaging images involve job loss as well as creation: it is the first time incentives have been geographically juxtaposed against plant closings and mass layoffs (as officially notified under the federal WARN Act). For the state's most generous subsidy, the maps of the largest metro areas like Detroit, Michigan, show very few deals going to the central city or the densest inner-ring suburbs, even though those areas have suffered the vast majority of shutdowns. For some, the images conjure up redlining, the practice of geographic discrimination that banks and insurance companies have been accused of.

Good Jobs First has produced several more such studies, all funded by the Ford Foundation. "Reverse Robin Hood" was the banner business-section headline of the *Chicago Tribune* reporting on 15 years of State of Illinois investments in the six-county Chicago metro area. The Good Jobs First maps revealed that one in six company-specific subsidies went to a small slice—the Northwest (O'Hare) Corridor—an enormously attractive place with the nation's second-busiest airport and several feeder freeways, the engine of the region's wealthiest quadrant. By contrast, large swaths of Chicago's South Side and its low-income and predominantly African-American southern and western suburbs got few deals or none. At a Chicago Urban League forum, the state's commerce secretary was publicly chastised.

Another study revisited the Twin Cities (*The Thin Cities*) where state legislators had responded to the Anoka study by adding a disclosure-form question: Did this deal involve a move, and if so, from where? Eighty-six times, the study revealed, companies had received subsidies simply to move around within the metro area, and the moves were overwhelmingly outbound: 22 were more than 10 miles outbound. The relocations were analyzed by race, poverty, welfare, and tax base wealth—and for their impact on workers who cannot afford a car: 60 of the 86 moves made jobs inaccessible via public transit (including 26 that had been accessible). The bottom line: longer commutes and more air pollution; a depleted tax base for places already poorest; and more low-income and workers of color spatially trapped, unable to compete for new jobs.

Two of the most recent studies were done in-house with ArcGIS. *Sprawling* found similar inequities in the Buffalo-Niagara metro area of New York. And another study of relocations—covering Cleveland and Cincinnati, Ohio—shows companies moving away from older areas to get lucrative enterprise zone tax breaks.

The policy punch line of the sprawl studies is simple: states (which legally enable and regulate incentives) have two "policy silos" that are utterly disconnected and often at war: economic development versus planning for transportation and land use. Therefore, Good Jobs First argues, states should rewrite their economic development program rules to make them subordinate to planning goals. Incentives are tools and nothing more, and they can be reformed to reduce sprawl and promote regional equity, but only if a state is intentional about it.

Good Jobs First has also created startling unpublished maps for labor leaders. In Chicago and Philadelphia, Pennsylvania, it mapped the geography of unionization and found that across the board, as jobs thin out, they deunionize. As a Chicago Federation of Labor officer reacted, "Now, sprawl looks like a giant antiunion conspiracy." After Good Jobs First publicized the

findings within labor, the national AFL-CIO passed a convention resolution condemning sprawl and urging its affiliates to weigh in for smart growth.

The smart growth movement has historically paid too little attention to jobs, Good Jobs First argues. Indeed, the original 10 principles of smart growth do not contain the word job or workplace. By using maps to dramatize how incentives fuel sprawl and how sprawl hurts union members, Good Jobs First has brought a new public policy hook and a new constituency to the cause.

Good Jobs New York, Good Jobs First's New York City project, has produced Subsidy Snapshots, or brochures with community maps showing company names and incentive deal details. In both Manhattan and Queens, New York, the snapshots were co-released with the borough president; they are being used by job training providers who seek to place trainees at companies that are committed to job creation. Good Jobs First most recently used ArcGIS in a regional impact study of workers dislocated in an Indiana plant closing.

These pioneering mapping studies have enabled Good Jobs First to reach large, new audiences; firmly connect incentives to sprawl and all its attendant injustices; and inspire some public officials to start rewriting the rules. No bar chart or correlation graph could have carried the messages so powerfully as maps.

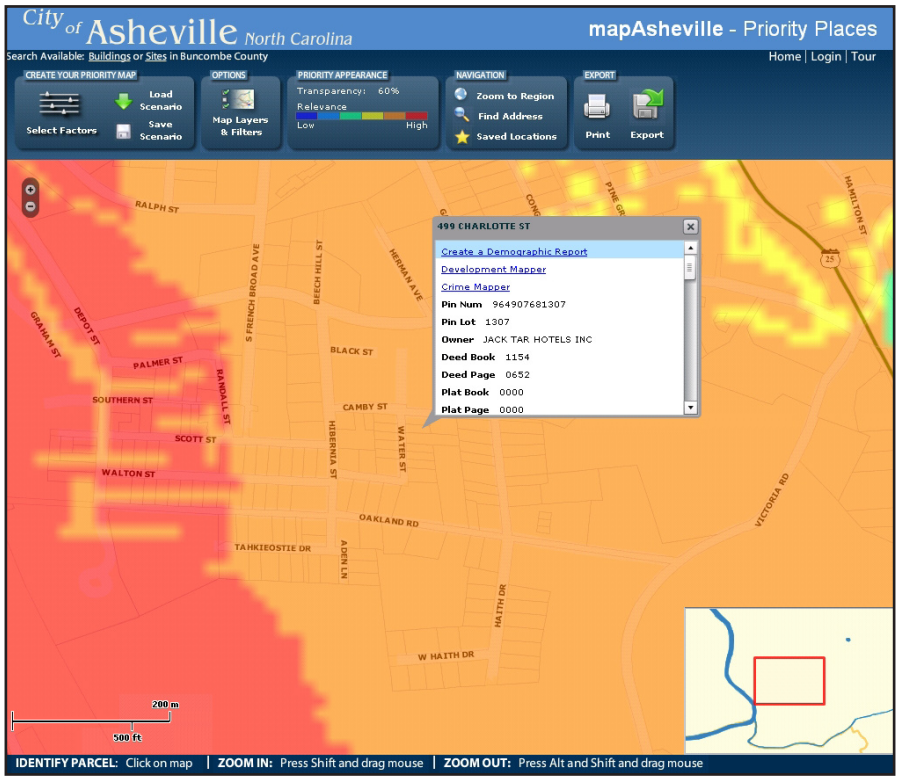
More Information

For more information, visit goodjobsfirst.org.

(Reprinted from the Summer 2010 issue of *ArcNews* magazine)

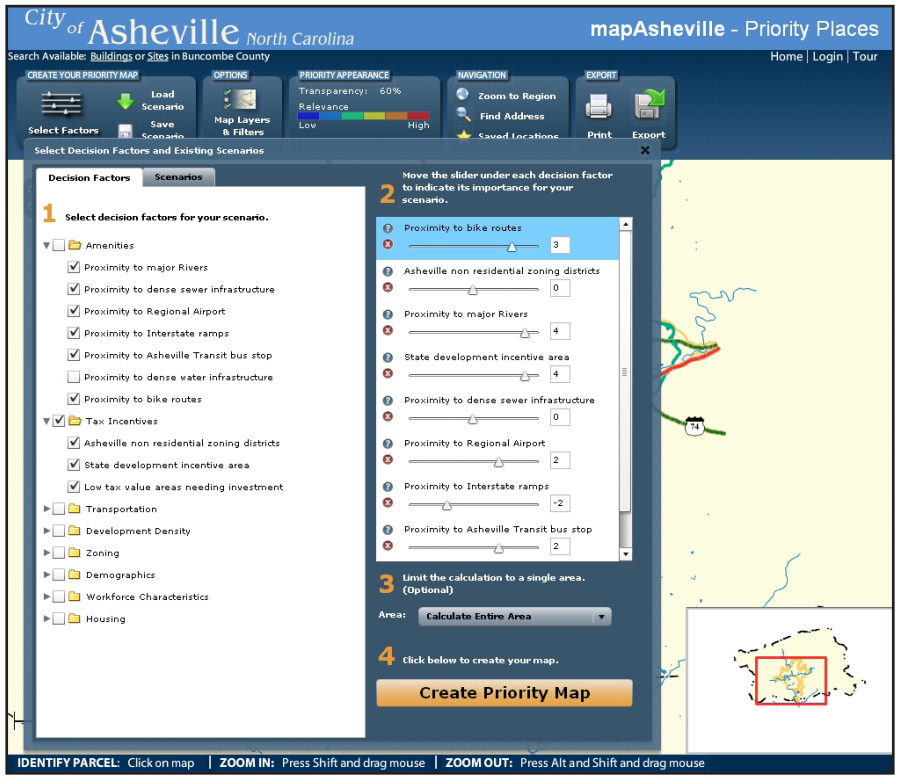
GIS Fosters Economic Development in Asheville

The City of Asheville is the largest city in western North Carolina and serves as the regional hub for business and other community amenities. Like many cities across the country, Asheville is concerned about increasing investment and attracting new businesses, as well as retaining existing jobs and companies in the region. To do that, the city has created Priority Places, a Web-based geographic information system (GIS) tool that promotes economic development by enabling citizens, business owners, investors, and government agencies to identify optimal locations for their activities (gis.ashevillenc.gov/mapasheville/priorityplaces). The application is part of a larger suite of GIS applications known as mapAsheville.



Users can produce an array of reports on demographic and economic characteristics, retail expenditures, and housing for areas surrounding their selected locations.

Choosing the right location is an important decision that can ultimately determine the success or failure of any new business. To facilitate the long-term economic growth that thriving businesses can provide, several years ago Asheville began looking for an analytic approach to business siting that would leverage the city's wealth of economic development data. The ideal solution would be Web based and easy to use. Furthermore, it would allow individual businesses to select and assign weights to decision factors that they consider important, rather than simply adapting their projects to preselected sites. Most importantly, it would generate customized priority maps based on the criteria selected, highlighting those locations that best meet each business owner's requirements.



The City of Asheville's Priority Places application enables users to create and save customized heat maps of sites that best meet their preferences by using sliders to weight their siting criteria.

In 2006, Asheville contacted Azavea (formerly Avencia Incorporated), an Esri partner, about an application Avencia had developed for the City of Philadelphia. The Philadelphia application used a weighted map overlay process to support business site selection. Users assigned weights to various factors including proximity to public transit, locations within tax incentive zones, proximity to waterfronts or parks, and areas with a high density of college graduates. The application enabled users to create heat maps of the sites that best met their choices.

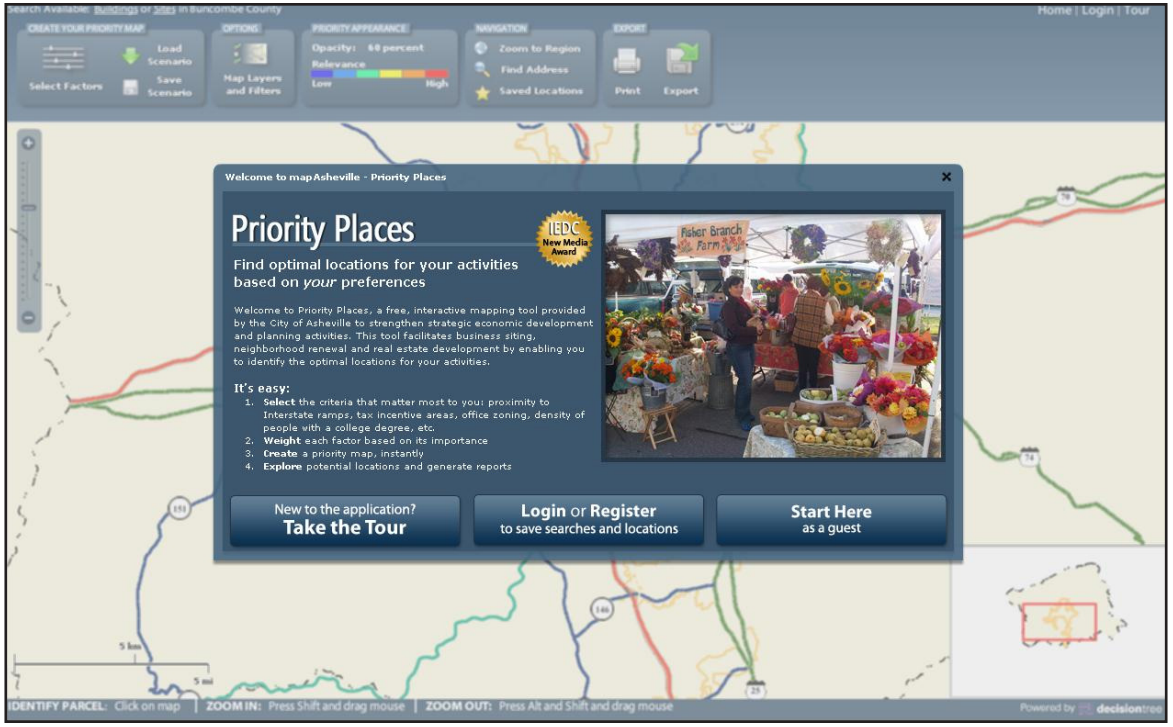
The Philadelphia prototype evolved into Avencia's DecisionTree, which had just been completed when Asheville contacted Avencia. The city chose to move forward with this high-performance processing component that is capable of making complex site optimization calculations in less than one second. Leaders in the Office of Economic Development selected the business siting factors integrated into the application, including proximity to interstate exits, regional airports, existing utility infrastructure, and state incentive areas.

Priority Places was officially launched in 2008 and provides an interactive user interface that displays each decision factor as a slider bar. The application was recently updated with the ArcGIS Server API for Flex, which incorporates a new user interface with the rich, interactive features made possible by the Adobe Flex toolkit.

On the site, users choose the importance of each decision factor by moving the appropriate slider bar from the neutral (0) position to a preference value ranging from -5 (avoid proximity) to 5 (prefer proximity). Decision factors can be selected and valued in any combination to provide truly customized site selections. The system then returns a heat map highlighting the areas that best match the specified criteria, and users can zoom in to view additional layers of data that can further enhance their decision-making powers. These layers include railways, flood hazard areas, zoning districts, and city-owned surplus and sale-pending properties. Additional features include geocoding, customized map color palettes, transparency controls, and the ability to create bookmarks of specific map views that can be quickly returned to at a later date.

Priority Places has also been integrated with Esri Business Analyst Online API, enabling users to produce an array of reports on demographic and economic characteristics, retail expenditures, and housing for areas surrounding their selected locations.

For businesses looking to establish themselves in Asheville, Priority Places provides access to information and analysis that might otherwise be out of reach. The city reports that in the past months, the user base for mapAsheville has increased by 20 percent, while maintenance costs have decreased.



The City of Asheville's Priority Places home page shows images relevant to economic development and provides helpful application use guidelines.

In light of its innovative work, leading organizations are acknowledging the city's achievements. In 2008, the City of Asheville won the prestigious Excellence in Economic Development Award in the New Media Initiative category from the International Economic Development Council (IEDC) for Priority Places. And in March 2009, mapAsheville won the G. Herbert Stout Award for Visionary Use of GIS, awarded by the North Carolina Geographic Information Coordinating Council.

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A Formula for Revitalization

Using Esri Business Analyst for planning project

By Matthew DeMeritt, Esri Writer

Hershey kiss streetlights line Chocolate Avenue.

Hershey, Pennsylvania, experienced a sudden and unexpected loss of visitor and resident patronage in its downtown. In 2008, Hershey Entertainment and Resorts, an entertainment and hospitality company dedicated to preserving the legacy of Milton S. Hershey, hired a GIS consulting firm to help attract consumers back to the area.

Retail trade area analysis is a necessary part of any civic development plan. To find a target market and gain knowledge about local consumers, geographic information must be carefully considered. Because GIS software specializes in extracting and aggregating geographic data, it is an ideal platform for conducting this analysis. Esri Business Analyst, which incorporates the Huff model (a tool for formulating and evaluating geographic business decisions), was instrumental to the process of successfully reenvisioning Hershey's downtown.

Location-Based Problem

The town of Hershey was originally designed by Milton S. Hershey to serve the needs of chocolate factory employees and their families. Built in the early 1900s, the original town included housing for factory employees as well as schools, churches, recreational facilities, and a trolley system. By the early 1930s, downtown Hershey had grown to become the center of activity for Hershey residents, with a bank, theater, department store, hotel, amusement park, and community center.

A statue of town founders Milton and Catherine Hershey on the campus of Milton Hershey School.

As the town grew and the number of visitors increased, Pennsylvania enhanced the local highway system to accommodate the increase in traffic volume. However, enhanced highways had the unintended effect of directing commerce away from downtown Hershey, enticing residents and visitors to shop in suburban shopping centers.

A New Vision

In 2005, Hershey Entertainment and Resorts drafted plans to revitalize the downtown. The revitalization effort started with the restoration of a prominent downtown building originally constructed in 1916 for printing candy labels. The newly renovated building opened in the summer of 2006 and is now home to two new restaurants on the ground floor, with the

Hershey Entertainment and Resorts corporate offices occupying the two upper floors. Later, an interactive museum, the Hershey Story, was located adjacent to the renovated press building.

In 2008, Hershey Entertainment and Resorts contracted Delta Development Group, Inc., a community planning firm located in nearby Mechanicsburg, Pennsylvania, to conduct the next phase of revitalization. With design assistance from EDSA, a landscape architecture and urban design firm from Baltimore, Maryland, Delta began a yearlong process of creating a new vision for the downtown area.

In keeping with Milton Hershey's original vision for downtown Hershey, the revitalization plan was based on the needs of the community while reestablishing a balance between the downtown and the surrounding resort, school, medical, and commercial areas. The goal was to make downtown Hershey serve the community so residents and visitors wouldn't need to go elsewhere.

Many Hershey factory employees reside in neighborhoods like this located in the town of Hershey.

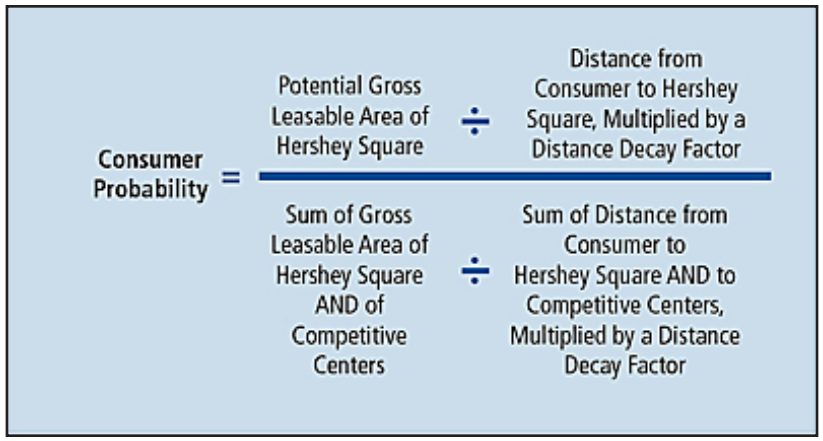
An Integrated Formula

As Delta assessed the ability of Hershey's market area to support revitalization, EDSA evaluated the downtown's physical opportunities and constraints in preparation for creating conceptual

designs. The ultimate challenge facing the team was creating a design concept with the right mix of appropriately sized uses clustered to capture the opportunities presented by the local market. The first phase of analysis would be to profile and measure the local market for real estate uses such as retail, residential, office, and public spaces.

In running demographic reports for comparative analysis, the most difficult task for Delta was determining the geographic trade area for downtown Hershey that would be used as a basis for estimating the amount of retail and restaurant space that could be supported. "The big question we needed to answer was, 'How far would people be willing to drive to shop and dine in downtown Hershey?'" said Debbie Tollett, senior associate at Delta Development Group. "To answer that question, we used the original Huff gravity model in Business Analyst." The Huff model is an analytical tool that measures the probability that a consumer will drive to a proposed new development site based on the distance they would have to travel to get there, the attractiveness of the development, and the area competition. It is assumed that the probability that consumer will travel to the site increases as the size of the site increases and as the distance or travel time for the consumer to the site decreases. *[The Huff model was developed by Dr. David Huff of the University of Texas and first published in 1963. To learn more about the Huff model, see "Parameter Estimation in the Huff Model" by David L. Huff in the October–December 2003 issue of* ArcUser magazine.*]*

Once Delta established the geographic market area, it could conduct a more detailed evaluation of consumer spending and identify target retail tenants for further analysis. However, at this juncture, the analysis had focused on general retail spending. With an estimate from EDSA regarding the contiguous land area in the downtown that was available for development, the Delta team approached the analysis by assuming that this land could be developed into Hershey Square, a town center with leasable retail space that could compete with surrounding suburban retail centers.



The Huff model modified with Hershey-specific assumptions.

Bringing the Formula to Life

Applying Hershey-specific assumptions to the Huff model gave a clearer picture of the local market. Those assumptions and the Delta team's input for the model included the following five components:

1. The Huff model substituted Esri's census block group polygons as the "consumers" and used the estimated total annual consumer spending for retail goods from Business Analyst's demographic data as the data field to be summarized for each block group in the model results.

2. EDSA provided a preliminary assumption of the number of square feet that could physically be developed on the available contiguous parcels identified for redevelopment in the downtown area. This estimate represented the attractiveness factor, the potential Gross Leasable Area (GLA) of Hershey Square in the formula shown to the left.

3. Esri's shopping center data layer was used to identify and select competitive retail centers: the 14 retail shopping centers located within 15 miles of Hershey, including a 246,000-square-foot outlet center within a quarter mile of Chocolate Avenue. As with Hershey Square, the GLA field was identified as the attractiveness factor for the competitive centers in the above formula.

4. Business Analyst calculated the linear distance from each "consumer" to the proposed location of Hershey Square, and to each of the 14 competitive retail centers. These calculations are represented on the right side of the divisor in the formula.

5. Linear distance between consumers and shopping center locations represents only one distance consideration in the Huff model formula. The distance a consumer is willing to travel to shop is also influenced by other considerations such as the type of goods sought. For instance, consumers would be more likely to drive a longer distance to shop for furniture than to shop for groceries. The Huff model provides a distance decay constraint that can be entered in the model account for this factor. The appropriate constraint is entered as an exponent between 1 and 2. A smaller exponent represents shopping activities for which consumers will travel farther, such as furniture purchases. Since the Hershey model is based on total retail spending and represents a variety of types of retail goods, an exponent of 1.5 was used in the model assumptions.

Results: Local Market Defined

Based on these inputs and calculations, the Huff model provided spending probabilities by block group that allowed the Delta team to identify a defensible trade area. This resulted in a conceptual design and scale for downtown Hershey that was driven primarily by the local market.

While the Huff model requires the user to have at least a conceptual understanding of how the model works and how various input components impact the model output, Business Analyst's user-friendly interface allowed the Delta team to access precise analytic capability that would otherwise be outside the realm of its expertise. "Before discovering the Huff model operations in Business Analyst, I tried to do the equation on paper," laughed Tollett. "All the variables that need to be plugged into the formula ate way too much time. Performing the operation in an integrated environment made all the difference in getting the quick and accurate results we needed."

(Reprinted from the Summer 2010 issue of *ArcUser Online*)

Compare Multiple Locations for Faster Decision Making

Custom Comparison Reports from Esri Business Analyst Online

Highlights

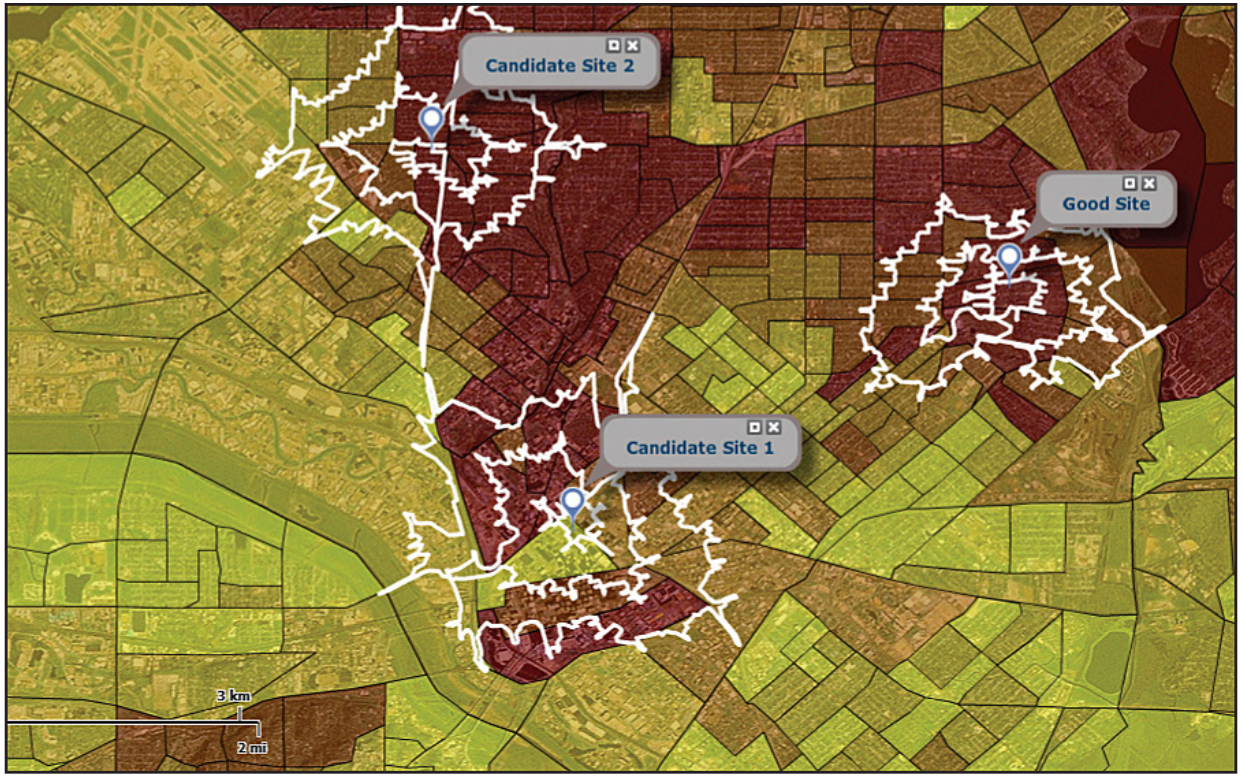
- Business Analyst Online helps users compare existing locations.
- Businesses can generate custom comparison reports using variables such as consumer spending.
- Location profitability can be compared to county, census tract, and national levels to check performance.

When businesses evaluate locations, they often compare sites to one another, or to a benchmark site that is known to be successful, to judge the suitability of the candidate locations. With Esri Business Analyst Online, small businesses, retailers, real estate professionals, and many other business segments can now take advantage of new comparison reports. Through an easy-to-use wizard, businesses can choose demographic and consumer spending variables to create the custom reports they require. Many locations are geographically dispersed, sometimes over large distances. Managers and analysts in charge of site selection thus often do not have intimate knowledge of the individual parcels or surrounding locations and rely on Business Analyst to provide accurate, detailed data reports, which allow them to respond to competitive pressures quickly and efficiently.

Easily Create Robust Customized Comparison Reports

Organizations can now quickly access preformatted reports or create and save custom comparison reports with variables of their choosing that best meet their individual business needs.

For example, the recent economic downturn has led to numerous retailers closing store locations across the country. Business Analyst Online allows retailers to compare existing locations, not just in terms of same-store sales, but also with detailed analysis of the geographic region surrounding a particular store location. Combining factors such as local area population, daytime population, income, and competitors' locations, and viewing these in relation to their own customer and sales data, pinpoints the most viable locations and where there should be consolidation.

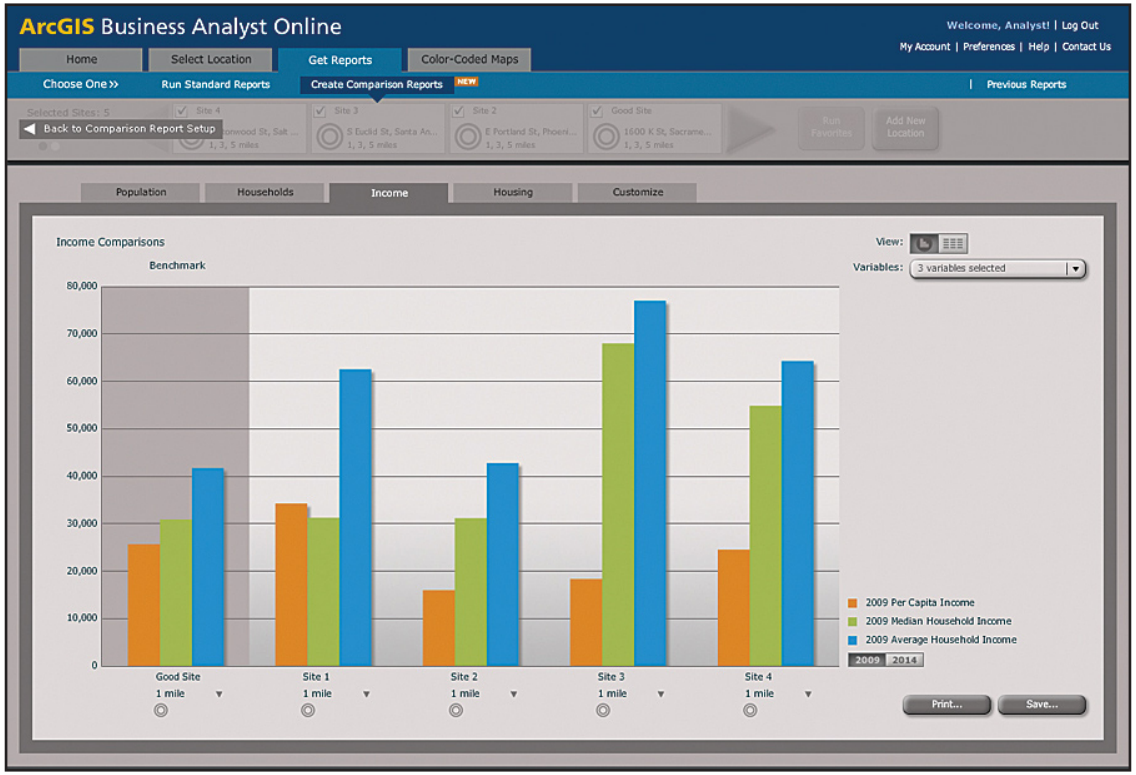


A visual comparison of proposed locations to a successful benchmark site.

Economic developers use comparison reports to help attract new business to their cities. Benchmarking a prospective site to an already successful location highlights the demographic and geographic similarities between the sites. Economic developers can then use this analysis to show new businesses side-by-side data that can provide insights about the local labor force, population, and spending and lifestyle habits. Evaluating candidate sites in this manner reduces the time needed to compile and evaluate critical input factors when deciding whether to move ahead with a development or not.

Financial institutions are also using the new capabilities to compare their locations. By combining demographic characteristics provided by Business Analyst Online with individual site performance indicators, the characteristics common to successful sites can be easily

identified. Business Analyst Online can then be used to find other suitable locations with similar characteristics.



Customized Level of Service

Thousands of companies and individuals have already integrated Business Analyst into their decision-making processes, making it an important business resource. The application is available in different subscription levels, from one-time-only reports to premium subscription packages and specialized development services. Nonsubscribers can purchase a day pass to take advantage of more than 50 preformatted reports and maps for 24 hours.

More Information

For more information about Esri Business Analyst Online, visit esri.com/bao.

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Egypt Launches Parcel-Based Deeds Registry to Spur Mortgage Market

Manual Registry Index Streamlined with GIS

By Peter Rabley, International Land Systems Inc.

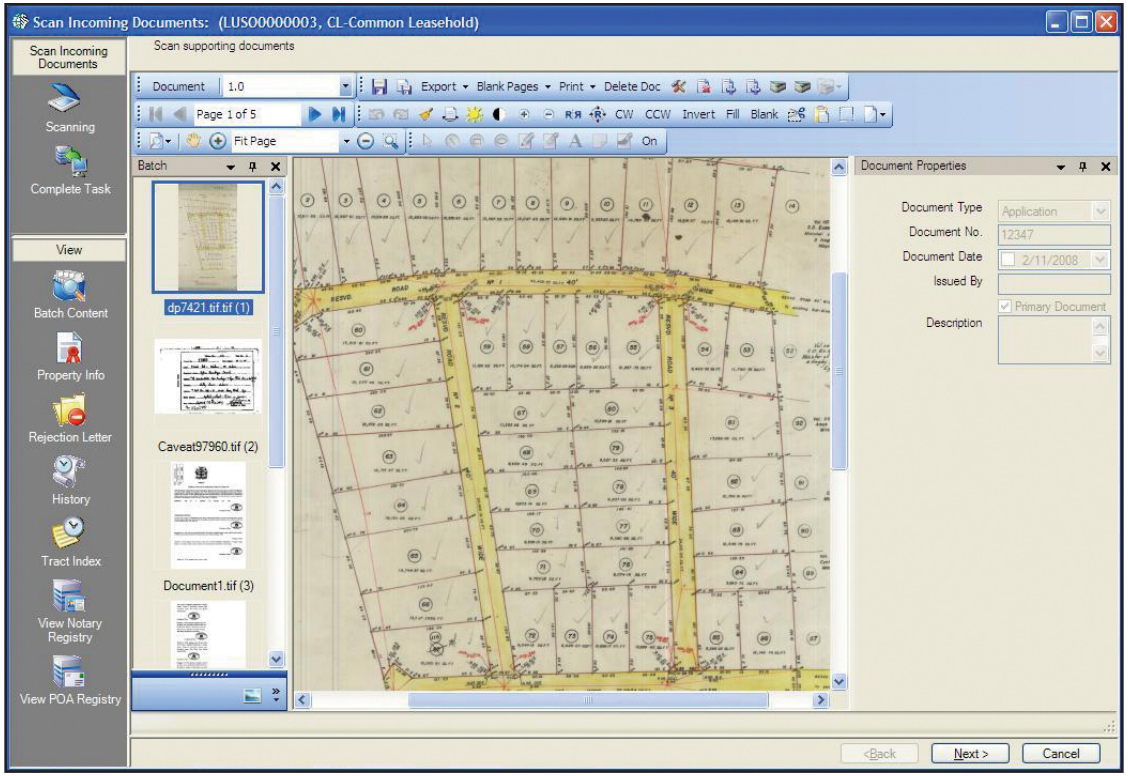
Highlights

- Clerks can easily view and share parcel map and other legal documents relating to the property.
- Land Registry System uses new cadastral mapping solution to minimize time required for applications.
- Educational campaign was begun to increase awareness of the benefits of registering real estate holdings.

Egypt has embarked on an ambitious plan to stimulate financial markets and create its first-ever mortgage industry by freeing up the billions of dollars in capital that are trapped in unregistered real estate properties. The centerpiece of this progressive economic program is the development of a parcel-based deeds registration system in Cairo that will make it easier for the lower and middle classes to have their landownership rights recorded by the government.

Landownership registration may seem an unlikely solution for jump-starting economic activity, but it is in fact a critical starting point for emerging urban markets around the world. Described in his groundbreaking book, *The Mystery of Capital,* Peruvian economist Hernando de Soto observed that low-income people everywhere in the world often have only one asset—the property they occupy.

This property represents an untapped resource in many urban areas because these landholders usually have no officially recognized right to own or occupy the property. In addition, many formal systems do not recognize informal or customary forms of land tenure. Without a registered deed, title, or lease, the owner cannot use the land as collateral and improve the property or start a business. For an emerging market, this untitled land is a major impediment to economic development.



Both paper and digital maps, construction plans, local taxing and planning data, and more, populate the geospatial database.

Recent studies indicate that the benefits of formally recognized landownership and occupancy extend beyond the economics of loans and mortgages. People with land titles or deeds or even paralegal titles enjoy a greater sense of security that they won't be evicted or that their home and land won't be taken away. This gives them the confidence to enhance the property, send their children to school, and demand basic services, as well as legal recognition from the government.

While the benefits of land registration are many, the disincentives are often considerable. In many parts of the world, poor people don't trust land registries or formal government out of fear that those systems will only result in taxation. Another common drawback is the formal

registration process itself, which is often complex and expensive for anyone but a wealthy landowner to attempt to navigate.

In Cairo, only 5 percent of the roughly three million real estate properties are registered in the existing paper-based deeds system. The land registration process, which lacks computerized automation, takes an average of 193 days to complete, involves many complex steps, and has high fees. The typical landowner doesn't view the process as worth the time and money involved.

The registry contains paper documents dating back to 1900.

The Egyptian government recognizes the long-term economic benefit of bringing the other 95 percent of Cairo's private properties into the formal system. With encouragement from

a rising middle class that increasingly wants to take advantage of mortgages, Egypt is streamlining the process and replacing the manual registry index in Cairo with a parcel-based deeds registration system that is linked to a digital cadastre using GIS technology.

Automation Teams with Parcel Maps

In November 2004, the U.S. Agency for International Development (USAID) provided the funds to initiate the Egypt Financial Services (EFS) program, of which one aspect (Task 2) was identified as modernizing the property registry in Cairo. Egyptian government counterparts are the Real Estate Publicity Department (REPD) of the Ministry of Justice and the Egyptian Survey Authority (ESA).

International Land Systems Inc. (ILS), an Esri Business Partner in Silver Spring, Maryland, and Esri Northeast Africa (ENEA) of Cairo are the two contractors responsible for Task 2, using state-of-the-art automated software and GIS.

ILS is implementing the Land Registry System (LRS), its off-the-shelf solution for real property title registration. LRS automates the entire property registration workflow and configures for local Egyptian laws, language, and documents. LRS in Egypt will use IBM's DB2 database management system and the LRS J2E-based content management system.

"From the outset, Egypt understood the value of linking the deeds registry with a digital cadastral map," says Noel Taylor, ILS vice president of International Programs and resident leader of Task 2. "This design establishes the framework so that government offices involved in land management, such as real estate registration, taxation, planning, and zoning, can tie in to the same GIS and share information at the level of individual parcels. One district in Cairo, comprising about 100,000 real estate properties, was chosen for the initial implementation."

The important task of developing the ArcGIS Server technology-based cadastral mapping solution (CDMS) is being handled by ENEA. The parcel index map is the base layer of the CDMS and is populated with the location and geometry of each parcel and building footprint, as well as a unique property identification number.

Fatma Abdel Kader, ESA general director of the Cadastral Mapping Department, notes that now that the two systems are integrated digitally, "it will allow the electronic exchange of information between ESA and REPD."

Automating the Process from the Ground Up

The existing registry contains paper documents dating back to 1900, and no unified property cadastre has ever been created, which meant an enormous volume of map data had to be obtained either in the field or from paper records and converted using LRS.

"The critical aspect of this phase was to create the unique parcel ID to link the data in the two databases," says Taylor.

A GPS mapping crew.

Populating the geospatial database in the CDMS was a complicated endeavor due to the numerous types of maps available. ESA provided both paper and digital maps, which were either scanned or imported into the cadastral layer. From local taxing and planning offices, maps describing parcel geometries and locations were gathered. Building footprints were digitized from aerial photographs or scanned from construction plans supplied by real estate developers.

"In this first district, there were many properties that had never been mapped, and we had to fill in those gaps with GPS mapping crews," says Taylor. "Field teams, all hired locally, were also used to verify the relational accuracy between parcels."

Going Live with Deeds Registration

REPD expects to open its new District Registry Office in Cairo in 2008. Extensive training in land registration practices and information technology is now under way for the staffers, many of whom have little experience with automated systems. REPD and ESA offices will be linked by high-speed telecommunications lines.

Ali Abdel Salem, former general secretary of REPD and now a consultant on the project, says that LRS and CDMS will "minimize the time required to inspect applications, assist applicants in dealing with the registry, and help them acquire the required documents to achieve a secure and stable tenure.

"Working within the system, a clerk may use the LRS ArcView extension to access the CDMS and view the parcel map and other legal documents."

"This extension will also be available to the public on a computer in the district office," says Taylor. "Our analysis of business processes revealed that a major bottleneck occurred because landowners didn't have easy access to the parcel descriptions that define their property. They will soon be able to obtain this information themselves by using one of the REPD terminals.

"When the systems are fully operating and the staff are comfortable in their new activities, the process required to record most real estate transactions will take only about 30 days and require a flat fee paid by the applicant. Once the registration has been approved and paid, the official deed will be printed directly from the system and handed to the landowner."

In preparation for the new Cairo registry, project participants are embarking on an educational campaign aimed at making the public aware of the personal and national benefits that will be derived from registering real estate holdings with the government.

About the Author

Peter Rabley is the president of International Land Systems Inc. with more than 20 years of experience designing and implementing land information systems around the world.

(Reprinted from the Spring 2008 issue of *ArcNews* magazine)

Mapping Urban Inequalities with GIS

By Linda Loubert, Economics Department, Morgan State University, Baltimore, Maryland

Highlights

- ArcGIS is used to geocode 911 calls and crime data to socioeconomic and demographic data to determine a focus/study area.
- Esri Business Analyst mapped all businesses around a proposed emergency shelter site.
- GIS is important to homelessness prevention.

Mapping urban areas can help cities target policies that are most efficient and effective for their communities, particularly for those who are less fortunate. However, finding a solution to a problem such as homelessness entails understanding the associated issues. GIS has become fundamental to that process.

Homelessness prevention, of course, should be the first priority. But when that has not taken place, it becomes necessary to have a structure ready to supply fundamental care and services. Finding a location for shelters gets to be a tricky situation for local governments because businesses find it undesirable to have homeless people close by and, therefore, resist their accommodation, hoping shelters will not be near their businesses or, as the slogan goes, Not in My Back Yard (NIMBY).

Social scientists at Morgan State University, Baltimore, Maryland, studied the impact of locating a permanent homeless shelter for the City of Baltimore with the intent of uncovering all perspectives of building a new structure. Their findings could be applicable to any city. Beginning with some statistics on homeless people, the study found a clear indication of the critical need for some type of permanent structure because

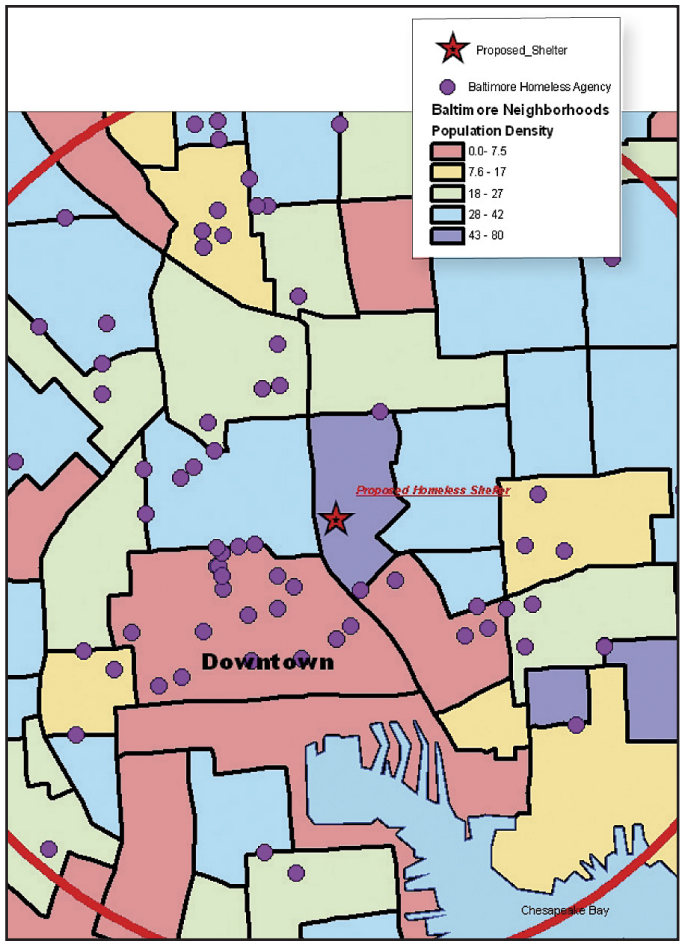
- More than 800,000 people may be homeless on any given day; 200,000 of them may be children (Burt, M. R., 2001. *What Will It Take to End Homelessness?* Washington, D.C.: The Urban Institute).
- During a typical year, 900,000 to 1.4 million children are homeless.
- Ten percent of all poor people may be homeless, even if only for a short while.

- Seventy-five percent of homeless individuals access services in central cities (*The Annual Homeless Assessment Report to Congress,* 2007).

When more than 50 percent of their income has to go for housing, this tends to push low-income people into homelessness even faster. Also contributing to the problem is that U.S. health care policies have removed institutional support for people with severe mental illness, along with a drastic reduction in long-term hospitalization for the mentally ill; this has pushed these individuals out into the streets.

The "visible" homeless people are generally overrepresented in central cities of large urban areas. In Baltimore, as in other cities, homelessness is a serious social and public health problem, so the city believed building a new emergency shelter for more than 200 people would help alleviate some of the problems for homeless individuals. Building the shelter, called the Housing Resource Center, is a strategy to address the City of Baltimore's 10-year plan to end homelessness. This project reflects various aspects of best practices to the extent that it integrates a 24/7 emergency shelter with an array of supportive services (health, counseling, and employment).

The study involved key stakeholders to understand the impact of this shelter as it related to homeless people, businesses,



This shows the population density for defined neighborhood boundaries and locations of current service providers within a 1.5-mile radius. Within this radius are at least 60 percent of the providers of services to the homeless.

service providers, and neighborhoods located less than one mile from the proposed site. The study also included the developers of buildings for homeless people who could contribute design ideas that would incorporate safety measures for the shelter residents and the residents of the surrounding community, as well as appropriate architectural designs for the area.

ArcGIS was used by the Institute for Urban Research at Morgan State through an Esri university site license. Using its overlays and tools, the institute's researchers incorporated ArcGIS in this study beginning with community mapping; they collected information from the city, local businesses, and neighbors of the proposed site. They captured mobility patterns of homeless individuals using GPS. ArcGIS provided the tools to geocode 911 calls and crime data to U.S. census block groups, and socioeconomic and demographic data from the U.S. census was added to paint a picture of the focused area for analysis. The researchers took population density into account for defined neighborhood boundaries and the location of current service providers within a 1.5-mile radius (showing at least 60 percent of the providers of services to the homeless).

It should be noted that the City of Baltimore has only used temporary emergency shelters, scattered throughout the city, not a permanent one. Even though the neighborhood is densely populated, the study showed that the proposed location of the site would be in an unpopulated area of the neighborhood, under the viaduct of an interstate highway.

With Esri Business Analyst, all businesses around the proposed site were identified. Businesses in the neighborhoods surrounding the proposed emergency shelter represent 13 percent of all businesses in the city. The area consists of the downtown district.

From this kind of study, the question naturally arises: Will the shelter bring more crime and/or disturbances? To answer this question, researchers geocoded emergency medical services (EMS) calls and other crime data to U.S. census block groups for 2004 and 2008. Since a private sponsor opened a multipurpose soup kitchen in 2007, within 1,000 feet of the proposed facility, the homeless traffic was assumed to have increased during that time; this gave good reason to use years 2004 and 2008 for analysis of crime and EMS data. Based on standard deviations, the results indicate that the proposed site would not increase crime with an influx of more homeless people.

The study concluded that businesses and neighboring communities possessed a rather negative view of having a permanent shelter in their area. Homeless people were seen as loiterers and panhandlers who sleep in public spaces and relieve themselves on private property

and who should not be concentrated in one area of the city. Service providers and developers perceived homelessness as a societal health illness, with the need for compassion and effective policy to relieve the symptoms. The homeless individuals who spoke during the focus group study indicated that their desire for help was only for private residency, not group residency, as the proposed structure would provide.

Using ArcGIS Desktop and Esri Business Analyst, the study concluded that the site would be in a sparsely populated area of a few blocks within a densely populated neighborhood that included some businesses. The crime and EMS data showed that no increase in crime would occur because of the site when standard deviations were examined.

Using GIS along with qualitative analysis, such as the focus group of stakeholders, cities can better understand the needs of the homeless population.

About the Author

Linda Loubert, Ph.D., is an assistant professor in the Economics Department at Morgan State University, Baltimore, Maryland, and an affiliate researcher in the Institute for Urban Research at Morgan State.

More Information

For more information, visit the Institute for Urban Research at iur.morgan.edu. Other key personnel for this study from Morgan State University were Mary Anne Akers, Ph.D., School of Architecture and Planning; Jonathan VanGeest, Ph.D., School of Community Health & Policy; Sidney Wong, Ph.D., School of Architecture and Planning; Azza Kamal, Ph.D., School of Architecture and Planning; and Marvin Perry, Office of Sponsored Programs.

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esri.com

380 New York Street
Redlands, CA 92373-8100 USA

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