Summer 2011

ArcUser

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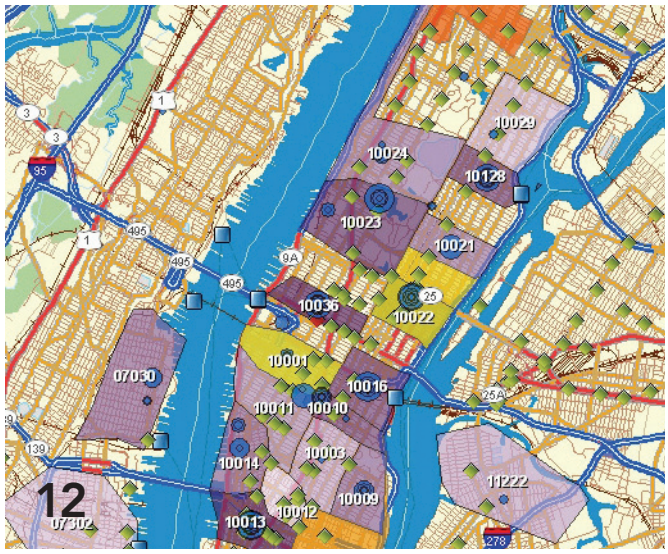

Focus

Features

Special: DevSummit 2011

To get an exclusive preview of ArcGIS 10.1 Scan this code or go to esri.com/arcgis10-1preview-arcuser

The Future Is Cloudy

The majority of technology experts polled by researchers for the Pew Internet and American Life Project expect that most people will compute and communicate in the cloud by 2020. This prediction in the 2010 report is hardly surprising, since we are already remarkably immersed in online hosted environments. We communicate through Facebook and Twitter and do our banking online. At work, we may use the services of companies like Salesforce.com, Inc., that delivers its products exclusively through the cloud. Quick access to greatly increased computing and storage capacity, as well as data resources, is making cloud computing a game changer for both business and government.

Esri has been making GIS available to business and government in the cloud for many years. ArcGIS in the cloud works seamlessly with ArcGIS across desktop, server, and mobile platforms. ArcGIS Online makes high-quality geographic content, apps, and tools from Esri and GIS users available from a common platform. With Business Analyst Online (BAO), businesses have a cloud solution that provides GIS-based analytic capabilities and demographic, consumer spending, and business data that can be used for generating reports that answer the needs of individual businesses. This information is instantly accessible using BAO for iOS, the iPhone app. Community Analyst, specifically designed for government users, provides thousands of constantly updated demographic, health, economic, education, and business data variables in an easy-to-use framework in the cloud.

Businesses are combining desktop ArcGIS with cloud capabilities to become more nimble and competitive. An article in this issue describes how MacKenzie Commercial Real Estate Services performs all types of market research, represents landlords, advises tenants, and manages properties using both desktop and online versions of Business Analyst.

According to Matt Felton, director of research for GIS and mapping at MacKenzie, "GIS enables us to combine Esri's rich collection of data with authoritative data from state and local government organizations and with our own local market intelligence." While talking with clients on the phone, brokers can use GIS to gather ownership, zoning, tax, and other information about a specific property on the fly so they can speak knowledgeably about it. Using ArcGIS Explorer, agents can also give tours of potential sites virtually.

Clearly, with abundant, current data and the tools to transform that data into actionable information, a bright future awaits business and government inside the geoenabled cloud.

Monica Pratt
ArcUser Editor

editor's page

ArcUser

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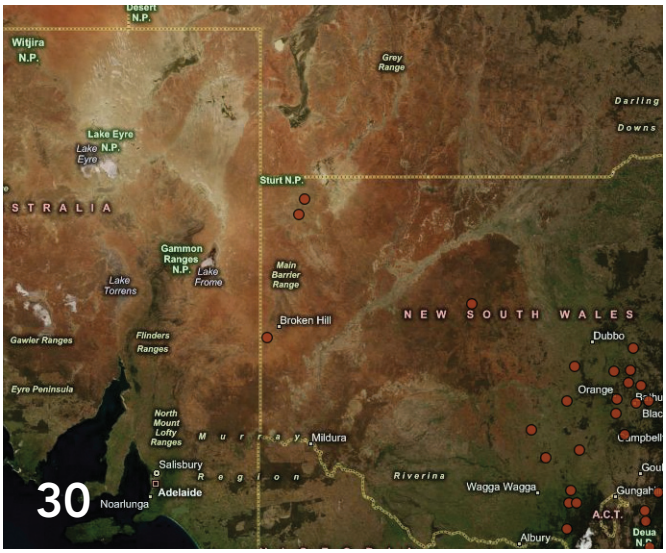
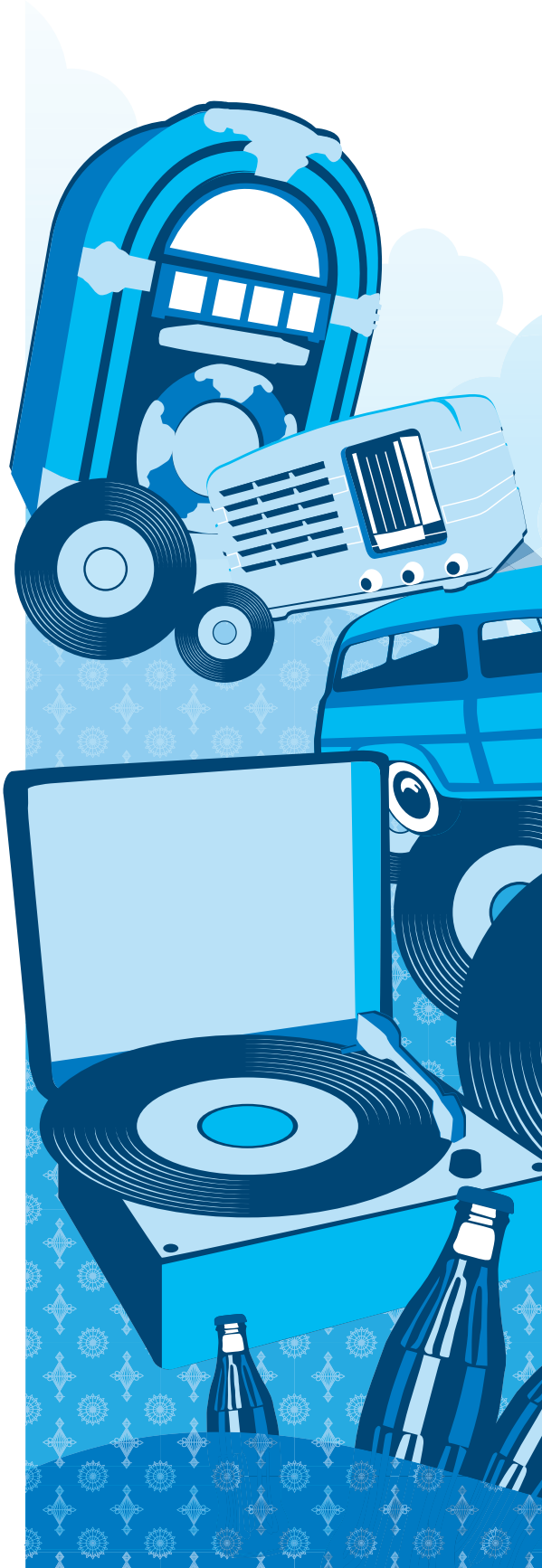
Departments



Local Officials Ride the Wave of Baby Boomers

Community Analyst helps make Placer County more friendly to retirees

by Karen Richardson, Esri Writer



What do Cher, Steven Spielberg, George W. Bush, and nearly 3 million other Americans have in common?

They are members of the baby boom generation who are turning 65 this year at the rate of 7,000 per day.

Baby boomers were born during the surge in population that followed World War II. They grew up during an era of dramatic social change that saw the Vietnam War, Woodstock, and the landing of a man on the moon. Their numbers have caused a demographic bulge that has redefined society as it passes through each phase of life.

Analysts are finding that the aging baby boom generation is now causing demographics in certain areas of the United States to change rapidly. One such area is Placer County, California's second-fastest growing county during the past two decades. Stretching more than 100 miles from metropolitan Sacramento east through the Sierra Nevada mountains to Lake Tahoe and the Nevada border, Placer County draws younger professionals and retirees alike to its mix of pleasant suburbs, small towns, foothills, and rugged mountains.

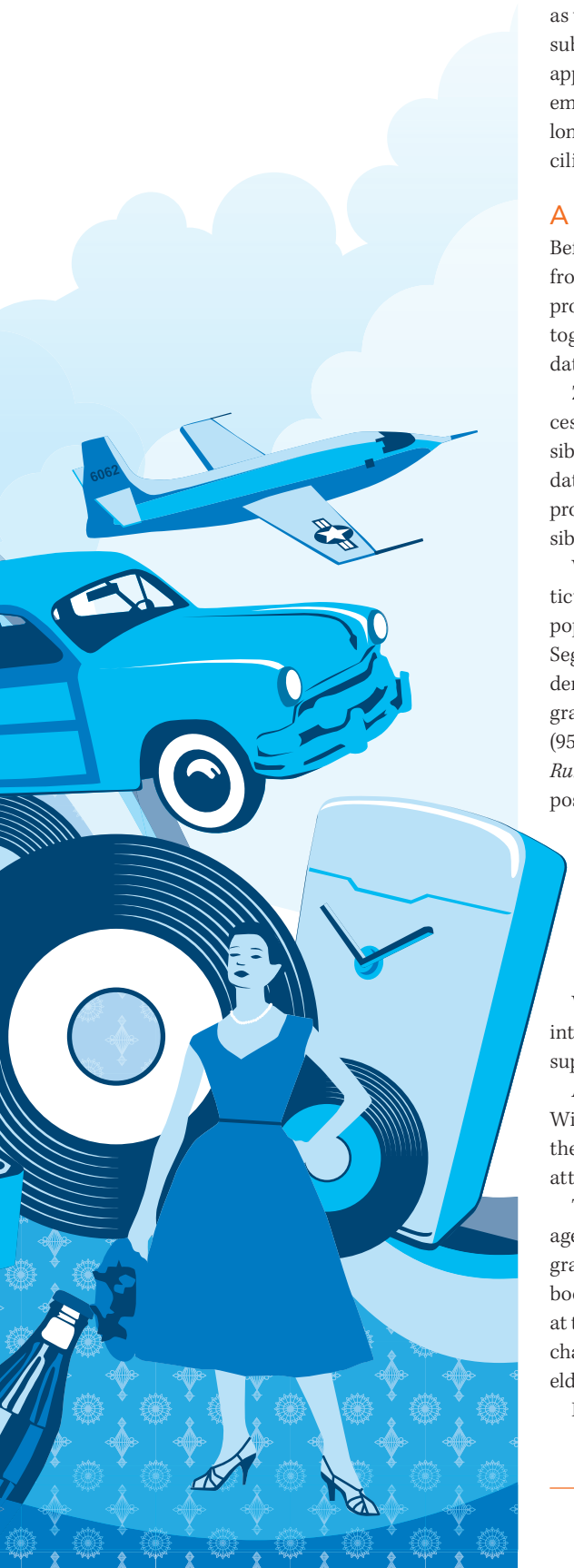
Like many communities, the area has grown organically. People were attracted by the relaxed pace of life and temperate climate. As a result, residents are scattered through the region. As its many baby boomers pass into retirement and live longer, Placer County's population profile is being transformed. Placer County wants to ensure a high quality of life for these aging residents by helping them continue living independently.

Online Source of Current Information

David Wiltsee, a retired urban and regional planner, is interested in understanding what this change means to the county's communities. Like many retirees, he keeps himself busy and currently serves as a local representative on a Placer County Municipal Advisory Council (MAC). Members appointed to MACs represent unincorporated areas of California counties and advise county government about these areas' activities and problems. They provide a link between citizens and government officials. Wiltsee's MAC includes a 51-square-mile ridge along Interstate 80 that Wiltsee has dubbed History Ridge, a reference to the area's role in western expansion, which includes gold mining, the first transcontinental railroad, and the first coast-to-coast highway (i.e., the Lincoln Highway).

Wiltsee has been busy assimilating information about the changes in Placer's demographics using Esri's Community Analyst. Understanding this information will help local government do more active planning. Wiltsee has a specific interest in ensuring that there are programs—like Meals on Wheels and various transportation programs—that care for the elderly. "We need to make our area retirement friendly," said Wiltsee. "I am finding information that will be useful to help the organizations that I volunteer for."

Esri Community Analyst is a web-based solution that provides analysis and mapping of thousands of demographic, health, economic, education, and business data variables. The solution is designed specifically for government agencies, policy makers, civic organizations, and nongovernmental organizations (like the ones Wiltsee serves on). Community Analyst can analyze data in a geographic context such as a congressional district, block group, or census tract.



Wiltsee is no stranger to using and analyzing geographic data. He came from Georgia, where he was the director of research and information for the state Community Affairs Department as well as the liaison with several federal government agencies including the Census State Data Center and United States Geological Survey (USGS) National Mapping Program. Today, Wiltsee uses his expertise to provide a detailed view of the needs of the area as well as its terrain barriers. Using Community Analyst, he can analyze neighborhoods and subcounty areas to enable more informed and refined decisions. With this information, the appropriate personnel can be dispatched to provide needed support such as meals, busing, emergency services, or in-home support. Community Analyst is also proving useful in longer-range planning, such as senior housing, and in identifying gaps in key services and facilities, particularly as related to access to health care, recreation, and continuing education.

A Geographic View of the Landscape

Before Wiltsee began using Community Analyst, the best managers could do was take data from aggregated census geographies and try to figure out how to apply that information to programs in an area. As Wiltsee explained, "We'd take the [census] tracts and patch them together in some way. The problem is in the rural areas, which are just so enormous that the data they contain becomes meaningless."

ZIP Codes were not very useful either, because they encompass such large areas. The process of finding information became completely manual and, consequently, not very accessible. "There is a mother lode of information that includes so much more than just population data," said Wiltsee. "All this information allows us to think creatively about how to solve the problems of getting resources and funding to senior programs. There are an awful lot of possibilities through the richness of the information."

Wiltsee finds the single-age and one-year data categories in Community Analyst particularly useful. These very specific datasets allow him to better understand the aging population and its trends for planning purposes. Lifestyle information from Esri's Tapestry Segmentation data was interesting to Wiltsee as well. Tapestry classifies United States residential neighborhoods into 65 unique market segments based on socioeconomic and demographic characteristics. The top three Tapestry segments in Placer County's largest ZIP Code (95648) are *Boomburbs, Rural Resort Dwellers,* and *International Marketplace.* For example, *Rural Resort Dwellers* have a median age of 47.6, are professionals in management or service positions, and own ATVs for leisure activities.

"It's time to buckle our seatbelts."

Wiltsee found the Esri Consumer Spending dataset useful. This dataset provides insights into the products and services consumers want versus what they actually buy, along with supply and demand by industry sector and area.

All these datasets are used to determine—with more specificity—which programs to offer. Wiltsee is spending a lot of time jotting down questions and developing a database for further investigations. Community Analyst is an invaluable tool for both grant applications and attracting private investment.

The issue of an aging population is important to Placer County. Many residents want to age in place (stay in their homes) instead of living in care facilities. New services and programs are needed to meet the needs of this changing population. As the first wave of the baby boomers hits retirement age, local officials can use Community Analyst to take a good look at this aging population. As the State of California's Agency on Aging observes, there is a dual challenge: preserving services for the oldest of the old today and planning for the needs of the elderly baby boomers of tomorrow. "It's time to buckle our seatbelts," said Wiltsee.

For more information, contact David Wiltsee at dwiltsee@sbcglobal.net or 530-878-9117.

Join the ArcGIS Beta Community

Ongoing online program makes software better

Become a part of the ArcGIS Beta Community and help Esri shape its next generation of products and services.

The ArcGIS Beta Community, Esri's new platform for conducting beta testing, provides a one-stop shop for all activities related to Esri's beta programs as well as information about new beta programs as they become available. The user community—composed of GIS architects, GIS analysts, developers, geodata experts, managers and end users—performs prelaunch testing of Esri's latest products and services in real-world environments that use actual customer workflows.

Gaining first access to the latest Esri software keeps you ahead of the curve by giving you the first view of the way the GIS industry is evolving. You can prototype and test your applications and solutions using the latest features in the beta release of the products.

The ArcGIS Beta Community tools make being a beta tester easier. With these tools, you can manage the profile of your systems, devices, and workstations. Forums, bug-logging tools, surveys, and product dashboards are available in a centralized place to manage your beta activities.

ArcGIS Beta Community members can participate in one or more Esri beta programs. Some programs are open to everyone, while others are restricted based on program requirements. This is a year-round process, so opportunities are constantly available. Community members may be invited to special, private beta programs that are limited to members who have specific technology backgrounds, skills, or interests.

During the beta period, issues, problems, and feedback are submitted through the ArcGIS Beta Community website. Help from other community members is available from online forums. Customers who are current on maintenance can get additional help from Esri Technical Support via phone, e-mail, or chat.

Participating in beta programs lets you learn new software features and functionality, test your workflows, and prepare for upcoming upgrades. Working with peers, you can explore innovative solutions and develop best practices. In addition, the feedback you provide through the program informs Esri's software development teams of required and suggested changes that strongly influence the final, released product.

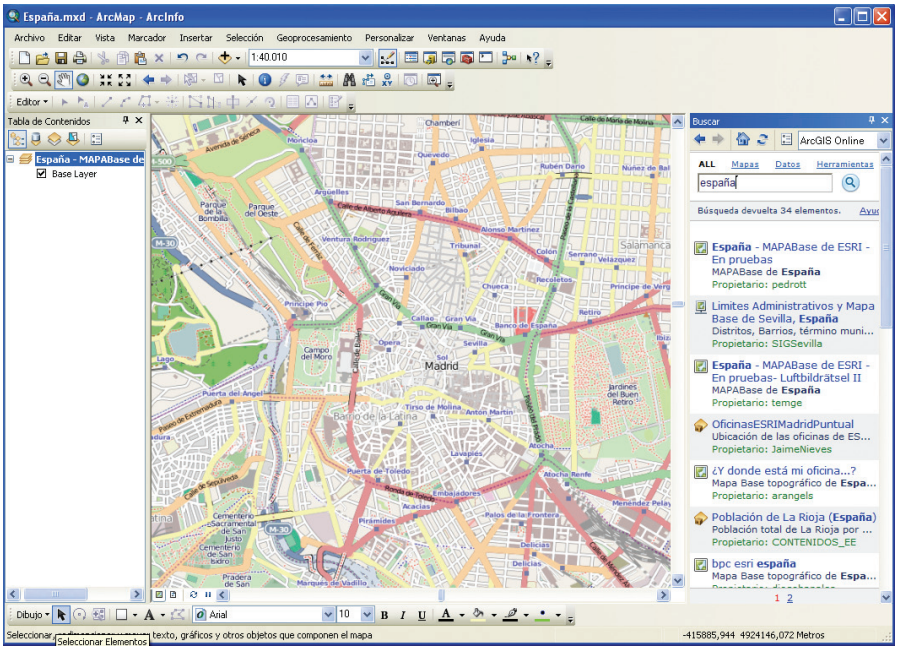
The time participants spend will vary based on the type of program, but Esri anticipates that beta testers will spend two to four hours each week using the product and completing evaluations that can include surveys, weekly tasks, bug reporting, and general feedback about the product. Sign up to participate in the ArcGIS Beta Community at betacommunity.esri.com using your Esri Global Account.

Meeting the Needs of Users around the World

ArcGIS 10 available in six languages

ArcGIS 10 is now available in French, German, neutral Spanish, Japanese, and simplified Chinese as well as English. Although Esri international distributors have done a good job of localizing software in several languages, Esri became more directly involved in improving the quality of products. The demand for localized Esri software continues increasing. For example, the number of Chinese-language Internet users has grown by 1,277 percent in the past decade according to Internet World Stats (www.internetworldstats.com). At that pace, the Chinese users will soon outnumber English users.

As the focus has shifted from individuals working on desktop machines to many users collaborating over intranets or the Internet, there is much greater need for a multilingual GIS product. With localization, users can simply toggle between the six available languages.

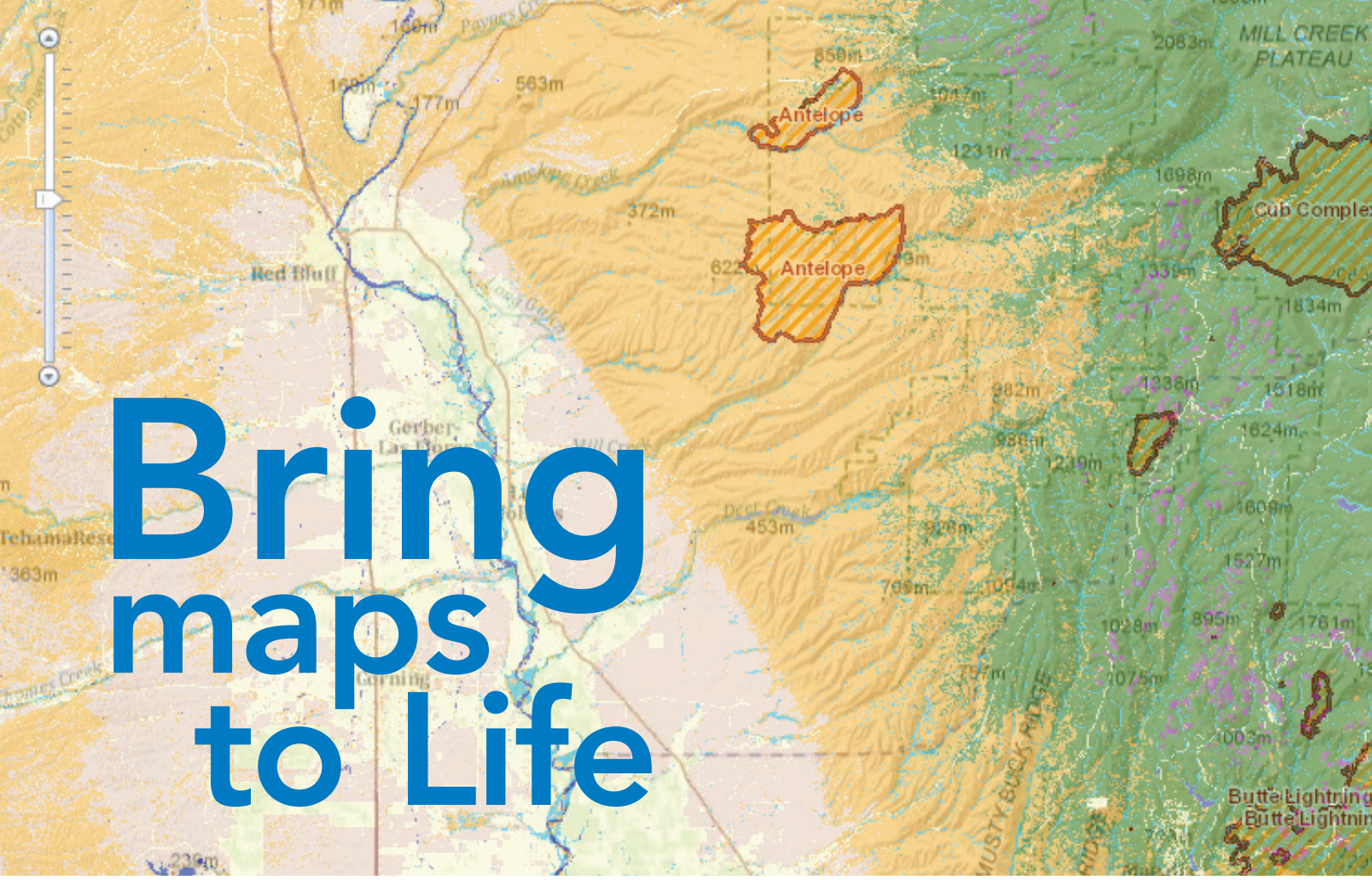


Spanish is one of the six language localizations available in ArcGIS 10.

With localization, users can simply toggle between the six available languages.

ArcGIS Explorer Desktop was the first multilingual product released by Esri. ArcGIS Desktop can also be installed in a multilingual fashion. Users logging on to one machine from different remote login sessions can choose a language. Alternatively, users can work on ArcGIS Desktop in one language user interface (UI) and share data with other users who can consume that data and work with it using a UI in another language.

Esri's Resource Center and Customer Care Portal websites are multilingual. The language displayed is based on the language of the country domain of the incoming request. From both hardware and management overhead perspectives, this is a more efficient strategy for maintaining different languages in a decentralized fashion. Esri chose German, French, neutral Spanish, Japanese, and simplified Chinese for initial localization efforts because these are the most commonly used languages on the Internet. With the release of ArcGIS 10.1, three more languages are slated to be added. Customers in the United States can learn more about localized versions of ArcGIS 10 by visiting the Customer Care Portal. Outside the United States, users should contact their local Esri distributor.



Bring maps to Life

Share and use maps created in free online viewers

In the latest version of ArcGIS Online, it is easy to design great-looking web maps to share with others, embed in a web page or blog, or use in web applications.

Two viewers are available from arcgis.com: ArcGIS map viewer and ArcGIS Explorer Online. You can share and use maps created in these viewers with other ArcGIS clients such as ArcGIS Desktop and ArcGIS apps for smartphones. Both the ArcGIS map viewer and ArcGIS Explorer Online are free, and neither requires local software installation.

Add Pop-up Windows

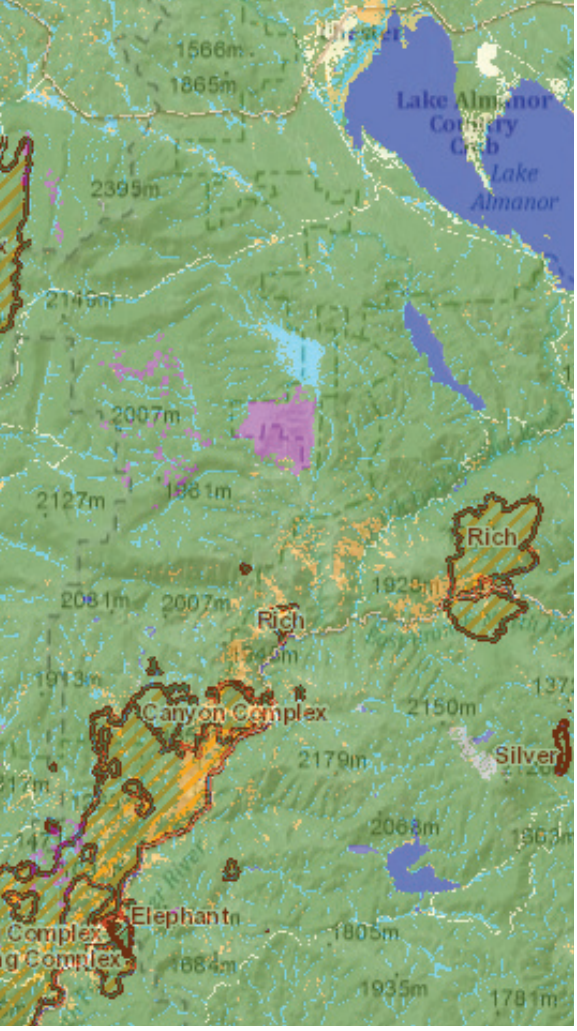
Pop-up windows are great for conveying pertinent and detailed information about specific features. Information for pop-up windows can come from an editable layer created directly in the map or an existing service layer that has been added to the map. Different types of charts can be displayed in a pop-up window that supply additional information including related statistics.

When working with service layers that someone else has created and published, the feature-specific information is derived from the attribute set available in the map or feature service. Pop-up windows can be configured, but any text or formatting will apply to all pop-up windows. When working with a map service produced by the map author, the pop-up window configuration can be saved as a layer property so the pop-up windows are automatically enabled on other web maps that include that service. To learn how to enable and configure pop-up windows in ArcGIS viewers, visit the ArcGIS Online website and watch the tutorial videos.

Ability to Edit Layers

Add an editable layer to an ArcGIS web map by adding an existing feature service layer from ArcGIS Server or creating an editable layer directly in either the ArcGIS map viewer or ArcGIS Explorer Online.

Features from a feature service layer can be edited by anyone who has access to the map so both viewers can be used for crowdsourcing maps that capture feedback from many people and allow everyone to see all edits. Public-facing 311 web applications let citizens report potholes, graffiti, property damage, and other community problems. Images or photos that are uploaded are displayed in a pop-up window along with any additional information. To display more detailed information about certain features on a map without creating a feature map service,



create an editable layer directly in the ArcGIS map viewer or ArcGIS Explorer Online.

Six symbol templates, organized by category, are available. After selecting a symbol template, simply click on the map location to add symbols. Customize symbols by choosing a different color palette or adding custom symbols referenced by a URL. To add descriptive information, use a map note pop-up window. Click the Edit button to add or remove features.

Adding features to a map is a great way to share information. By default, web maps created with the ArcGIS map viewer or ArcGIS Explorer Online are not shared. Share a map publicly so it can be embedded in a web page or blog, e-mail the map URL to your friends, or share it on Twitter or Facebook.

Maps can be shared publicly or with specific groups via ArcGIS Online. Shared maps can be copied and augmented by others to create a mashup—a powerful yet easy way to collaborate and create content that others will find useful. For specific information, visit the ArcGIS Online website to watch videos on this topic.

Configuring Time-Enabled Maps

Support for time-enabled maps, available with ArcGIS Server 10, has been added to the ArcGIS map viewer and ArcGIS Explorer Online. Web maps created with either application can publish a temporal service to a map directly in the viewer. These maps are in high demand, especially during natural disasters. In these situations, these maps are instrumental to personnel planning and managing response efforts as well as keeping the public apprised of news and developments. For more information on time-enabled maps, visit the ArcGIS Online website to watch videos on this topic.

Share Presentations Using ArcGIS Explorer Online

Easily share professional slide shows creatd-ed using the new version of ArcGIS Explorer Online. Presentations can be shared via direct URL access. The easy interface in ArcGIS Explorer Online enables users to make dynamic interactive presentations in minutes.

Use 3 New Productivity Features in BAO

Discover, organize, and analyze information more easily

Three time-saving features in Business Analyst Online (BAO) help find and organize information.

Smart Map Search

Select up to five variables, and Smart Map Search in BAO will identify the areas on a map that meet all specified criteria. In the new release, Search can access additonal data resources:

- Market Potential—Measure the probable demand for a product or service.
- Retail MarketPlace—See where consumers' needs are being met as well as where there are new market opportunities.
- Consumer Spending Averages and Indexes—Compare spending between sites or search for areas with specific spending levels.

Export Color-Coded Map Data to Excel

Premium subscription BAO members can export the data displayed in color-coded maps to Microsoft Excel. Simply clicking the Export to Excel link on the Color-Coded Data tab will export the data visible in the current extent of the map to Excel.

Change Symbology of Imported Layers

Change symbology for imported addresses to Bing search results on the fly. This is useful for distinguishing features that reside on different layers of a map. Click the symbol icon next to the layer name under My Layers to select a new symbol. The symbol can be any of the available standard symbols or an image file chosen and stored locally.

Enhanced American Community Survey Data

Available on the desktop, on the server, and online from Esri Business Analyst

Esri has made American Community Survey (ACS) data, available from Esri Business Analyst products, more usable and understandable by providing reports, thematic mapping, online help, and symbols that flag the reliability of this new sample data.

In 2010, the Census Bureau changed how it collects decennial census data by eliminating the traditional long form questionnaire with a new rolling survey that collects data on income, education, employment, language, migration, citizenship, marital status, and housing characteristics such as value and rent. ACS samples a small percentage of the United States population every month, then combines and averages data to produce one-, three-, or five-year databases. ACS uses a smaller sample size, which impacts small-area estimates.

Using data from this survey requires greater sophistication by GIS users. For a more detailed explanation of ACS, see the series in *ArcUser* by Esri chief demographer Lynn Wombold that begins with "Changes and Challenges: Understanding American Community Survey Data" in the October–December 2007 issue.

In addition to ACS data for standard Census Bureau geographies, such as states, counties, census tracts, and block groups, Esri provides the ability to query ACS data for the most popular geographies—ZIP Codes and user-defined polygons (e.g., drive times, rings, and custom trade areas).

Esri has made it much easier to evaluate estimates based on the ACS margin of error (MOE). The Census 2000 sample, with data collected using the long form, represented approximately 1 in 6 households on one day, April 1, 2000. ACS represents approximately 1 in 40 households on a rolling sample basis, but the smaller sample sizes can produce larger sampling errors.

With each ACS estimate, the Census Bureau reports an MOE, or measure of the variability of the estimate due to sampling error. The MOE enables data users to measure the range of uncertainty around each estimate. The larger the MOE, the lower the accuracy of the estimate—and the less confidence one should have that the estimate is close to the true population value.

Since ACS data in geographies not supplied by the US Census Bureau lacks tabulated MOEs, Esri has remedied this situation by developing algorithms to calculate MOEs using guidelines from the Census Bureau. These algorithms account for full and partial areas within the custom area.

Because making decisions about the quality of an estimate based on the MOE is difficult, Esri has simplified the process by adding symbols that flag reliability of data based on sample size. Symbols are based on thresholds of reliability Esri established using an estimate's coefficient of variation (CV). *[CV is a measure of relative error in the estimate, calculated as the ratio of the standard error to the estimate itself.]*

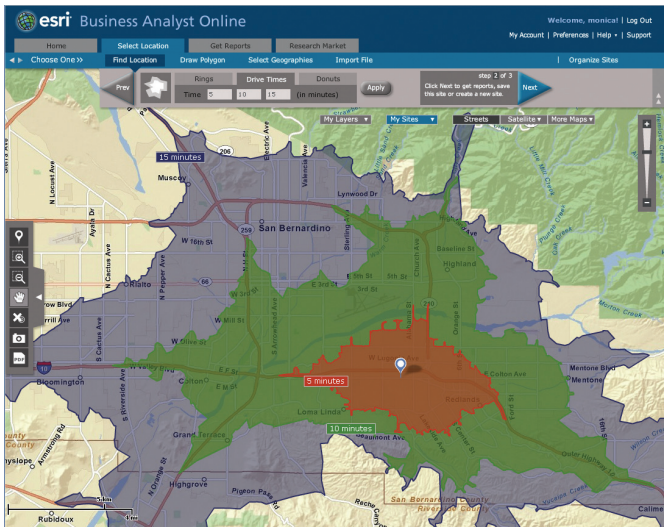
High Reliability: Small CVs, less than or equal to 12 percent, are flagged green to indicate that the sampling error is small relative to the estimate. These estimates are reasonably reliable.

Medium Reliability: Estimates with CVs between 12 and 40 are flagged yellow and should be used with caution.

Low Reliability: Large CVs (more than 40 percent) are flagged red to indicate that the sampling error is large relative to the estimate. These estimates should be considered very unreliable.

These innovations eliminate the need for users to interpret the ACS MOE and provide more accurate data for making better business decisions.

Esri also supplies ACS Population Summary and ACS Housing



American Community Survey (ACS) data is available from Esri Business Analyst products.

Summary reports that contain data from the 2005–2009 ACS five-year period estimates. The ACS Population Summary includes variables on education, language, and income. It also includes variables for marital status, school enrollment, educational attainment, language, means of transportation to work, travel time to work, employment by industry and occupation, income, and poverty status. The ACS Housing Summary provides housing data that includes variables for home value, mortgage status, amount paid in rent, units in structure, year structure built, type of heating fuel used, and number of vehicles available for both owner-occupied and renter-occupied housing units.

These reports are available immediately to guest users and subscribers of Business Analyst Online (BAO). *[BAO is a web-based solution that combines GIS technology with extensive demographic, consumer spending, and business data for the entire United States to deliver on-demand, boardroom-ready reports and maps.]* Business Analyst Desktop users can access ACS data by choosing the Show Online Reports option from Preferences. Business Analyst Server users can integrate ACS data and reports instantly via the Business Analyst Online APIs. For more information, see esri.com/bao.

Localization, Not Location

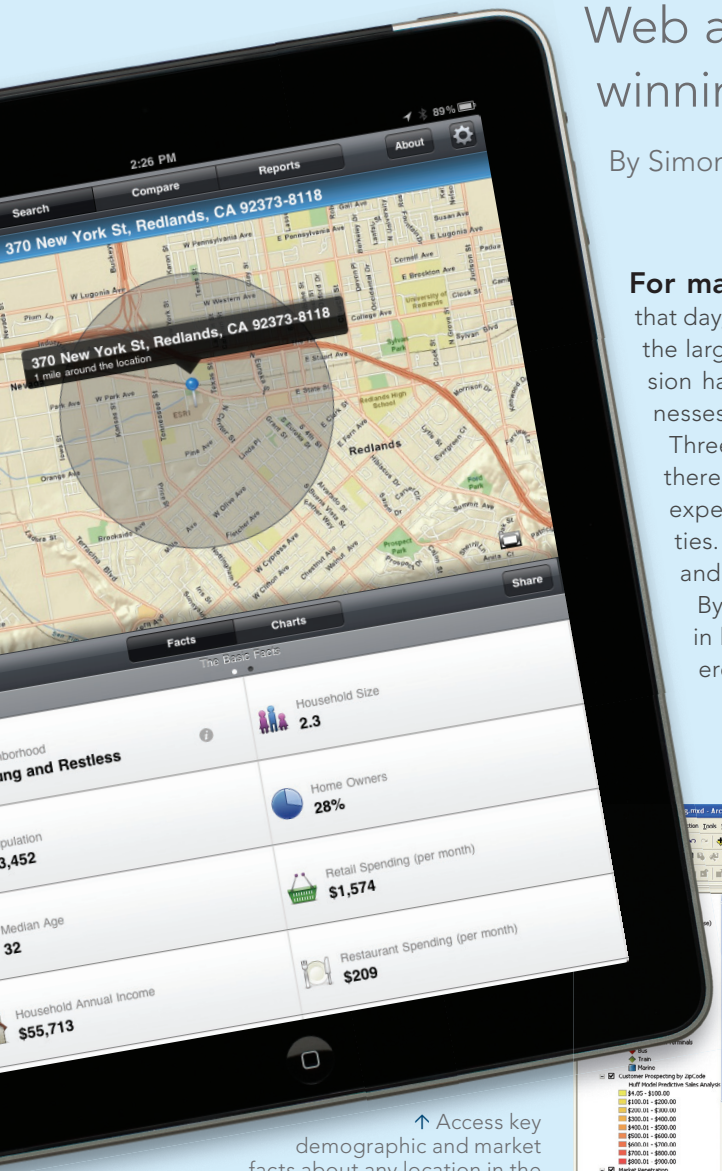
Web and smartphone apps support winning retail strategies

By Simon Thompson, Esri Commercial Business Industry Manager

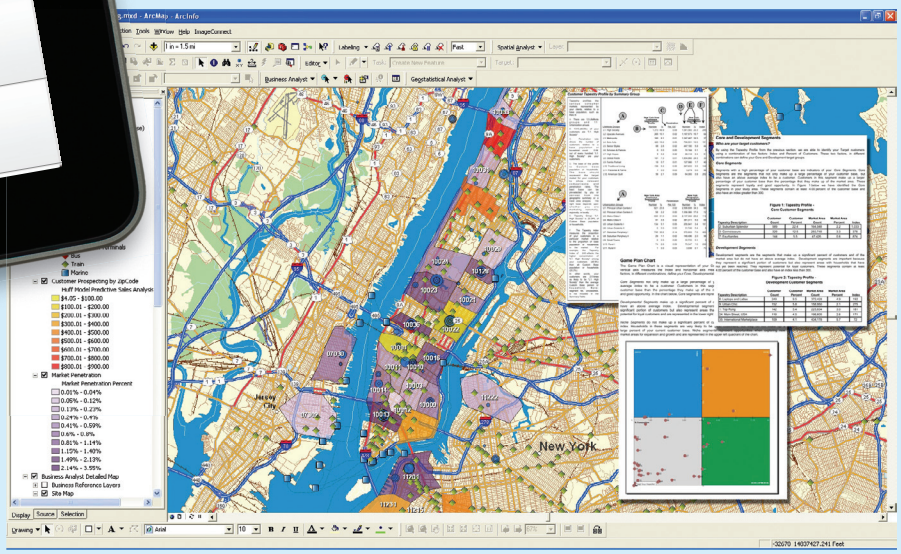
For many of us, the world changed forever on September 15, 2008. On that day, the current global financial crisis began when Lehman Brothers filed the largest bankruptcy petition in United States history. The ensuing recession has turned much of our thinking about how we run successful businesses on its head and created new realities.

Three years after the onset of the greatest recession in modern history, there is a new kind of normal. We have new consumer behavior, revised expectations, innovative ways of doing business, and different opportunities. GIS is one of the technologies that has helped organizations survive and thrive in the face of all this change.

By finding new strategies and a better understanding of different drivers in local markets and the global economy, the retail industry is empowered with more accurate information and is forging in new directions.



↑ Access key demographic and market facts about any location in the U.S., using your iPhone, iPad, or iPod touch with the free BAO for iOS app.



↑ Pueblo County GIS consultancy service helped a local web-based business improve its market penetration nationwide. This map shows market penetration areas in and around New York City.

The Consumer Is King

Today, consumers are holding the cards. It's no longer a case of "build it, and they will come." Overinflated expectations of store numbers, profit margins, and gross revenues during the boom years have been replaced with conservative management, controlled build-out, and revised business strategies. Every aspect of driving success and maximizing return on investment is location dependent. Localizing merchandise and correctly configuring sites to maximize profits based on the profile of the people in an area and their needs are significant challenges in today's economy. This is where GIS is helping.

Localization is the mechanism for balancing market opportunity with supply and demand. To do this, owners and managers need to be able to apply a range of geographic analysis, models, and know-how. Chain operators seeking growth and profitability from fewer, better-located stores require better techniques for accurately modeling potential.

Customers *Are* Their Locations

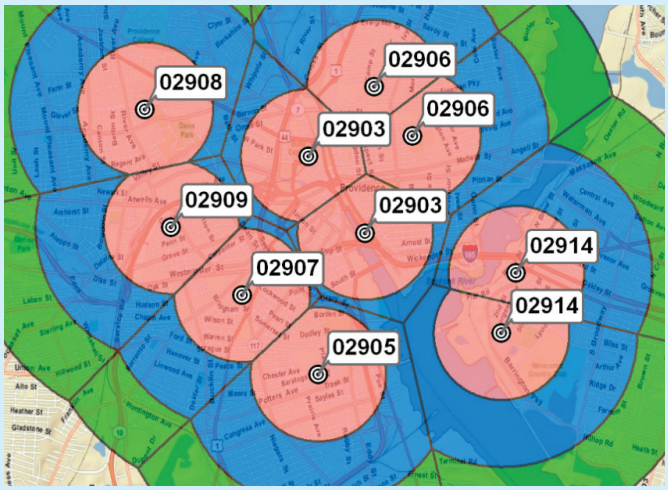
Markets are not uniform, nor is their potential. Markets vary based on what is already available; what can be supported economically; the types of people in the catchment; and the predominant flavor, lifestyle, or culture of the area. Physical infrastructure such as roads and transit networks—together with transportation barriers—limits access and defines whether intersections and destination points are attractive.

Cities can change many of these factors by modifying transportation networks and building new roads, but retail developments are often organic. Retailers are not part of a master plan; instead, they compete against each other for locations, often pitting neighborhoods against each other.

The traditional approach to defining markets based on a primary trade area is out-of-date. Anyone analyzing actual customer data struggles to find that elusive boundary where a customer chooses one store rather than another.

GIS can help. Reviewing demographic reports by geography gives business owners and operators a much more accurate picture of the landscape. As an enabler of marketing insight, GIS provides a detailed view into the potential performance of a business under different market conditions and economic factors.

Where customers live or work is not necessarily where they buy something. Purchasing behavior and shopper frequency are driven by convenience.



↑ The traditional approach to defining markets by primary trade area is outdated. Finding that elusive boundary where a customer goes to one store rather than another is challenging. GIS can help.

It's almost impossible to consistently predict sales using primary trade areas, but business owners have become so used to them that they are willing to put up with the failures.

Or are they?

Where customers live or work is not necessarily where they buy something. Purchasing behavior and shopper frequency are driven by convenience. Organizations need to capture and understand shopping habits, not just buying habits. It's no longer acceptable to use the distance from a store to model changes in sales potential or increased competition. The distributions of sales for real-world stores are too divergent and diverse to continue with this historic technique, because today, overbuilt means overexposed.

Bring the Store to the Customer

Given the varying demographic profiles of customers, how does one individualize the store, restaurant, or service center to provide the one-to-one, personalized experience consumers now demand? In a world where cheap is chic and coupons are cool, how does a franchise succeed with fewer loyal, value-oriented customers and customers who are trading down but expecting much more?

Business owners need to understand not only whether a business is in the right place but also whether it's a suitable business for that market. This is where local owners and operators are so important. Owners and operators are the front line in any neighborhood. They care about the local area because they live there too. They know neighborhood and customer tastes and have daily exposure to habits and changing behavior.

Investing personal assets to create and maintain a business ensures that owners and operators of franchises think long and hard about every decision. Smart organizations are using location analysis to empower local operators to use profiles of the people in an area to localize merchandise and correctly configure stores to maximize profits.

From beverage selections to localized price promotions and location marketing, getting the product and service mix right affects the bottom line every time. This can mean configuring the format and size of the store to different market needs, providing product choices, and sometimes even moving to a new location to reduce competition and optimize revenues.

The Circle of Life

Today's GIS technology embraces the modern, consumer-oriented world. Through iPhone apps and web-based applications, businesses can use GIS without training and with minimal financial outlay. Market research; customer analytics; and the creation of extensive demographic, spending, and income reports let anyone in the franchise industry understand surplus and demand in specific locations and create forward-looking plans.

A wide range of analytic techniques and sophisticated models have been published by experts. These resources are readily available. Ranking and scoring a market or franchise territory are now easier than ever. Because this data is continually updated, businesses stay current with market changes and variations in economic factors.

However, benefits don't stop there. GIS is applicable throughout the entire business life cycle. Initially, the technology helps in site selection and market planning by helping owners and operators match opportunities with budgets and expectations. As a retail network matures, GIS helps optimize the growth strategy and maximize returns from investment by creating more efficient systems and optimal store placement. Using GIS, businesses can not only understand where and how they should expand but also better manage the scale, format, and pace of expansion.

Better business decisions are made by asking the right questions. With GIS, franchisees and franchisors get answers that matter.

As an enabler of marketing insight, GIS provides a detailed view into the potential performance of a business under different market conditions and economic factors. Using these tools, many franchises have outperformed other industry sectors during the recent recession. Better insight into changing income and age profiles, house valuation, disposable incomes, lifestyles, spending patterns, and consumer habits has helped companies tune their franchises to match consumer demand. By doing so, many have enjoyed increased gross margins, reduced inventories, and enhanced customer loyalty. This has resulted in much healthier balance sheets than many analysts predicted.

Don't Just Get Answers—Get Answers That Matter

Even in an economy that has slowed, GIS helps business owners and operators understand their long-term potential, manage the bottom line, and align operations with opportunity. Better business decisions are made by asking the right questions. With GIS, franchisees and franchisors get answers that matter. The technology helps test hunches and investigate scenarios with real-world data using insight gained from information and experience. Whether it is used to look at the possibilities for one location or develop growth strategies for an entire store network, GIS can unlock the market potential of areas and reveal what the expectations are for each.

For more information, visit esri.com/business.

Business Analyst: Faster, Easier, and More Current

ArcGIS 10 release for both desktop and server

Esri Business Analyst Desktop and Esri Business Analyst Server users can now research markets, analyze customers, and evaluate sites more quickly using up-to-date online resources.

Performance has significantly improved over Business Analyst 9.3.1. In Business Analyst 10, processes are 60 times faster. The speed of data aggregation for trade areas makes it possible to process data nationwide without having to break up work into smaller groups. With the new business search tool, users can filter, add, and remove criteria quickly and easily and display only the desired information.

In addition, the Business Analyst toolbar and menu have been redesigned and reorganized to let users work more efficiently. Users can include just the tasks they want on the new, dockable Business Analyst window. This includes adding favorite commands, accessing project files, and running batch tasks. The Custom Data Setup wizard (previously known as Analysis Layer Setup) is now on the Business Analyst menu. The process for incorporating user-generated data has been streamlined, and the format for all reports has been updated. Reports are now easier to read and comprehend on-screen and in print.

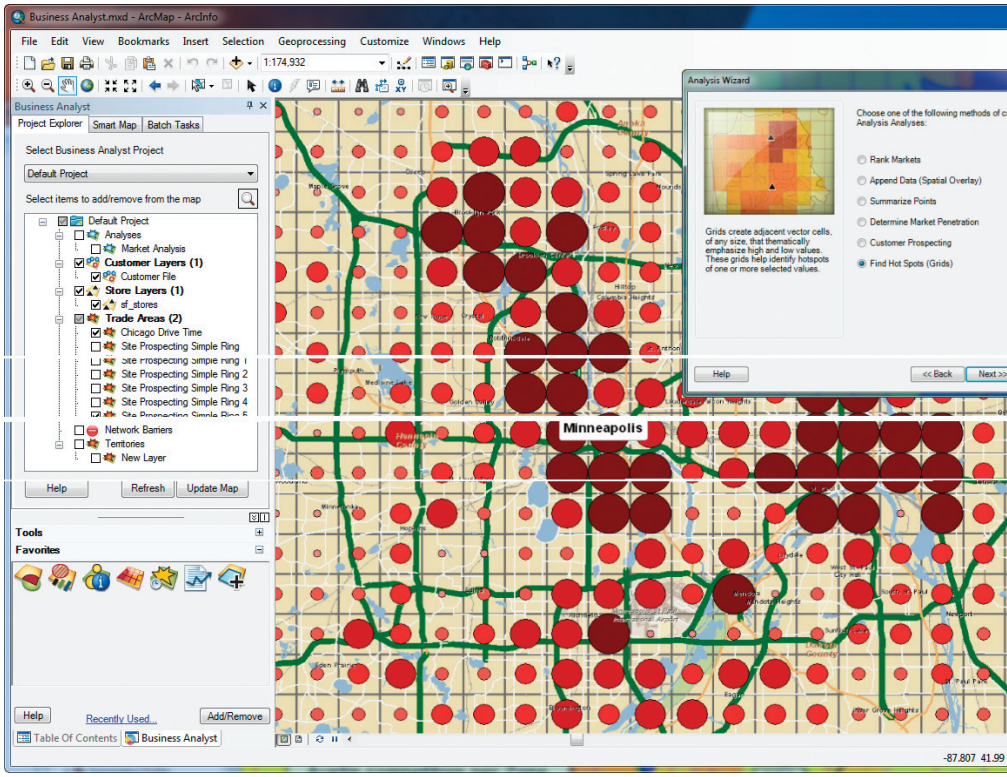
With access to more resources and data online, Business Analyst users get more timely and direct access to current information. The 2010/2015 data can be accessed from Business Analyst 10. The recently released Business Analyst Online (BAO) Reports Add-in lets Business Analyst Desktop users access data updates as soon as they have been released. Desktop users can seamlessly incorporate the latest data into their workflows as soon as it is available.

The new Message Center launches with Business Analyst. It gives users quick access to recently used projects and maps; connects to the Business Analyst blog and forum; and provides links to the latest news, demos, help files, and software updates. Business Analyst is available for use on the desktop and as a server-based, collaborative solution.

New with the 10 release, Business Analyst Desktop Premium contains everything in the standard version plus more demographic, business, consumer spending, and market potential data, along with the segmentation tools from the Segmentation Module and the full version of Address Coder software for geocoding and data appending.

Developers can create applications that include the demographic data reporting capabilities of Business Analyst using either the Business Analyst Online API for Flex 2.0 or the Business Analyst Online API for Silverlight 2.0. Complete code samples are available on the Business Analyst Resource Center at resources.arcgis.com/ba-online-apis.

For more information on Business Analyst solutions, visit esri.com/ba.



↑ Esri Business Analyst provides a detailed view into the potential performance of a business under different market conditions and economic factors.

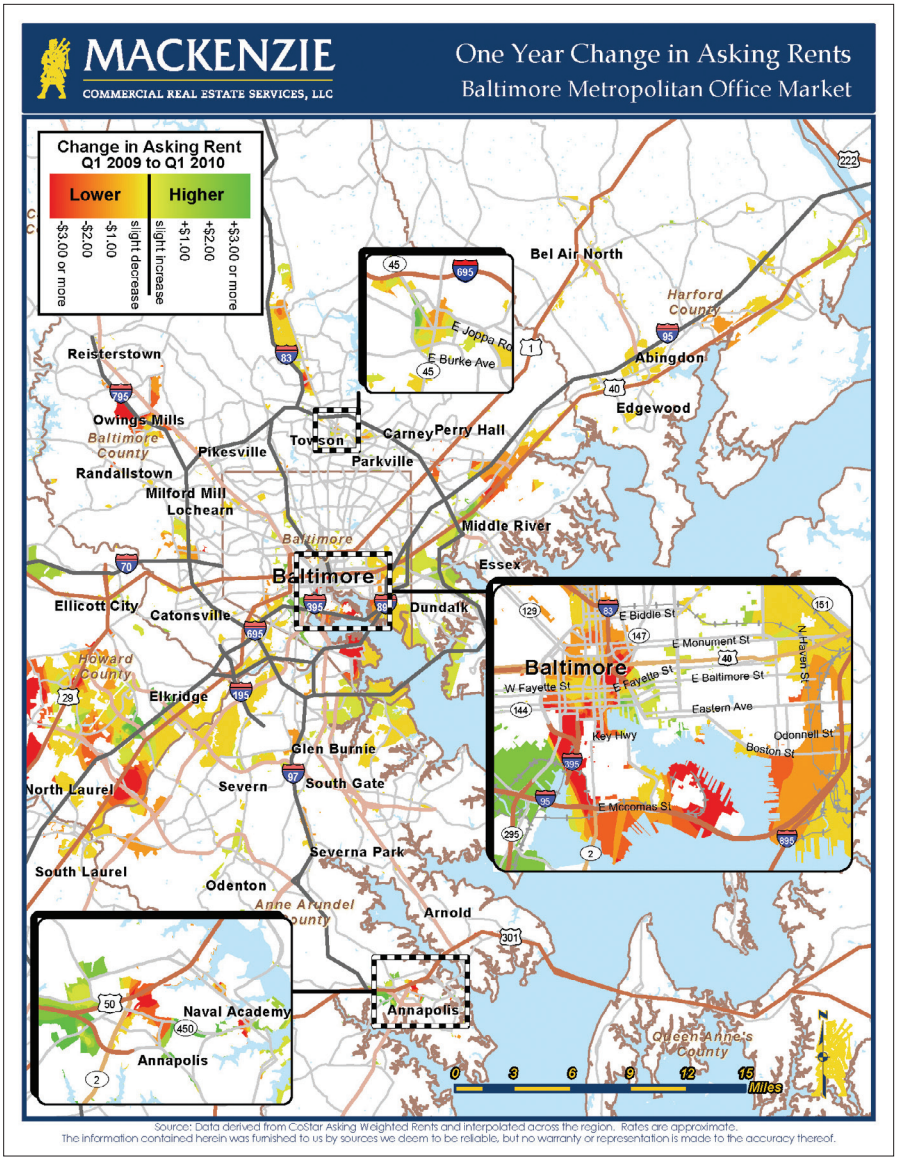
Enhancing the Commercial Real Estate Life Cycle

Using a combination of online and desktop GIS

By Karen Richardson, Esri Writer

As a company dealing with buildings and space management, MacKenzie Commercial Real Estate Services has relied on maps to view information for the past 20 years. However, it wasn't until the company incorporated Esri Business Analyst software that MacKenzie's agents really understood their commercial holdings.

Business Analyst and Business Analyst Online (BAO) are now used at the company every day to understand and analyze vast amounts of data. Today, MacKenzie Commercial Real Estate Services uses Business Analyst for all stages of the commercial real estate life cycle at the company, including development, landlord representation, tenant advisory and site selection, market research, construction, and property management. The software has even helped the company offer services to new customers who were not interested in real estate transactions.



↑ GIS combines place with time so brokers can better understand trends in the commercial real estate market. This heat map displays one-year changes in asking rents for the Baltimore market. Bright green areas indicate rising values, and dark red areas indicate deep declines.

Discovering a Digital World

MacKenzie is one of the largest commercial real estate firms in the Baltimore metropolitan area, with more than 140 associates and offices in Annapolis, Baltimore, Bel Air, Lutherville, and Maple Lawn, Maryland. When the company first began using maps to view data, the process was cumbersome and time-consuming. MacKenzie staff would pull aerial photographs off the web, use Adobe Illustrator to plot listings, then draw road and highway labels by hand.

When Matt Felton was hired as the director of research for GIS and mapping, he introduced the company to Esri Business Analyst. Staff now had access to the vast amount of data included with the software such as retail information, consumer expenditure segmentation data, and market potential indexes.

"For the first time, I think members of my company really saw their real estate," Felton said. "We had a lot of fun with the data, viewing and exploring information in a way they hadn't experienced before. The more they saw in the maps, the more questions they would ask."

No stranger to GIS, Felton previously served as a director at Towson University's Center for GIS. The center's staff are GIS consultants to government organizations and private businesses in the mid-Atlantic region. While at the center, Felton worked in many disciplines: homeland security, transportation, economic development, land planning, natural resources protection, public safety, and emergency management.

The one area Felton hadn't experienced was commercial real estate. "I was drawn to the frontier of applying GIS as a common operating picture in a discipline that is inherently location," he said. Felton left Towson and joined MacKenzie right when the economy took a turn for the worse.

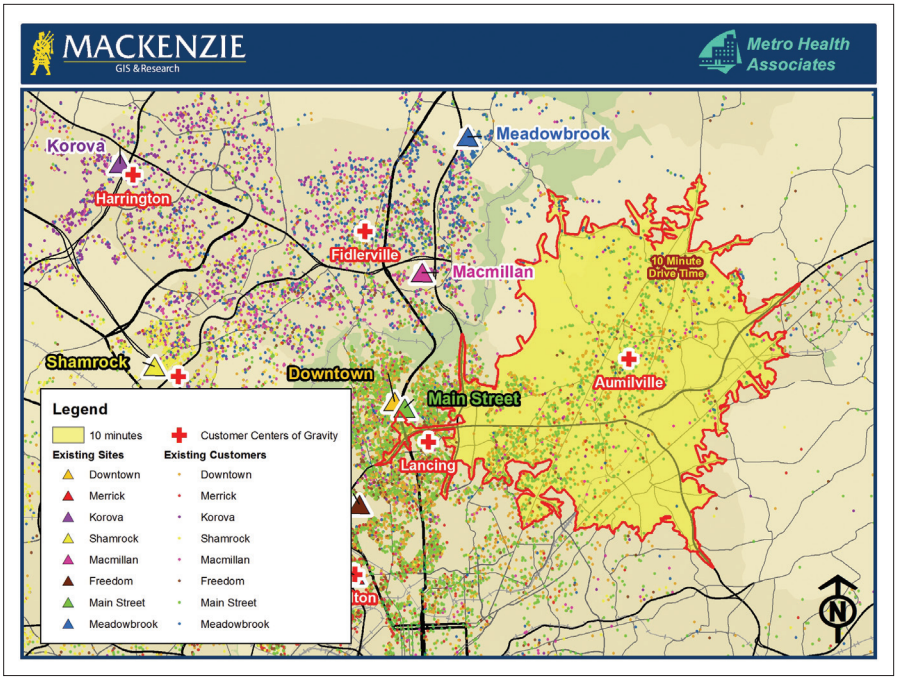
"Probably not the best-timed decision," Felton laughed. "But in hindsight, I couldn't have planned it any better. Just when things got really competitive, I had a tool that gave us an enormous advantage."

Gaining a More In-Depth Analysis

Felton heads a team that actively supports about 40 MacKenzie brokers who have mapping and data discovery needs. These needs vary depending on the type of client being served. BAO is used to create quick reports that are often used to investigate data downloaded from real estate information data providers such as CoStar.

When simply exploring a location is important, brokers can use ArcReader to view, discover, and print maps on their own. ArcReader is a free, easy-to-use desktop mapping application from Esri. For more in-depth analysis, Felton's team uses Business Analyst and Esri's Tapestry Segmentation data to characterize neighborhoods for clients.

"Maybe we are working with a company that sells suits," explained Felton. "We can show them where the people who buy suits are located based on the psychographic profile of their customers."



↑ This map reveals customer behavior that can be used to identify optimal locations for new health care facilities and evaluate the locations of existing sites.

Whether the task is to simply plot a listing or provide a more in-depth analysis of the market, there are replicable steps that every broker follows. First, an area is identified based on available space, high market potential, or other criteria that is important to the client. Once the area is selected, the broker identifies potentially suitable buildings or offices and performs analysis to determine if the site will support the selected criterion or reveals any hidden opportunities.

Timely Data Means Better Decisions

Local information, such as tax maps, are brought into Business Analyst and overlaid on aerial and plat maps for a more accurate, timely view of a location. "Brokers used to spend hours at the courthouse trying to locate the proper tax map," said Felton. "Now—in 15 minutes—a broker can pull up exactly what is needed over the Internet and display it on the desktop."

This map-centric view of the data allows the agent to click on a property that is of interest and automatically be taken to the state assessor's web page for the property. "This is often much easier than trying to search the online database," explained Felton. "Often, an undeveloped parcel has not been given an address, and our search allows the agent to zoom to the area of interest and click for information."

Once a site has been identified, the agent can explore that area by layering data from hundreds of other layers including zoning, tax incentives, floodplains, nearby businesses, and traffic counts. "GIS enables us to combine Esri's rich collection of data with authoritative data from state and local government organizations and with our own local market intelligence," Felton added.

MacKenzie's brokers can nimbly combine this data to help their clients make more informed and timely decisions. Another advantage? The broker is seen as an expert. "At the same time our brokers are on the phone with a client, they can be finding the property and all the information about it—who owns it, how it is zoned, and how much traffic passes by. They can then create a map layout quickly and e-mail it instantly to the client while still on the phone," said Felton. "GIS enables our agents to be real smooth."

Smooth Operators

Speaking of smooth, Felton has put GIS to use during board meetings and client presentations. Using ArcGIS Explorer, another no-cost viewer from Esri, MacKenzie agents are able to give tours of potential sites—virtually. Agents can instantly narrow down what might be an extensive list of prospects to those that will really pan out.

When a national board of directors was considering relocating its headquarters to a another city, MacKenzie's staff treated the directors to a digital fly-through of each potential site including 360-degree, bird's-eye, and street views of each location. The cost, amenities, and terms for each building were also available and could be queried in ArcGIS Explorer. The directors were able to narrow down their options from 30 to 3 before making the requisite site visit.

"Instead of spending an entire day with a bunch of sweaty people in suits in a van, we were able to narrow down our search sitting comfortably in a conference room and only spend a few hours touring the sites that were really of interest," said Felton. "Time and resources are limited. GIS enables us to do the most with everything we have available to us."

Opening Up New Opportunities

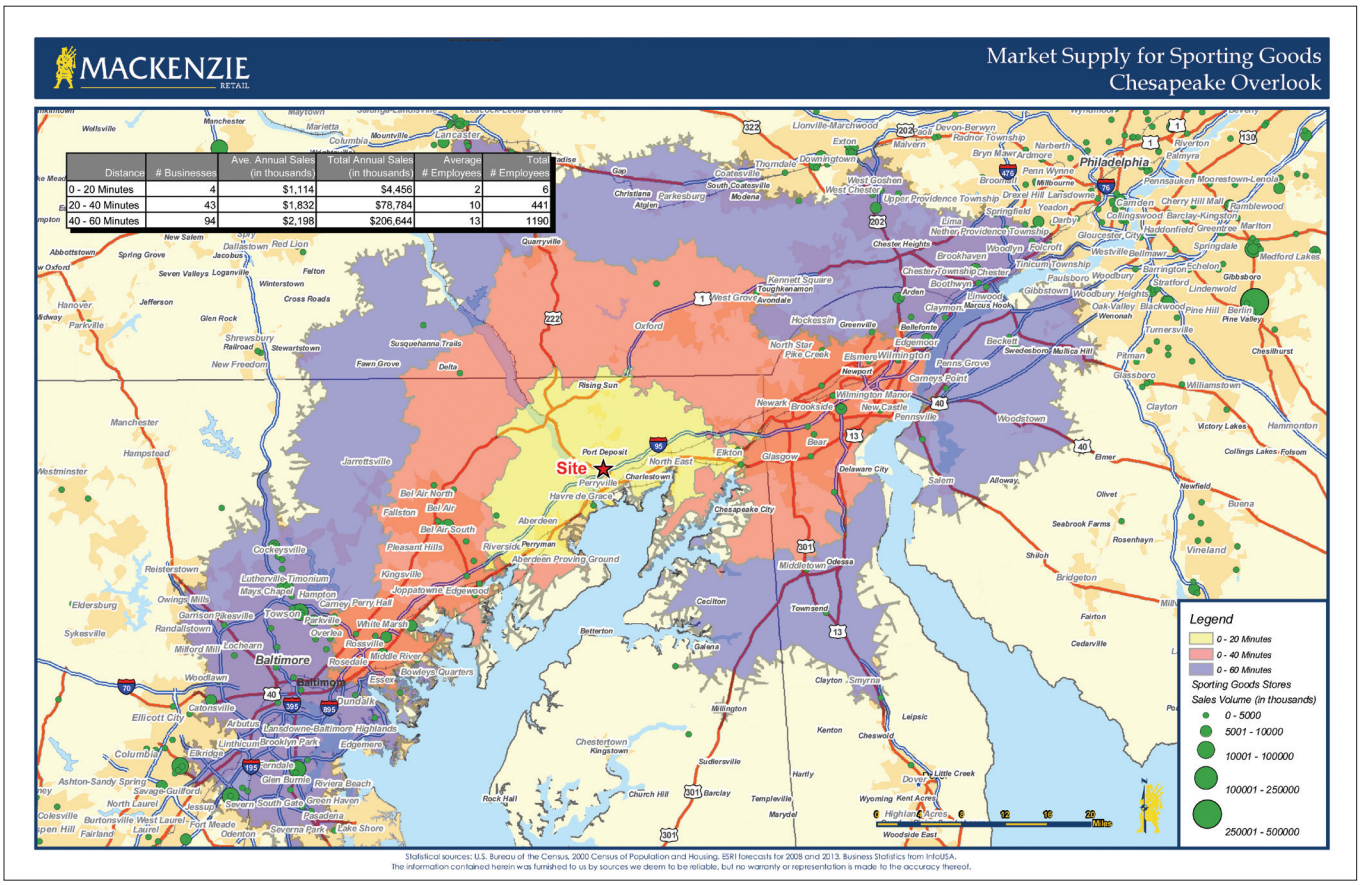
Another application is the company's innovative approach to landlord representation. GeoProspector, a solution the company has created based on Esri's ArcReader and ArcExplorer, helps brokers more effectively search for tenants. GeoProspector combines multiple layers of information, such as streets and office buildings, into an interactive map that is organized by a status grid. Based on the color of the building, brokers can methodically search the grids for potential tenants or buyers, ensuring that they exhaust all possibilities before moving on to another region.

"Instead of going down a long list of prospects, our brokers can work each map area, ensuring that they are effectively canvassing the entire market," said Felton. "GIS has definitely made our company more efficient and has been an invaluable tool for making smarter and faster decisions. We use it on the front end of the process to cull through a lot of data and to help our clients make the best choices possible, then we use GIS on the back end to communicate those choices to stakeholders in a very compelling format."

GIS has also helped MacKenzie branch out and offer new services to clients, even if there is no real estate transaction involved. The company has been assisting a regional hospital with a strategic plan for a new outpatient facility by performing an analysis of the market demand for existing health care, current facilities, number of patients, and other aspects of developing the plan. Using Business Analyst, MacKenzie's staff are able to ask what-if questions and model different scenarios. Would it be better to consolidate existing facilities, relocate those facilities, or open new facilities? Called a GeoStudy service, it is available to any organization.

Informed Decisions, Better Collaboration

Business Analyst and Business Analyst Online are helping MacKenzie integrate the data—property values, location information, zoning data—commercial real estate brokers need to make informed decisions quickly. Integrating this information into one common platform provides a persuasive communication format that enhances collaboration between landlords, tenants, investors, developers, property managers, and brokers.



Distance	# Businesses	Ave. Annual Sales (in thousands)	Total Annual Sales (in thousands)	Average # Employees	Total # Employees
0 - 20 Minutes	4	$1,114	$4,456	2	6
20 - 40 Minutes	43	$1,832	$78,784	10	441
40 - 60 Minutes	94	$2,198	$206,644	13	1190

↑ Combining market areas (20-, 40-, and 60-minute drive times) with business volume data to understand existing market supply for sporting goods and related products helped determine if a large sporting goods store at a new site in Perryville, Maryland, was viable.

Mapping the Market to Create Healthy Banks

Web portal gives better view of financial practices

By Karen Richardson, Esri Writer

SNL Financial's clients can quickly visualize their branch locations against the locations of competitors and see opportunities for growth through mergers and acquisitions.

For the past two decades, SNL Financial has built a strong reputation for providing accurate and up-to-date financial data, news, and insights. Clients of the Charlottesville, Virginia-based company include leading investment banks, asset managers, banks and thrifts, and regulatory agencies. The company is frequently quoted by major media publications such as *The Wall Street Journal*, *New York Times*, and *USA TODAY*.

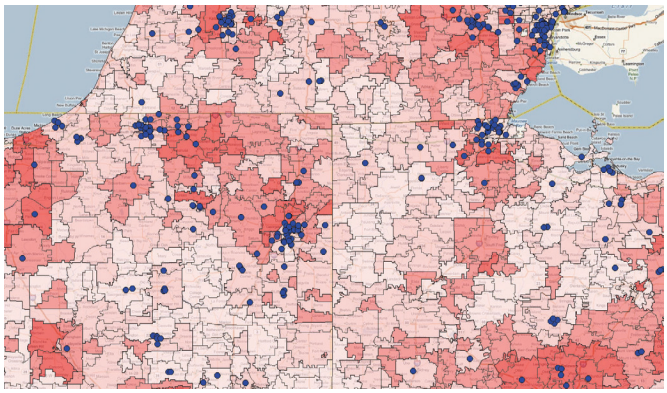
SNL collects, standardizes, and disseminates specialized business information for the banking, financial services, insurance, real estate, and energy industries through its SNL Interactive (SNLi) web portal. The portal includes SNLi Mapping, a mapping application delivered to the portal's subscribers. SNLi Mapping uses Esri's ArcGIS software to view and analyze information on a map.

Mapping Business Worth

SNL started incorporating ArcGIS software and Esri data in its product to offer customers detailed GIS and analytic functionality. The analytic tools SNL's customers wanted were readily available in ArcGIS. With ArcGIS, clients can view various types of data, including street information and aerial images, and create new data, such as adding new market areas and incorporating demographic information and business data. SNLi Mapping incorporates these features, creating intuitive market analysis and visualization tools for subscribers. The website services allow subscribers to identify locations of assets, perform competitor searches, and generate in-depth or ad hoc analyses as needed.

SNLi Mapping proved popular with subscribers, and SNL was delighted with the success of the online mapping service. "Clients find visualizing information on a map to be very useful," said Dan Sheets, project manager at SNL Financial. "Using this tool, the information they need really pops out at them."

Using SNLi Mapping, subscribers can better evaluate companies' mergers and acquisitions and make more informed decisions. They are performing their own market analyses and integrating demographic data with geographic information such as the location of major cities, interstate highways, and company buildings. Because it has high-quality mapping capabilities, many subscribers also use SNLi Mapping for making presentations. "Having all this information integrated makes it easy for them to understand market valuation and why a particular location or company may be more attractive than another," said Sheets.



↑ Users can quickly see their branches plotted with hundreds of demographic variables that Esri provides, helping them better understand their markets and opportunities for growth.

GIS Analytics Moves to Banking

Based on the success of SNLi Mapping, the company incorporated GIS visualization and analysis into Branch Analytics, a different web-based application that was created specifically to analyze bank markets. Branch Analytics allows customers to quickly perform in-depth market studies, integrating bank branch deposit and demographic data. SNL expanded its use of Esri's ArcGIS software to create and deliver the geographic visualization and analysis. Users can quickly see their branches plotted with hundreds of demographic variables provided by Esri, helping them better understand their markets and opportunities for growth.

Clients for the application range from newly chartered banks to superregional institutions that cover large areas of the United States. They use SNLi daily to make important strategic decisions such as where to locate new branches, how to increase market share, and what products to offer to customers. Using Branch Analytics, they can access SNL's database filled with detailed profiles on more than 20,000 United States financial companies, including all publicly traded banks and thrifts, privately held institutions, and credit unions. Subscribers can quickly search for 150,000 branch locations and plot them on maps using the latitude and longitude of the bank location, which is derived from the reported branch address and validated by SNL's Branch Data Management team using a variety of sources. Esri provides its Updated Demographics and Business Summary data annually.

"SNL is the trusted information partner for all the top 50 depositories in the [United States] as well as hundreds of regional and community banks," said Elizabeth Rouse, product manager for branch and geographic intelligence at SNL Financial. "And 100 percent of investment banks with any substantive financial institution industry practice are SNL subscribers."

Powerful GIS Analytics on the Web

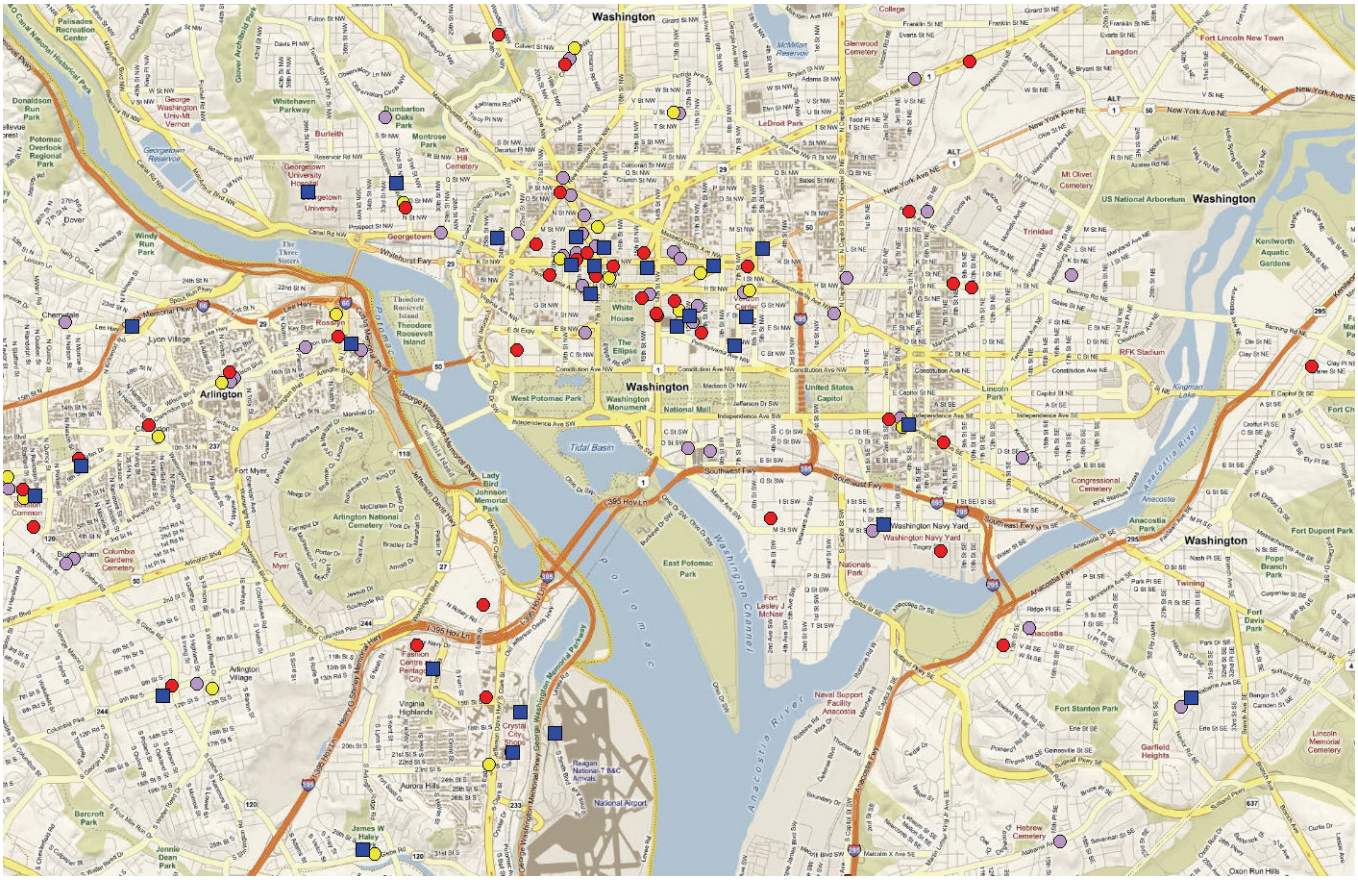
Subscribers can use Branch Analytics to delve deep into the marketplace and find the best solution for maintaining a healthy balance sheet. Changes in market deposit concentration can be viewed using the service. This allows subscribers to model what-if scenarios such as what would happen if they opened new branches, offered different services, or closed underperforming sites. The application can model bank-specific activities, such as branch acquisitions, and change attributes on the fly. These attributes can include adjusting ownership for recently announced business transactions. Custom geographic markets can be created to see the effects of these activities in the real world.

Banking professionals can create maps using SNL data and customize them for use in professional documents and presentations. This is easily accomplished by creating a report with Branch Analytics.

Maps can also be created after generating a report. Subscribers simply create a Branch Analytics report that, for example, looks at company market share in an area. The application automatically exports the analysis to a map. As information is updated, or the analysis is customized, the map dynamically absorbs the changes to reflect the adjusted report.

"This has been a powerful tool for our customers," said Rouse. "Visualizing and modeling business practices help our customers make the best strategic decisions and better understand the markets they operate in."

For more information, visit esri.com/finance.



↑ SNL's clients can quickly visualize their branch locations against the competitors' locations to identify opportunities for growth through mergers and acquisitions.

Modeling the Impact of a Patient Surge

Simulating the effects of flooding on health care facilities

By Sara Larsen, David Judi, Sara Del Valle, John Ambrosiano, and Timothy McPherson,
Los Alamos National Laboratory, Energy and Infrastructure Analysis Group

Los Alamos National Laboratory (LANL) has developed new GIS-based tools to qualify and quantify the risk and impact of flooding on the health care sector.

LANL's Energy and Infrastructure Analysis group is often called upon to respond to events that threaten critical infrastructure. The group is asked to return its analyses quickly. Depending on the event, *quickly* can range from days to hours.

For example, in 2008, the LANL Fast-Response Team provided more than 80 analysis products to evaluate the impacts of flooding in the Midwest and due to Hurricanes Gustav, Ike, and Holly. The water and dam infrastructure sectors are of special importance, because water is not only fundamental to human health but is required for electricity generation, waste conveyance, industrial applications, and irrigation. LANL energy and infrastructure researchers can model water distribution and waste collection, hurricane infrastructure impacts, dam failure and flooding, and other phenomena when evaluating water-related critical infrastructure.

The health care and public health sector can also be impacted by water availability, dam failures, and the effects of water-related weather events such as hurricanes and flooding. To further refine the interdependent relationships between these two sectors, the Energy and Infrastructure Analysis group has developed new tools to estimate risk and measure the impact of flooding on health care facilities.

GIS is an integral part of these tools. The LANL team has leveraged Esri's suite of GIS software, particularly the ModelBuilder application in ArcGIS Desktop, and ArcGIS Server, to simulate not only flooding caused by weather events or dam break conditions but also injuries and loss of life that can occur during and after such events. Results of flood simulations can be used to parameterize a geospatial health care model for evaluating the impact of a surge of injured persons on facilities in the region adjacent to the floodplain.

Flood Modeling

Flooding accounts for almost two-thirds of federally declared disasters, making it the largest disaster category in the United States. Flooding caused approximately $50 billion in property damage in the 1990s. Flooding in any given location fluctuates from year to

← Flooding accounts for almost two-thirds of federally declared disasters.
(Photograph courtesy of FEMA/Walter Jennings)

year, but an increase in flooding has been observed over the past century, attributed to both climate change and population growth in flood-prone areas.

To address this issue, the National Flood Insurance Program (NFIP) was formed to reduce the costs of flood damage and improve disaster assistance. NFIP is tasked with floodplain identification and mapping. However, these maps were created for insurance purposes, not for disaster mitigation or emergency response. Many NFIP maps are more than 10 years old, and coverage across the United States is not complete. Efficient and accurate hydrodynamic models must be used to fully understand the ramifications of flood disasters for any location. *[Computational numerical models are used to describe or represent the motion of water.]*

Two-Dimensional Modeling

Many hydraulic models have been developed that can simulate the inundation area of flood flow in one dimension using flood channel cross sections, but these models are not equipped to accurately represent more complex hydraulic flows in floodplains and urban environments. Two-dimensional modeling is more prevalent and gives more accurate results, but it is also more computationally demanding.

Meeting fast-response deadlines requires overcoming the computational limitations imposed by more sophisticated flood modeling. The Infrastructure Consequence Flood Inundation Tool 2D (ICFIT-2D), a custom GIS application, was written to quickly solve modified hydraulic equations that predict the timing, depths, and velocities of overland flow.

ICFIT-2D was later adapted as a stand-alone application written in Java that could be accessed from the web to provide accurate flood estimation for a wide range of flood events (e.g., dam/levee failures, surges, riverine flooding). It also takes advantage of multithreaded computing capability for fast-running simulations. The primary outputs of ICFIT-2D are time-stamped floodplain rasters that describe the depth, velocity, and peak flow attributes of the modeled event.

Injury and Loss-of-Life Methods

A key step in characterizing and evaluating the risks associated with flood or dam failure is to review the population within the floodplain extent to estimate the number of people injured, the extent of their injuries, and the number of lives lost. Historical data concerning flooding and dam failures that includes information related to the resultant deaths and injuries caused by proximity to a dam, any forewarning provided, and other factors have mainly been used to parameterize loss-of-life models. Few models have been developed that estimate injuries resulting from a flood, but these estimates are valuable for the development of emergency operations plans and resource allocation during and after an event.

In 2005, Edmund Penning-Rowsell, Peter Floyd, David Ramsbottom, and Suresh Surendran developed a method for estimating injury and loss of life during a flood using three factors: flood hazard, area vulnerability, and people vulnerability. The flood hazard rating is derived from depth, velocity, and debris characteristics of the flood—a spatial output from the ICFIT-2D model. The area vulnerability rating relates to the effective flood warning and preparation of the area, the speed of onset of the flood, and the characteristics of the land use or zoning of the area (e.g., residential homes, multi-story apartments, commercial/industrial properties, mobile homes). The people vulnerability factor is based on the degree to which people are exposed to the flood and the number of infirm/disabled or senior persons in that population.

In the method developed by Penning-Rowsell et al., the population within the floodplain is multiplied by the hazard rating—in this case, the spatial grid output from ICFIT-2D, with each cell containing its own hazard rating and the area vulnerability score, giving the exposed population. This number is multiplied by the people vulnerability score to predict the number of people in the exposed population who will be injured. Multiplying the injured population by an increased hazard rating provides an estimate of the number of deaths among the exposed population. This proposed injury and loss-of-life estimation method was implemented using ArcGIS and the ModelBuilder application and deployed via ArcGIS Server.

↓ Water infrastructure is uniquely important.
(Photograph courtesy of the Bureau of Reclamation/Alexander Stephens)

Injury and Loss-of-Life Tools

ModelBuilder greatly facilitated the automation of the Penning-Rowsell method by breaking each calculation into a visual, easy-to-follow task sequence. The model's structure can be grouped into three stages: preprocessing, calculations involving the hazard rating raster and the area/people vulnerability rasters, and the final spatial output and summarized results.

Preprocessing Population Data

Before flood risk can be addressed, the population in the flood zone needs to be determined. Gridded population datasets, such as Oak Ridge National Laboratory's LandScan dataset, can be ingested to characterize the population within the hazard area. To alleviate problems associated with grid resolution differences between population and simulated flood hazard grids, the population grid can be resampled and/or reprojected to the extent and cell size of the hazard rating raster.

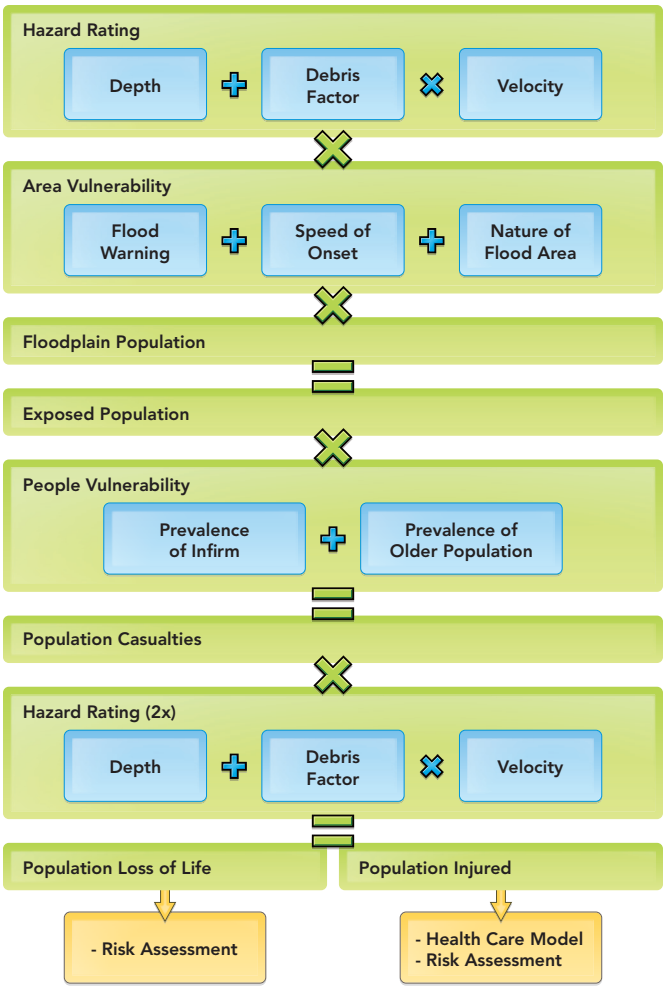
Resampling only addresses cell size and doesn't change the value within the cells (i.e., population distribution among the resampled cells), so the output from the reprojection and resample tasks needs to be divided by an appropriate value so that the original geospatial population is preserved. As a final preprocessing step, the population at risk (i.e., population within the flood hazard) is identified and extracted.

Calculating Hazard Rating and Area/People Vulnerability

Using the model dialog box, the user assigns vulnerability parameters based on knowledge of the floodplain area. Penning-Rowsell et al. determined values that would provide a reasonable estimate for injuries and deaths when applied to several historic flood study cases. The vulnerability parameter domains in the tool dialog box were limited to those shown in the table. When the model is run, the values given by the user are entered into the model as new rasters with an extent and cell size equivalent to the hazard rating raster. After summing the area vulnerability scores, they are multiplied by the hazard rating. The results are reclassified such that values are capped at 100 (i.e., more than 100 percent of the population affected cannot be counted as a casualty). The people vulnerability scores arealso added. Both vulnerability rasters are then multiplied by 0.01 to arrive at percentage values for vulnerability.

Area Vulnerability			
Nature of Area	1	Low Risk Area	Multistory apartment buildings, taller commercial or industrial properties
	2	Medium Risk Area	Typical residential area (two-story homes), low-rise commercial/industrial properties
	3	High Risk Area	Bungalows, mobile homes, busy roads, parks, single-story schools, campsites
Speed of Onset	1	Low Risk Area	Very gradual onset of flooding; spans several hours
	2	Medium Risk Area	Gradual onset of flooding; spans approximately an hour
	3	High Risk Area	Rapid flooding; occurs in less than an hour
Flood Warning	1	Low Risk Area	Effective tried-and-tested flood warning and emergency planning, some flood warning
	2	Medium Risk Area	Flood warning system present but limited, very little flood warning received
	3	High Risk Area	No flood warning system and no flood warning received
People Vulnerability			
Very old people (> 75 years) as percentage of general population	10	Low Risk Area	Well below the national average
	25	Medium Risk Area	Near or at the national average
	50	High Risk Area	Well above the national average
Infirm people as percentage of general population	10	Low Risk Area	Well below the national average
	25	Medium Risk Area	Near or at the national average
	50	High Risk Area	Well above the national average

↑ Table 1: Parameters for the Penning-Rowsell method



↑ Conceptual diagram of the Penning-Rowsell method for estimating injury and loss of life

ArcGIS Server as a Tool Hub

An important aspect of any fast-response analysis effort is staff availability. If only one person in the office knows where a critical tool is and how it functions but is unable to stay or return to the command center during a fast-response event, the entire analysis comes to a halt.

It is therefore paramount for emergency response groups to boost their resilience by cross-training staff so they understand how fast-response tools work and keep those tools and extensions in a central location on shared servers that are easily accessible. For all GIS-related tasks, ArcGIS Server has become a core component simply because it makes specialized tools available to anyone at the command center with a desktop installation of ArcGIS.

Depending on their requirements, some tools are also available without the desktop interface and can be used over the web. The injury and loss-of-life model described in this article is limited to a desktop interface because one of the primary inputs is the hazard rating raster file. However, a web implementation may be useful if the raster is first converted to an ASCII text file, which is an acceptable input for web-deployed geoprocessing.

Demands on Health Care Facilities

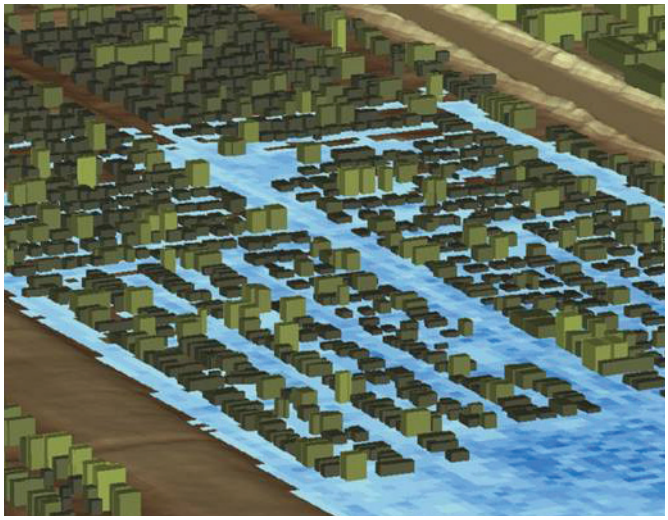
To estimate the impact of flooding on the health care sector, the LANL Energy and Infrastructure Analysis group uses a health care facility model that focuses on hospital networks and the attributes for each hospital such as bed capacities and expected occupancy. When the health care model is run, data from the American Hospital Association (AHA) Annual Survey Database Fiscal Year 2008 and the Dartmouth Atlas of Health Care (DAHC) is retrieved for hospitals in and around the floodplain region.

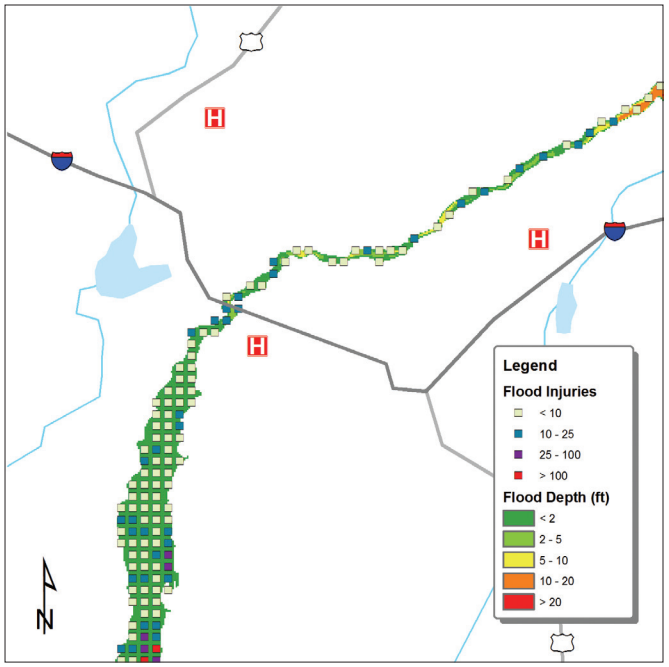
Generating Final Output and Summarized Results

The final steps of the Penning-Rowsell methodology involve multiplying the population within the floodplain by both vulnerability percentage rasters to arrive at a number of casualties within the floodplain. The term *casualty* here describes the number of people who are hurt or killed during a flood event. The initial hazard rating raster is multiplied by a fatality coefficient to identify hot spots where deaths are more likely to occur. This value is also converted to a percentage and multiplied by the casualty raster. The result is a spatial arrangement of where fatalities are likely to occur within the context of the calculated casualties.

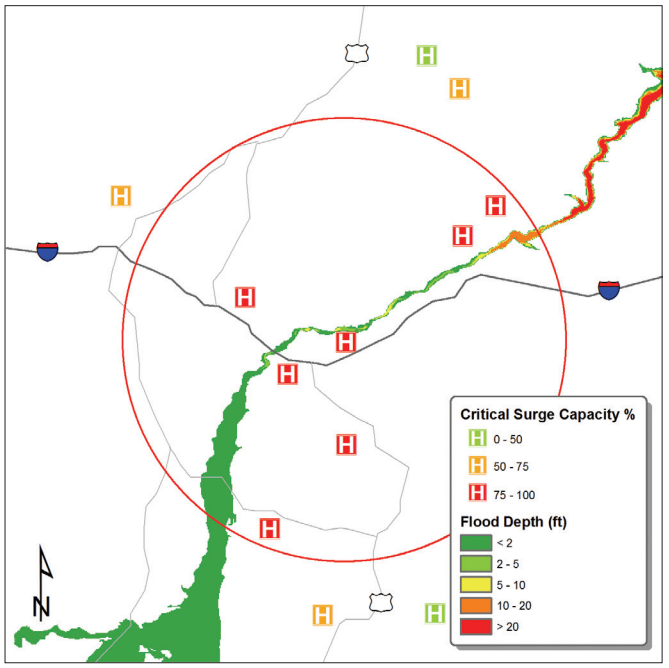
Simple subtraction of the fatality raster from the casualty raster yields the final injury raster—a spatial depiction of where injuries are likely to occur.

↓ ICFIT-2D models overland flood flows.





↑ Mapping the impact of a flood on hospitals and people in the floodplain



↑ Mapping surge in critical care need and its impact on facility capacity

The hospitals in the model are capable of responding to changes in patient condition as they progress from critical to noncritical care, or vice versa, to their eventual discharge or death. One important assumption of the model is that hospitals can only admit patients on demand if they have the available capacity. If they reach full capacity during the model run, surplus patients become a surge that must be relocated to the next nearest hospital with available capacity. Hospitals in or very close to the floodplain are considered to be in need of evacuation and become part of the surge.

Based on the available literature concerning injury severity and survivability, a portion of the injured are assigned a severity rating of either critical or noncritical. As the model runs, it allocates critical and noncritical patients to nearby hospitals until they reach capacity. The model takes into account how long these patients must stay in the hospital to either recover or die. Surplus patients are taken to the next nearest hospital until that hospital reaches capacity, and so on, until the entire injured population has been allocated.

The model also allocates regular care for noncritically injured patients, but at a slower rate, reflecting the lessened urgency of this allocation. During a typical simulation run, the noncritically injured are allocated to the surrounding facilities located in a much larger impact radius.

Conclusion

The ability to realistically simulate and predict the cascading impacts from an adverse event or disaster is key to characterizing its risk. It can also help with emergency planning, mitigation, and resource allocation before and after the event. The LANL Energy and Infrastructure Analysis group has worked tirelessly to develop the tools needed to accurately model such impacts. From hydraulic/hydrologic models to energy infrastructure to injury and health care simulations, GIS has become an invaluable tool for these analyses, especially when the turnaround times are short and lives are at stake. The LANL Energy and Infrastructure Analysis group is dedicated to the mission of making the nation safer and reducing the risks to infrastructure that support our way of life. For more information, contact

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Sara Larsen works at Los Alamos National Laboratory in the Energy and Infrastructure Analysis group. Her research involves finding new ways to model water and energy interdependencies, resilience, and site vulnerability. She has earned a bachelor's degree in geography and master's degrees in civil and environmental engineering from the University of Utah, with an emphasis on water resources.

References

Penning-Rowsell, Edmund, Peter Floyd, David Ramsbottom, and Suresh Surendran. "Estimating Injury and Loss of Life in Floods: A Deterministic Framework," *Natural Hazards,* Vol. 36, Numbers 1–2, pp. 43–64.

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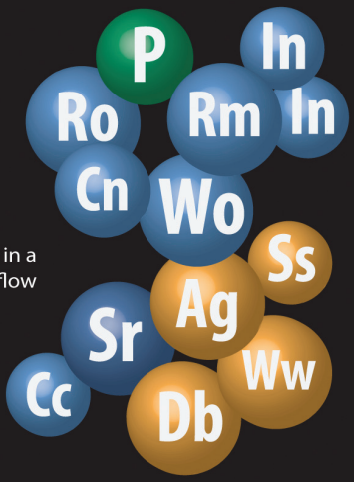


Elements in a sample workflow

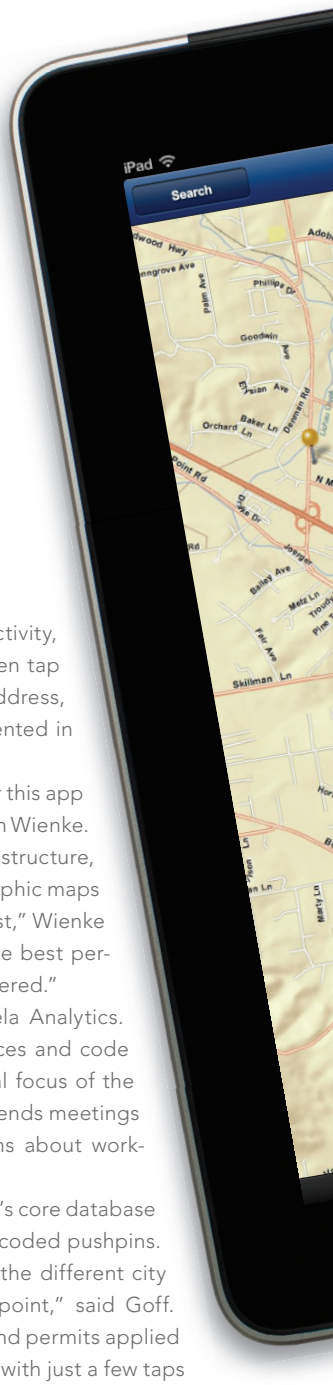
1 Gc GIS Centric															2 Bl Business Licensing
3 Wb Web Browser	4 Dt Desktop									5 P Permitting	6 Bp Building Permits	7 Zp Zoning Permits	8 Ce Code Enforce	9 Pa Planning Activities	10 Rs Renewals
11 M Mobile	12 Ag ArcGIS									13 Ta Tasks	14 Is Inspections	15 Pr Plan Review	16 We Workflow Engine	17 F Fees	18 Em Expired Lic Mgmt
19 R Reporting	20 Ss SQL Server	21 Sl Silverlight	22 Wp WPF	23 W Windows	24 Am Asset Mgmt	25 Sr Service Request	26 In Inspection	27 Wo Work Order	28 Cs CMMS	29 Rm Reactive Maint	30 Pm Preventive Maint	31 N Notices	32 Bc Building Codes	33 Cu Conditional Use	
34 Or Oracle	35 Fm Facility Mgmt	36 Sw Stormwater	37 El Electric Utilities	38 E Equipment	39 L Labor	40 M Material	41 S Storeroom	42 T Tasks	43 Cr Condition Rating	44 C Costs	45 Lu Land Use	46 Co Cert. of Occupation	47 Is Inspection Scheduling	48 B Bonds	
49 Ww Water Wastewater	50 St Streets Traffic	51 Wf Work Flow Mgmt	52 Db Dashboard	53 Ar Asset Registry	54 Qt Query Tools	55 Cc Call Center	56 Mh Maint History	57 Co Contractors	58 Os Online Submittal	59 Cr Corrections	60 RR Revenue Reporting	61 Iv Invoices	62 Ch Court Hearings	63 Op Online Payments	
64 Lg Local Govt	65 Pm Park Mgmt	66 E Event Mapping	67 S Scheduling	68 Me Multiple Entities	69 Ro Related Objects	70 Ui Extensible UI	71 Mt Map Tools	72 B Budget Planning	73 Cw Crew Mgmt	74 St Status Tracking	75 Rp ROW Permits	76 O Online Application	77 Ad Attached Docs	78 Lm Location Mgmt	

79 I Inbox	80 Gc Geocoding	81 Eq Equipment Mgr	82 Tv CCTV	83 Cn Condition Analysis	84 Pj Project Mgmt	85 Ca Cyclical Activities	86 Mm Meter Mgmt			87 Pc Parcel Centric	88 Dp Develop Plats	89 Fe Fee Estimator			
90 Od Open Data Model	91 Kp KPI	92 Gr Graphs	93 Sc SCADA Interface	94 Lm Lifecycle Mgmt	95 Ai Developer API	96 Cm Contract Mgmt	97 N Network Mgmt			98 If Impact Fees	99 Cp Child Permits	100 Bh Business History			

On-the-Go Dashboard

Enterprise oversight tool for the iPad

By Matthew DeMeritt, Esri Writer



Information on permits, license applications, and other municipal transactions is immediately available almost anywhere by simply tapping the location on a map, thanks to an iPad app from Esri Gold Tier partner Accela Inc.

Since the emergence of the iPad, government and business users have been eager to exploit the device as a serious business tool. Software professional Chuck Spink, senior product manager at Accela, envisioned an app that would provide real-time access to data from Accela enterprise software for government, Accela Automation. That data would be displayed as charts, graphs, and maps.

Hundreds of governments already use Accela Automation to monitor and automate many traditional tasks. Creating a remote dashboard to display back-end data seemed the next logical step in extending the system's benefits. A dashboard app would complement Accela Automation by providing a window to enterprise data, aggregating and processing it so it could be more easily analyzed.

When someone engages in any transaction with a city—applies for a permit or license, pays a fee, or schedules an inspection—Accela Automation keeps precise records of that transaction. These transactions can be represented as points on a map. The software's integration with ArcGIS provides the "what and where" component that organizations need to understand activity and make effective decisions.

Accela extended this value to iPad users by connecting to an agency's map data, whether it is published from ArcGIS Server or supplied by maps from ArcGIS Online. After successful testing at several agencies, Accela's iPad app, Accela Analytics, is now available for free to Accela Automation customers via Apple's iTunes App Store. With it, accessing the summary information for a permit, license application, or code case is as simple as tapping the map marker on the app's map.

Three of Accela Analytics' four screens connect to the Esri mapping engine for viewing geospatial data. Agencies and departments can view charts and graphs of activity, while maps show the location of records along with other related information. A Watch List screen drills down into each record, providing more detailed access to information such as the applicant name or parcel number. Because all information is read-only, items in the list can be removed without affecting the back-end data.

"Accela Analytics lets users track a range of application trends, such as inspections, open cases, and so forth," said Spink. "A supervisor can view building permits, licensing activity, and other kinds of records in chart form and then tap the corresponding locations on the map to see address, record type, and record ID of the items represented in the chart."

Speed and flexibility were paramount goals for this app according to Accela senior product manager Brian Wienke. "For agencies that may not have robust GIS infrastructure, our vision was to provide them with rich cartographic maps that look good, are easy to deploy, and render fast," Wienke said. "Esri's ArcGIS Online solution provided the best performance of all the mapping solutions we considered."

Salt Lake City was an early adopter of Accela Analytics. Orion Goff, the city's director of building services and code compliance, appreciates that maps are a central focus of the app. Like any city department manager, Goff attends meetings with government managers who have questions about workgroup activity and labor distribution.

The 16 different workgroups that share the city's core database are clearly represented on the map using color-coded pushpins. "That gives managers a broad view of what all the different city workgroups are doing from a statistical standpoint," said Goff. Current figures, such as the number of licenses and permits applied for in a given area, can be called up in an instant with just a few taps and swipes.

Goff also uses Accela Analytics to monitor building inspection calls. "Analytics makes access to the data for the purpose of administrating processes really simple and quick," said Goff. "For example, I'm in a conference right now and checking how many inspections are scheduled for our building inspector group." From the app, Goff can drill down into the data to see if the number of inspectors is sufficient on a given day and balance the load if it isn't.

Like Goff, Keith Alvis, who is the maintenance management coordinator for the city of Westminster, Colorado, also uses the app to manage his resource needs. "If I need to reference asset data in my meeting, all I have to do is open the app and tap the location, and all the information is there," Alvis said. Analytics also lets Alvis see the quantity of calls received over time and allows him to graph out the number of calls received over a designated date range. "If we see that certain customer service calls trend up or down, this may give us an indication of future resources that may be needed," he added.

↓ Accela Analytics gives real-time access to enterprise data displayed as charts, graphs, and maps.

↑ For agencies without a robust GIS, the iPad app can use the rich cartographic maps from Esri's ArcGIS Online.

"Government transparency isn't just important for the public. It's also vital to give critical workers a window into the impact of enterprise technology on their operations, wherever and whenever they need it," said Maury Blackman, Accela CEO and president. With shrinking budgets and ever-increasing workloads, governments need simple oversight tools that present enterprise information in real time. Working in tandem with enterprise systems that leverage GIS, iPad apps like Accela Analytics provide the ideal launching point for viewing the back-end data that drives government and business operations.

A GIS App for the Facebook Generation

Bringing *The Atlas of New South Wales* to life online

By Dr. Pedro Harris, New South Wales Land and Property Management Authority; Stephen Lead, Ajilon Australia; Danny Savic, Azuron Ltd.; and Tim Lucas

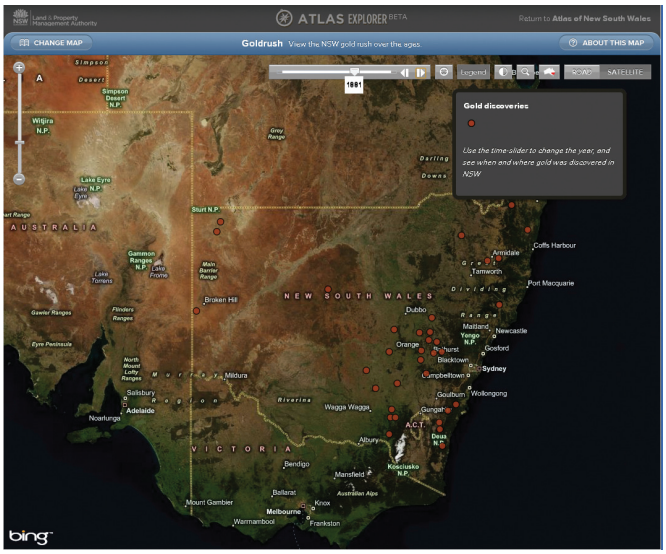
The authors designed a JavaScript-based web mapping application called Atlas Explorer, which makes the rich content of *The Atlas of New South Wales* accessible through an intuitive interface that eliminates the learning curve associated with many mapping sites.

"Read the manual."

Increasingly, these words are falling on deaf ears. The web is full of complicated mapping applications, laden with tools, check boxes, and drop-down lists, designed by experts, for experts. The user is expected to learn how to use the system. To address this problem, a new breed of applications is emerging with elegant and intuitive interfaces that give a more satisfying user experience.

The Atlas of New South Wales

Our aim was to build a simple but powerful GIS application aimed at the Facebook and iPod generation that never reads the manual and expects things to "just work." Our starting point was *The Atlas of New South Wales,* a new 200-page printed book. This book, written by experts from the New South Wales (NSW) government, academia, and industry, provides a comprehensive picture of NSW. Topics include the history of indigenous and European people, European exploration, analysis of the modern-day population, the history of elections over the past 150 years, the economy, and the environment. Our goal was to bring the printed book to life in an online site, complete with interactive maps. The finished application may be seen at atlas.nsw.gov.au.



↑ Many datasets, like this one showing the Gold Rush, are based on historical information, so the new time-aware functionality was configured to allow users to visualize changes over time.

Atlas Explorer Map Viewer

We wanted a full-screen map viewer that would allow the user to navigate anywhere in New South Wales. We turned to the ArcGIS API for JavaScript version 2.1 to create the new Atlas Explorer mapping application.

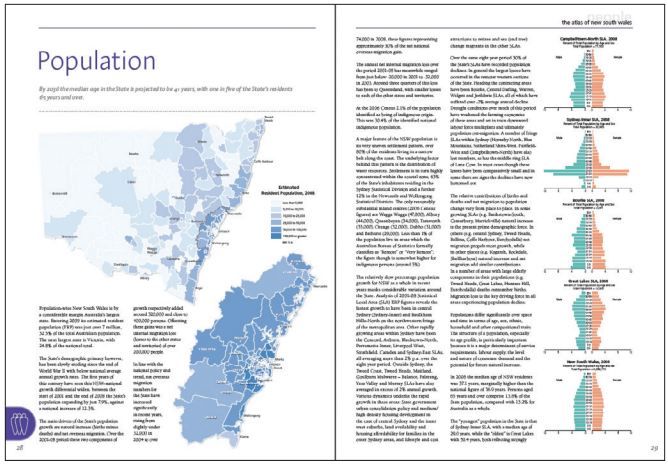
A GIS with No Tools?

To keep things simple, we needed to minimize the controls used to interact with the map. With no additional coding, the ArcGIS API for JavaScript provides the ability to

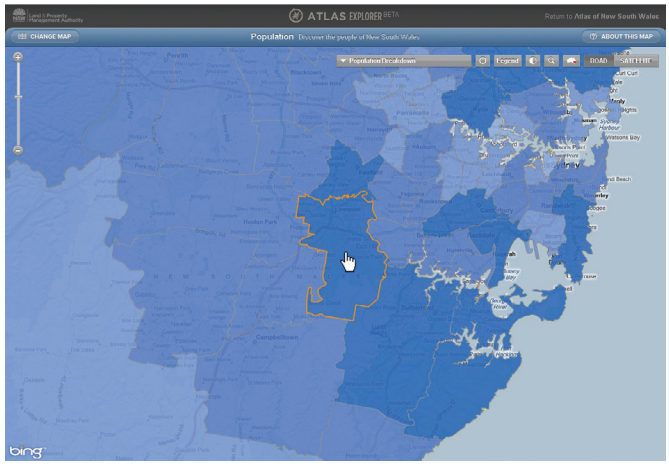
- Zoom in by double-clicking.
- Zoom in and out using the mouse wheel.
- Zoom in and out using the navigation control.
- Zoom to a box using the Shift key.
- Pan the map by holding the left mouse button while dragging.

Using the JavaScript map's built-in behaviors for navigation, we eliminated the need for Zoom In, Zoom Out, and Pan tools, which resulted in a far simpler user interface. Using most GIS interfaces, it is necessary first to select an Identify tool, then click on a feature to retrieve its attribute values. To avoid this requirement, we used feature layers as overlays on the basemap. Running a listener for the onMouseOver event meant that an Identify tool wasn't necessary, because the features themselves became identifiable. Incorporating the Identify tool's functionality into the layer's own behavior allowed us to dispense with the Identify tool, further simplifying the user interface.

In our case, when the mouse is moved over a polygon, the cursor changes to a pointer and the feature is highlighted. This alerts the user that additional information is available. (A separate listener event removes the highlight graphic when the mouse is moved away from the feature.)



↑ The website, atlas.nsw.gov.au, is based on *The Atlas of New South Wales*, a 200-page printed book.



↑ In the Atlas Explorer, navigation is controlled by the map, and the Identify functionality is controlled by the layer.

No Table of Contents?

We avoided the requirement for a complex table of contents by allowing only one theme to be visible at any time. This removed the need for check boxes to control layer visibility and prevented the problem of multiple, overlapping layers. Because the map extent does not change when the theme is changed, the user may still compare various themes within the same area. For a site aimed at the general public, this seemed a reasonable compromise to avoid undue complexity.

Time-Aware Layers

Many datasets in the atlas are based on historical information, so the new time-aware functionality was configured to allow users to visualize changes over time. Setting up a time-aware layer is a simple process:

1. Enable time on the layer's Properties dialog box in ArcMap.
2. Configure the time slider in ArcMap.
3. Create an ArcGIS Server map service from the map document.
4. Initialize a time slider in the online mapping application.

Once these steps have been completed, a new time extent property is set at the map level. All layers in the map automatically update to reflect changes in the time extent and only show features that are valid for the specified time. In the atlas, this allows users to visualize historical processes, like the progress of European settlement over time, and brings the historical datasets to life in an intuitive manner.

Challenges

The use of feature layers removed the need for an Identify tool but posed its own set of challenges. Displaying complex polygon features across NSW resulted in large download sizes and long download times. The solution was to use the maxAllowableOffset parameter to allow the features to generalize on the fly. By listening for the map's onZoomEnd event, the maxAllowableOffset value could be optimized for any map scale.

Conclusion

ArcGIS Server and ArcGIS API for JavaScript provide powerful tools that can be used to visualize complex datasets simply and easily. An added benefit of the JavaScript API was that it removed any dependencies on third-party plug-ins, so our site could run on any web browser.

A user-centric interface and workflow are essential if the goal is to engage with the non-GIS community. Using the built-in behaviors of the ArcGIS API for JavaScript for the map and layers can help simplify the user interface while still allowing rich and engaging interactivity. For more information, see *The Atlas of New South Wales* at atlas.nsw.gov.au, follow @AtlasOfNSW on Twitter, or contact Stephen Lead at Stephen.Lead@ajilon.com.au.

About the Authors

Pedro Harris is the chief information officer at the New South Wales Land and Property Management Authority (LPMA). LPMA is the principal mapping authority for NSW and maintains a portfolio of GIS and mapping websites. The Atlas Explorer for the *Atlas of New South Wales* website is LPMA's first viewer targeted at the general public rather than government, business, and industry.

Stephen Lead is a principal GIS consultant at Ajilon Australia, a consulting, project management, and system integration specialist located across Australia. Prior to joining Ajilon, Lead spent eight years working at ESRI Australia Pty. Ltd. and ESRI (UK) Ltd. He is a previous contributor to *ArcUser*.

↓ Stephen Lead

Danny Savic is a web technology specialist at Azuron Ltd., a consulting and system integration firm based in Sydney, Australia. Savic has worked on numerous web-based projects for clients both large and small.

Tim Lucas is a designer based in Sydney, Australia, who provided invaluable input into the user experience and interaction design for this project.

Migrating Widgets to the ArcGIS Viewer for Flex

Some tips and tricks to ease the process

By Robert Scheitlin, Calhoun County; and Bjorn Svensson and Derek Law, Esri

This article tells developers how to migrate widgets developed with the Sample Flex Viewer (SFV) to the ArcGIS Viewer for Flex. It assumes readers have experience using the ArcGIS API for Flex and are familiar with the Adobe Flash development environment, and experience developing with the Flex API and Adobe Flash is strongly recommended.

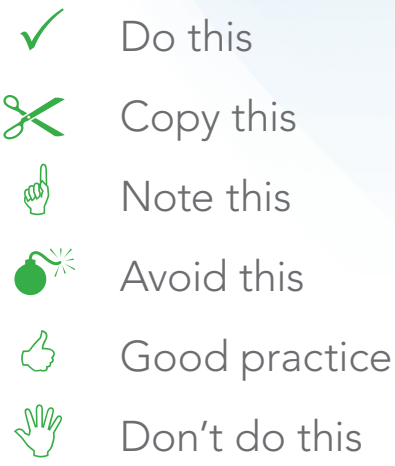
Released in November 2008, the SFV was a developer sample built on the ArcGIS API for Flex. It enabled nonprogrammers to deploy a rich Internet application for ArcGIS Server with minimal effort. Since its release, the SFV has been downloaded more than 30,500 times, and many sites have been built on the SFV.

SFV also provided a framework for Flex API developers to customize and extend the viewer. One important area was the ability to create custom widgets. Widgets are modular pieces of code that extend or add to the functionality of the SFV. They can be tailored by the widget developer for specific tasks that require particular data and conditions to be present in the viewer, or they can be generic and allow SFV to be configured by nonprogrammers to work with their own data. More than 50 widgets have been created for SFV and shared on the ArcGIS API for Flex code gallery. Many of these widgets can still be accessed from the Esri ArcScripts site (arcscripts.esri.com/; search for "flex" AND "viewer").

In September 2010, Esri released the ArcGIS Viewer for Flex—the official product release of the SFV. It includes 20 core widgets that support many standard web mapping application functionalities.

Many users wondered about the SFV widgets that were produced and shared on the ArcGIS API for Flex code gallery. Would these widgets "just work" in the new ArcGIS Viewer for Flex application?

Unfortunately, the answer is no. The ArcGIS Viewer for Flex uses a framework that differs from SFV. It is based on a newer release of the ArcGIS API for Flex and utilizes the latest Adobe Flash technology. To use widgets previously developed for the SFV, the code base for those widgets must be migrated and recompiled for the new ArcGIS Viewer for Flex 2.x API libraries.

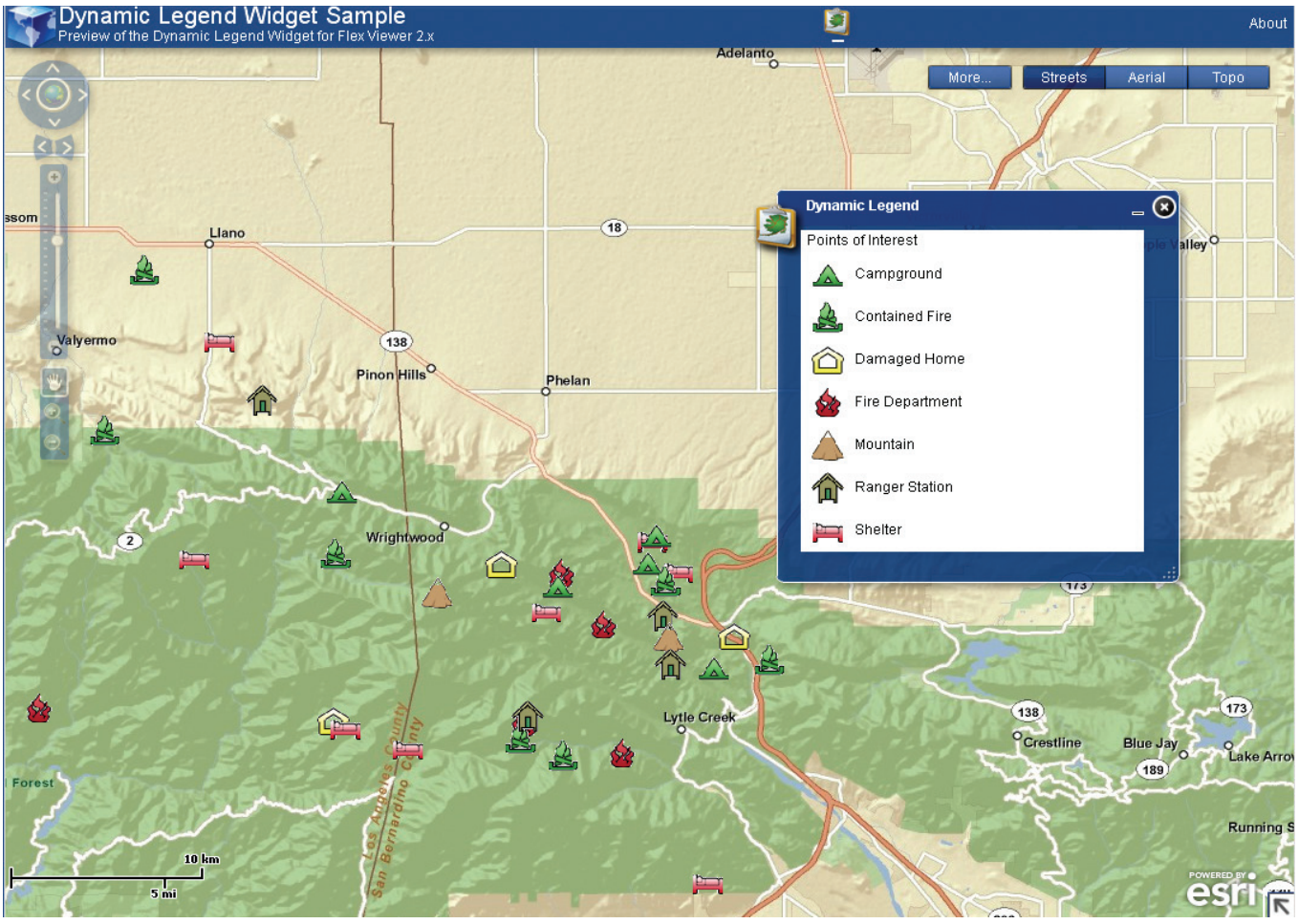


This article provides tips and recommended practices to help Flex developers easily migrate custom widgets from the SFV to the ArcGIS Viewer for Flex. Flex developers should be aware of the differences between the SFV and the ArcGIS Viewer for Flex. These differences are summarized in Table 1.

Sample Flex Viewer	ArcGIS Viewer for Flex
Uses Adobe Flex SDK v3	Uses Adobe Flex SDK v4
ViewStack	States
mx:Text	s:Label
mx:HBox	s:VGroup
mx:ComboBox	s:DropdownList
Based on ArcGIS API for Flex 1.x	Based on ArcGIS API for Flex 2.x
symbol package	symbols package
com.esri.ags.tasks.Query	com.esri.ags.tasks.supportClasses.Query
com.esri.ags.tasks.FeatureSet	com.esri.ags.FeatureSet
Framework	Framework
WidgetEffects	viewer:transitions
com.esri.solutions.flexviewer.SiteContainer	com.esri.viewer.ViewerContainer
BaseWidget	viewer:BaseWidget

↑ Table 1: ArcGIS Viewer for Flex equivalents for SFV

Table 1 highlights some of the subtle—but key—changes in development patterns between the SFV and the ArcGIS Viewer for Flex. The concepts are the same, even though they may have been renamed. However, this is not a comprehensive list of these differences. At the Adobe software development kit (SDK) level, Adobe recommends using the new Spark components. For example, s:VGroup is used instead of mx:HBox. For more detailed information, see the resources list at the end of this article.

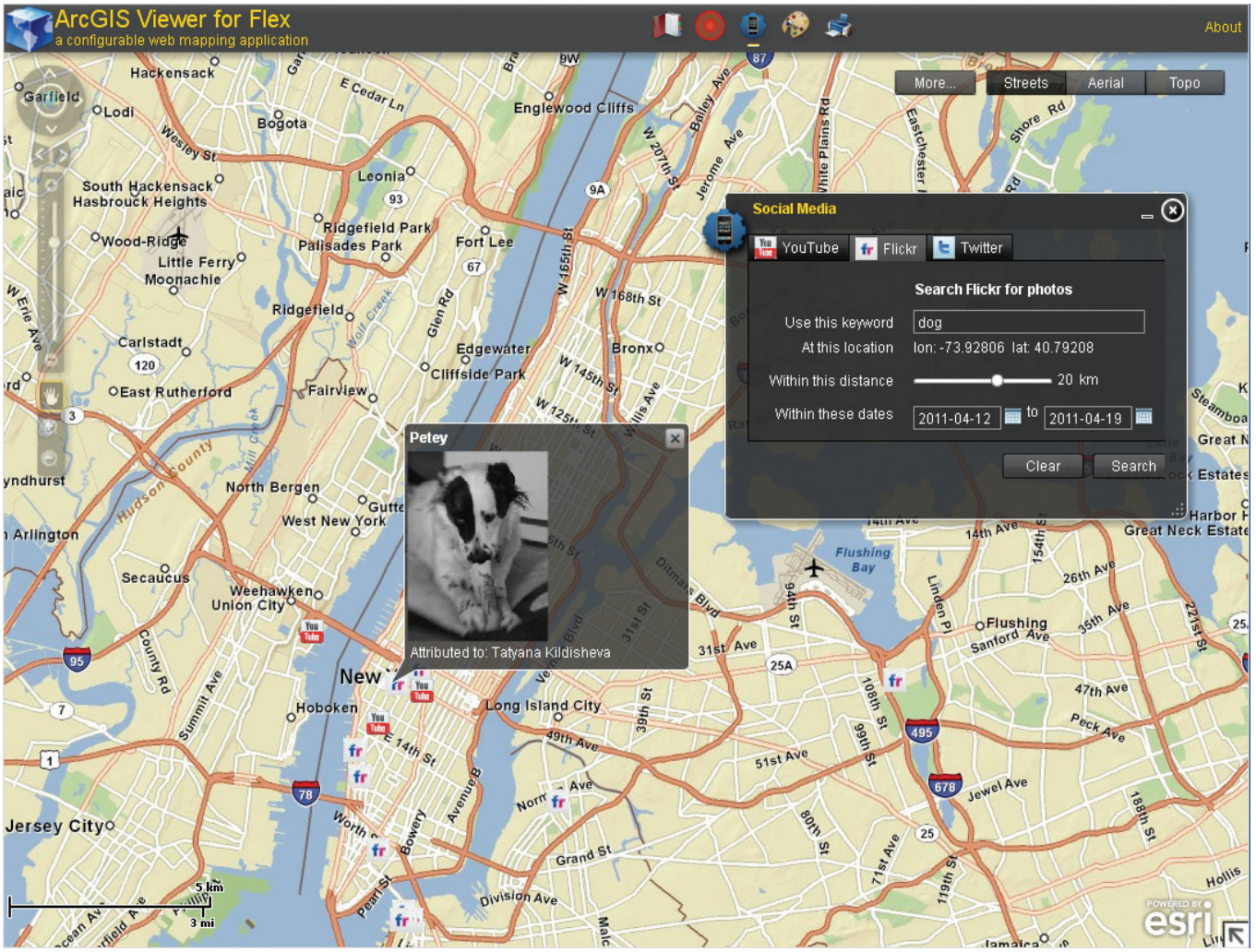


↓ This Dynamic Legend widget created by Robert Scheitlin modifies the contents of the legend based on scale dependency and layer visibility. Map services and/or specific layers in a map service may also be excluded from the legend.

General Tips on Widget Migration

- ✓ Start the widget migration process with a new MXML Component. Create the new MXML Component as part of a package in the widgets folder (i.e., widgets.LiveLayer). Follow Viewer coding standards. The widget package should share the same name as the widget name (minus the word "widget"). For example, the full widget name and package would be widgets.LiveLayer.LiveLayerWidget. Base the new MXML Component on BaseWidget.
- Don't give the new component a width or height; that is handled in the widget template.
- ✓ If the widget is going to reference custom components, such as item renderers and data groups (which are designed to replace the mx:Repeater in the new Adobe Flex SDK 4 environment), add the widgets.xml name space to the BaseWidget element (e.g., xmlns:livelayer="widgets.LiveLayer.*).
- ✓ Use the widgetConfigLoaded event if the widget has a configuration file. This ensures that the widget configuration file has been loaded before you try to use it. Having a widget configuration file allows nondevelopers to change certain aspects of the widget without altering the code and compiling the application.
- ✓ An fx:Script block is needed for the ActionScript code that will be migrated from an mx:Script block in the old widget. Add an fx:Script block by typing it in the new widget file instead of just copying the mx:Script block from the old widget.
- States replace the ViewStacks used to separate pages or views in old widgets. A little planning will go a long way here. Examine the old widget and determine how many VBox elements are children of the ViewStack, that is, how many states will be needed. Each state must have a name as shown in the example in Listing 1.

↓ The Social Media widget created by Ping Jiang searches YouTube for videos, Flickr for photos, and Twitter for Tweets based on a keyword.



```
<viewer:states>
  <s:State name="filterResults"/>
  <s:State name="resultsList"/>
</viewer:states>
```

↑ Listing 1: Each state must have a name.

✓ In the old SFV, an animation that occurred when moving from one view to another was handled by a custom ActionScript class called WidgetEffects. In the new viewer, transitions are used for this purpose. The targets for transitions will be the names of the states defined previously. An example is shown in Listing 2.

```
<viewer:transitions>
  <s:Transition autoReverse="true" toState="*">
        <s:Fade targets="{[filterResults, resultsList]}"/>
  </s:Transition>
</viewer:transitions>
```

↑ Listing 2: Handle animations between views with transitions.

✂ Copy the MXML elements that define the UI of the old widget, paste them into the new widget, and comment them out. The commented old code can serve as a reference. This will save some time because it eliminates the need to switch back and forth from old widget code to new—both versions will be present.

Moving the widgets' MXML code from mx components to Spark components during the code migration is recommended. Use Table 1 to determine the Spark equivalents for some mx components. The WidgetTemplate element is still the base for the widget's UI. The new widget template in the ArcGIS Viewer for Flex has renamed a few of the events. For example, the "widgetClosed" event is now just "closed" and the "widgetOpened" event is now "open."

The height and width of a widget's UI is defined in the widget template. Each widget state will be a Spark group element, and each ID will share the same name as the states defined earlier. Set the visibility of the group to false and add another attribute, "visible." After the attribute "visible" is typed, add a dot after it, and the automatic code completion will display the available states (when using the Adobe Flash Builder IDE). Choose the state name of the current group.

```
<viewer:WidgetTemplate id="wTemplate"
                width="430" height="240"
                open="widgetOpenedHandler(event)"
                closed="widgetClosedHandler(event)"
                minimized="widgetMinimizedHandler(event)">
  <s:Group id="resultsList"
         width="100%" height="100%"
         visible="false"
         visible.resultsList="true">
       <s:layout>
              <s:VerticalLayout gap="10" horizontalAlign="center"
verticalAlign="middle"/>
       </s:layout>
  </s:Group>
  <s:Group id="filterResults" width="100%" height="100%"
         visible="false" visible.filterResults="true">
       <s:layout>
              <s:VerticalLayout gap="4" horizontalAlign="center"
verticalAlign="middle"/>
       </s:layout>
  </s:Group>
</viewer:WidgetTemplate>
```

↑ Listing 3: Widget template

- Examine the code for old mx components that could be "Sparkified." For example, if the old code uses an mx:Text, then its Spark counterpart is s:Label; an mx:HBox could become an s:Hgroup, mx:Button could become s:Button, and mx:ComboBox could become an s:DropDownList.
- Another practical tip is to copy all the old mx:Script code from the old widget and paste it inside the new fx:Script block. As mentioned earlier, don't copy the mx:script block in its entirety; just copy the contents between the <![CDATA[ ]]>. There will be several errors that will have to be addressed one at a time.
- Replacing the import statements in the script block that have changed in the ArcGIS API for Flex 2.2 is important.

SFV import statement	Replacement import statement in ArcGIS API for Flex 2.2
`import com.esri.solutions.flexviewer.SiteContainer`	`import com.esri.viewer.ViewerContainer;`
`import com.esri.ags.symbol.*`	`import com.esri.ags.symbols.*;`
`import com.esri.ags.tasks.Query`	`import com.esri.ags.tasks.supportClasses.Query;`
`import com.esri.ags.tasks.FeatureSet`	`import com.esri.ags. FeatureSet.`

↑ Listing 4: Replace import statements.

One simple way to fix these is to examine the reported compile error. Double-click it to go to the specific line; put the cursor at the end of the offending class; and press Ctrl+Spacebar for Content Assist, which will add the required import statement.

- While it is not required, it *is* a good practice to migrate mx:Repeater to the Spark DataGroup class. Accomplishing this involves creating three new items, *Results.as, *ResultDataGroup.as, and *ResultItemRenderer.mxml. Fortunately, there are several examples of this code in the ArcGIS Viewer for Flex. A quick shortcut: simply copy and paste these three items from SearchWidget and rename them with the new widget's name.
- If the old widget used an mx:Repeater, the code probably has many references to its dataProvider. It will be necessary to create a bindable private var of type ArrayCollection to replace it. Everywhere in the code that references the repeaters, dataProvider must be changed to reference this new ArrayCollection.
- The new ArcGIS Viewer for Flex allows developers to specify a custom info window to use with a particular widget or one of the widget templates that comes standard with the viewer. Using this new capability involves several code additions and changes, such as overriding the widget's showInfoWindow function. Rather than identifying each line that must be changed and added in this article, look at one of the existing core Viewer widgets and search for "info." That search will return items like the infoURL string, which holds the infoURL string from the widget configuration file, or the DATA_CREATE_INFOWIDGET event.
- When using the new info window and data group (when replacing mx:Repeater), a couple of new import statements must be added:

```
import com.esri.viewer.IInfowindowTemplate;
import mx.core.UIComponent;
import spark.components.supportClasses.ItemRenderer; and
import com.esri.viewer.AppEvent.
```

- If the data group and item renderer will be updated, the mouseOverRecord, mouseOutRecord, and clickRecord event handlers must also be updated to convert events passed to these handlers to an itemRenderer instead of using the infoData object.

About the Authors

Robert Scheitlin is the GIS manager for Calhoun County, Alabama. A GIS software developer for 12 years, he has worked on projects that included full ArcObjects custom applications, ArcGIS Engine applications, and ArcGIS Server API for Flex and Flex Viewer applications. He has used and customized the Sample Flex Viewer since its release and supported Flex developers on the ArcGIS API for Flex forum. After initially focusing on Visual Basic and Visual Basic. NET, he is now focusing primarily on Flex. His background as an Esri Authorized Instructor has given him the ability to teach others about software development and customization.

Bjorn Svensson is the lead product engineer for ArcGIS API for Flex and ArcGIS Viewer for Flex. He has worked with web mapping at Esri for 10 years. Previously he worked as a GIS consultant in Africa, Asia, Europe, and the Americas.

Derek Law is part of the ArcGIS Server product management team, covering the ArcGIS Viewer for Flex and Silverlight. He has been with Esri for 10 years, with extensive experience working with geodatabases and ArcSDE technology. In recent years, his focus has been on the configurable client viewers for ArcGIS Server.

```
var llResult:LiveLayerResult = ItemRenderer(event.target).data as
LiveLayerResult;
```

When migrating widget code and using the queryTask, if the code is not connecting to an instance of ArcGIS Server 10 or higher, you need to set queryTask.useAMF = false.

Title bar buttons in the new ArcGIS Viewer for Flex no longer return events, so the click handler does not require an event.

Old format

```
private function toggleFilterPanel(event:MouseEvent):void
```

New format

```
private function showResultsList():void
```

The order in which title bar buttons are added is the opposite order in which they were added in the SFV (e.g., the first button to appear on the left should now be the last one added).

The third property for the addTitlebarButton function is used to designate whether the button is selectable. The default value is true.

The assets directory in the SFV was com/esri/solutions/flexviewer/assets/images/icons/. The assets directory in ArcGIS Viewer for Flex is located at assets/images/. (Notice there is no subfolder of icons.)

To summarize, there are many key items that Flex developers should be aware of when migrating a custom widget from the Sample Flex Viewer to the ArcGIS Viewer for Flex. An example of migrated widget code can be found at gis.calhouncounty.org/DevSummit2011. It demonstrates the LiveLayerWidget code and includes developer comments.

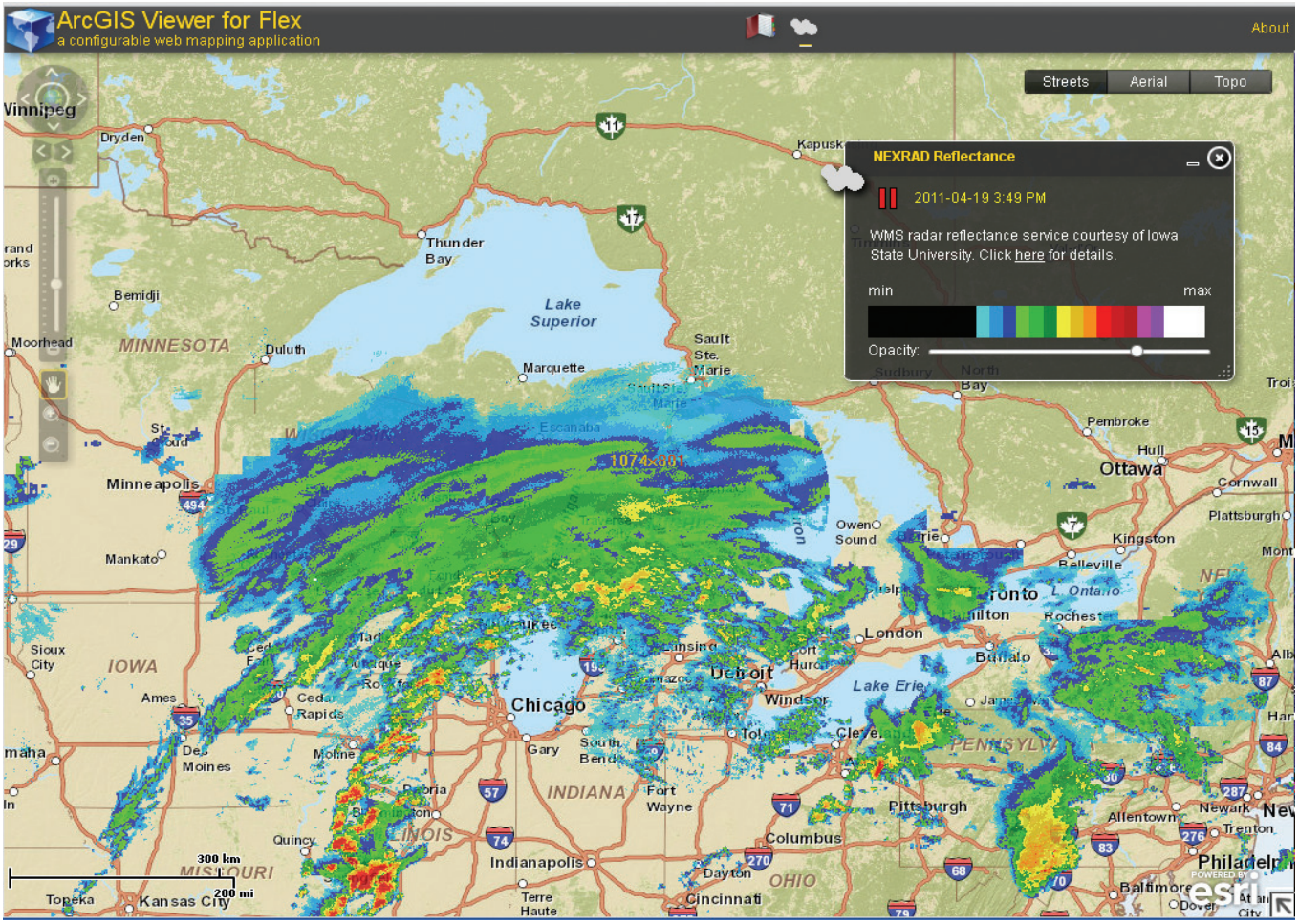
Online Resources

Differences between Adobe Flex SDK 3 and Adobe Flex SDK 4
adobe.com/devnet/flex/articles/flex3and4_differences.html

Esri API changes between ArcGIS API for Flex 1.x and 2.x
http://help.arcgis.com/en/webapi/flex/help/index.html#/Migrating_from_1_3_to_2_0/017p0000000z000000/

ArcGIS Viewer for Flex Resource Center
links.esri.com/flexviewer

↓ Mark Deaton's widget shows a changing series of NEXRAD radar reflectance images (indicating severe weather) over the US for the previous hour. It also demonstrates the use of WMS layers via the ArcGIS Flex API.



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Is the Cloud Right for Your Organization?

Looking at hosted services in the oil and gas industries

Most people use cloud services every day for e-mail, online banking, or driving directions. But are these online services appropriate for the oil and gas business? Keith Fraley, geoinformation consultant for Shell Exploration and Production (E&P) in Houston, Texas, says it's time for the industry to get "SaaS-y." A longtime user of GIS software for E&P, Fraley talked with Barbara Shields, editor of the Esri newsletter *Petroleum GIS Perspectives,* about the benefits that Software as a Service (SaaS) data vendors could bring to the industry.

↑ Keith Fraley, geoinformation consultant for Shell Exploration and Production

Shields: What data management problems do you see being resolved by hosted data services?

Fraley: Speaking primarily from a DaaS *[Data as a Service]* perspective, Internet technologies and infrastructure have advanced to a point that using a cloud service could potentially be more advantageous than managing data in-house. About 90 percent of a petroleum company's data is from external sources. E&P companies spend tremendous amounts of money and time internally managing datasets that they don't own but rather lease. Moving to an externally hosted solution for vendor datasets would significantly reduce the footprint of the IT systems in place internally and allow a company to focus on managing its own internally derived data.

An oil company's data can potentially come from hundreds of resources such as IHSE0, Tobin *[oil and gas lease data]*, PennWell *[Corporation]*, BLM *[Bureau of Land Management]*, NOAA *[National Oceanic and Atmospheric Administration],* and many others. Internally managing so many datasets is a problem that forces you to be reactive. Because data providers' products have evolved over time, there is no uniform way of induction. Data is delivered by different means, from DVDs and FTP downloads to SDE imports and file geodatabases. It also arrives in periodic increments—some monthly, some quarterly, and some whenever the provider gets around to it. The GIS data manager is basically at the mercy of vendors'

methods of delivering their data. It would be much easier if data managers could simply plug into a hosted service database whenever they need it. And if they don't need the data any longer, they could simply unplug rather than going through the task of expunging datasets and derived datasets (exported shapefiles, TIFFs, and x,y files) from their systems.

Shields: The Data as a Service model sounds good for the client, but why would a data vendor be interested in deploying cloud services?

Fraley: A data service provider is able to aggregate (build once, deploy everywhere) its operating environment and have new distribution channels. In addition, looking at access rates helps vendors see trends, predict growth, and meet demand. They would be able to simplify the pricing model that meets their clients' needs. Furthermore, rather than building monster-level patch rollouts and dataset pushes, the service provider could focus on smaller upgrades and real-time dataset updates.

Data and software web services are growing in popularity, and the change is inevitable. This trend cannot be ignored, and the data industry must act now to keep up with competition and the needs of its clients.

Shields: What basic ideology would data vendors need to address before making the transition from traditional data service to cloud services?

Fraley: The ideology that oil and gas software products should be "walled gardens" must change. Oil and gas companies have a hard time being agile managing data because a lot of our vendors' products are designed to be walled gardens of proprietary software and data. They don't see that building products focused on interoperability and standards is in their best interest.

Shields: Petroleum companies have yet to adopt data and software hosted services. Why should they consider it?

Fraley: The model of DaaS from the cloud makes sense in the oil and gas world. In fact, I would argue that it is the perfect scenario for us. We are a very data-intensive industry. Most oil and gas companies house mammoth amounts of geospatial data, which has traditionally been locked up by power GIS users. As geospatial professionals, it is in our best interest to get that critical information to the people that make business-critical decisions. With a cloud model in place, our ability to build RIA *[rich Internet applications]* becomes easier. We can take our internally managed data and quickly mash it up with vendor web services and get it in front of the decision makers.

Shields: An often-heard argument by petroleum people is that cloud computing is a security risk and a bandwidth problem. Can you address these concerns?

Fraley: Security is absolutely a primary concern, and it should be. The Internet, by its very nature, is inherently insecure. This is the main reason why the concepts being discussed here are mainly SaaS as a one-way street. Oil and gas companies are consumers of data and do not push internally confidential data into the cloud. However, the security aspect will evolve and eventually get to the point where companies will not have great concern about storing critical, confidential information in the cloud, much like we as individuals do already in regard to the banking industry. Regarding bandwidth, many data services are delivered over standards and protocols such as XML and JSON *[JavaScript Object Notation]*, which are not heavily bandwidth intensive. The beauty of this is that I can send spatial and nonspatial information through a simple REST URL, which is not a huge bandwidth hog.

Shields: What role do you see Esri playing in web mapping services?

Fraley: Esri has come a long way since the ArcIMS days, in terms of web services. It is building products that focus on interoperability and standards. ArcGIS Server is an excellent cloud-based product.

Some petroleum companies have stepped up to ArcGIS Server but are still using an ArcIMS approach, thinking that the new technology is merely a way to make pretty maps on the web. That is the tip of the iceberg of what the product can do for you. One example of ArcGIS Server as it relates to DaaS is the product's GeoData Service. This service gives the data vendor the ability to easily and quickly push data products (updates, deletes, and replication) to its client, eliminating the need for DVDs or FTP downloads.

Another example of Esri's commitment and understanding of the cloud is ArcGIS Online. My company is leveraging the free web mapping services of world imagery, topos, and street maps (and many more) available there. This saves us the cost and hassle of trying to manage that data in-house. From an SaaS perspective, the Esri cloud-hosted web APIs for JavaScript, Flex, and Silverlight provide a robust yet lightweight solution for developers.

Shields: How do you foresee the oil and gas industry moving into cloud services?

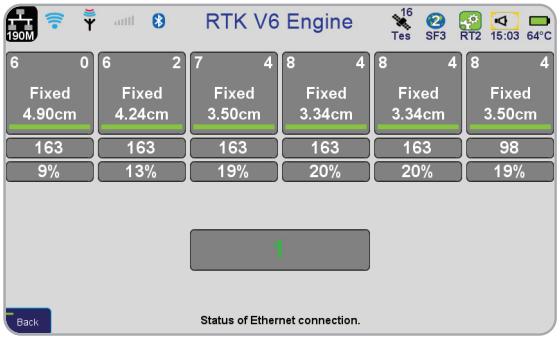
Fraley: The industry migration to the cloud will be an incremental process. There is no magic bullet for migrating decades of legacy systems and workflows to a new model, no matter how great the new model is. In the end, vendors and clients must understand the need for fundamental changes in the way data and software get delivered in our industry. Then they must have the technology, infrastructure, and knowledge in place to implement that change.

Learn more about cloud GIS at esri.com/technology-topics/cloud-gis.

JAVAD

You've come a long way, Survey!

Six Pack RTK V6 Engine

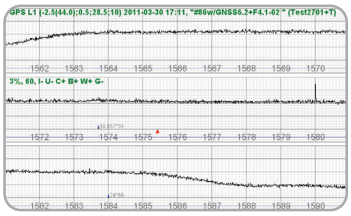


We invented and implemented the six pack RTK V6 engine (patents pending). Six RTK engines work in parallel to produce the best results in all conditions.

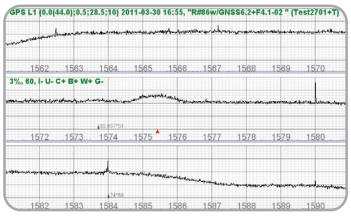
Don't Look! Don't Touch! ... Survey with Lift&Tilt

It seems TRIUMPH-VS reads your mind! Many sensors, intelligence, and innovations inside TRIUMPH-VS bring this new revolution to surveyors.
You don't need to look. You don't need to touch.

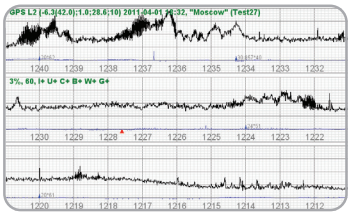
See who jams your RTK!



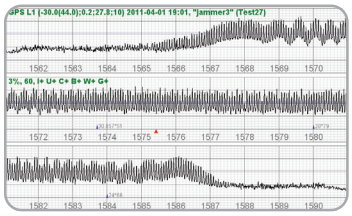
A very clean area. No interference at all.



Clean area, rooftop of our San Jose office. Almost no interference.



Small interferences near our Moscow office. RTK somewhat affected.



A $430 jammer totally destroyed all GPS signals. No RTK and no work.

See all details at www.javad.com

Seeing New Possibilities

2011 Esri Developer Summit previews a promising future

By Carla Wheeler, Esri Writer

Mark Ping and Adam Knight glimpsed the future of GIS development.

Ping and Knight, who both work for Esri partner VESTRA Resources, Inc., in Redding, California, were first-time attendees of the Esri Developer Summit. They were among the 1,350 developers who attended the world's largest developer summit devoted to GIS, held March 7–10, 2011, in Palm Springs, California.

And the future looks promising. "The possibilities are enormous. My eyes are being opened," said Knight, impressed by a demonstration of the ability of ArcGIS Server 10.1 to calculate and draw drive-time polgons and retrieve and display demographic data for those areas in mere milliseconds.

Developers came from all over the United States, Canada, Australia, Austria, Sweden, and Belgium to learn how to use Esri technology when developing applications for desktop, web, and mobile technologies; share best practices and development patterns; exchange ideas; and solve problems. They also got a sneak peek at what's being developed for ArcGIS 10.1, which will be in beta in June and is slated for release in late 2011 or early 2012.

The summit largely drew desktop application developers, but developers for web and mobile technologies were well represented too. ArcGIS supports multiple implementation patterns, including those that are rapidly emerging for cloud/web and mobile GIS.

That pleased Ping, a big fan of the Android operating system that's on his smartphone. "I'm impressed with the smartphone platform," he said after watching a demonstration of ArcGIS for Android. Esri will also offer an API for building GIS-enabled applications for Android devices. Both the app and API will be released this spring. "I see the [Android] platform as dominating the mobile market, so I'm glad to see Esri embracing it," Ping said.

Bringing New Applications to Life

Esri president Jack Dangermond opened the summit by emphasizing the important role that developers play in bringing new applications that utilize Esri technology to their users. "Increasingly, there's a gap between what we develop and what needs to be developed to make people really productive," said Dangermond, adding that this is where the developer community steps in. "That takes special talents. It takes the talent of understanding what's needed and wanted, then engineering—thinking through, designing, and creating—that special application that really works."

Scott Morehouse, director of software development for Esri, echoed Dangermond's sentiment about the collaborative spirit. "We're here together because we want to build great stuff," he said. "Our purpose is to build a platform for working with maps and geographic information, which you can leverage to do great work. The goal is to create systems of information that bring geographic data and understanding about the real world to life for real people."

Morehouse said Esri is increasingly developing for the web/cloud and mobile device environments.

"We are moving more functionality from the enterprise style of system building into a cloud or web style of system building," he told developers. "We are looking to move our services architecture into a hosted environment. We will move more desktop functionality into lightweight mapping applications that run on [smart]phones and [other mobile] devices and in browsers."

ArcGIS Online

Sud Menon, from Esri's software development team, described ArcGIS Online as being "ArcGIS available to you as an online, cloud-based system." On smartphones, tablets, or desktops, ArcGIS Online offers free access to maps, apps, and tools published by Esri and other GIS users. ArcGIS Online users, who now number more than 60,000, can also create and share maps within a community of interest or with everyone.

Esri's Jeremy Bartley demonstrated ArcGIS Explorer Online, showing the newly added support for time, editing, and pop-up windows. "Great web maps need great pop-ups," he said, showing the developers how to configure pop-up windows using the USA Household Income map as an example. "It makes for a compelling map when you can provide key information to your users."

Mobile GIS

Dave Cardella, product manager for Esri mobile technologies, said that ArcGIS runs on many mobile platforms and devices. "We have ready-to-deploy applications and APIs. The applications are configurable. Some of them are customizable. They are all built on an API we make available for you," he said.

ArcGIS and ArcGIS Mobile are excellent solutions for the Windows Mobile platform, Cardella said, noting that new functionality is currently being added to ArcPad and ArcGIS Mobile applications and software development kits (SDKs) to improve both customization and the overall user experience.

"The smartphone and tablet market has really exploded. We see these devices increasingly being implemented within organizations that want to extend the reach of their GIS from the office out into the field," said Cardella. "They want to replace their paper-based workflows and improve the currency and the accuracy of their data—all in an effort to make more timely and accurate decisions. Since we last met, we have been hard at work improving the capabilities and tools you need to build solutions for these platforms."

For iOS and Windows Phone, Esri offers both a deployable application and an API that now include data collection and editing capabilities. The ArcGIS for Android application has the same data collection and editing capabilities. *[It was released in May 2011; version 1 of the API was officially released in April 2011.]*

For all these applications, users can add attribute information; edit points, lines, or polygons; and add attachments such as images, movies, PDFs, and Microsoft Word documents, Cardella said.

ArcGIS Portal

As part of the release of ArcGIS 10.1, Esri will offer customized versions of ArcGIS Online for use behind a firewall. ArcGIS Portal, a software product that will run in an organization's private cloud, will offer the same collaboration and sharing tools as ArcGIS Online but in a secure, on-site environment to protect proprietary, sensitive, or confidential data. The portals will become the central repository for authoritative content that users inside organizations can access to

- Quickly create maps and apps using templates and web mapping APIs.
- Form groups to collaborate on projects or common activities.
- Share maps and apps with private groups or the entire organization.
- Embed maps and apps in custom web pages or blogs.

Configurable Web Client Viewers

Esri lead software architect Art Haddad demonstrated ArcGIS Viewer for Microsoft Silverlight, a site starter application for creating a web client viewer for ArcGIS Server and ArcGIS Online services that also works with web maps from arcgis.com. Built on ArcGIS API for Microsoft Silverlight, it includes an application builder that enables users to quickly and easily create a fully functional, custom web client viewer through a user-friendly application user interface that includes a What You See Is What You Get (WYSIWYG) preview. No programming or configuration file editing is required. This application is ideal for nondeveloper users and novice web application creators. It is currently available in public beta from the Esri Beta Community site. Mansour Raad from Esri also demonstrated an early prototype of the ArcGIS Viewer for Flex application builder. Both viewer application builders are targeted for release at the 2011 Esri International User Conference (Esri UC).

Heart of the Summit

ArcGIS program manager Jim McKinney called the technical sessions the "heart of the summit." The 30 user presentations this year included A Year of Silverlight—Tips and Tricks; Designing a GIS App for the Facebook Generation; Cloud Love: Moving Off Premises Step by Step; and Becoming a Python Developer: Leveraging the Language and Community Tools. Esri also hosted 70 technical sessions, including Choosing a Mobile Development Platform; Building and Using the Esri Social Media VGIS Mapping Application; ArcGIS for Defense/Intel—A Developer's Guide; Creating, Managing, and Utilizing a 3D Virtual City in 10; and ArcGIS 10.1 and the Road Ahead.

First Look at 10.1

"I was blown away by what was shown in progress for 10.1, in particular the improved performance and increased support for and emphasis on Python," said Ping, a senior software developer. "It absolutely justifies our efforts to build reusable tools in Python and train [our] GIS experts in the programming language."

Knight, who also works as a software developer, was struck by the improvements in speed in ArcGIS 10.1, the new ArcGIS Viewer for Microsoft Silverlight, and the enhancements in ArcGIS API for Microsoft Silverlight. Being new to the Developer Summit, he said he arrived in Palm Springs with some preconceived notions. "I think I was expecting to be trained on how to do certain things," said Knight. "Once I realized this wasn't the case, I was able to get much more out of it. I realized that the purpose of the DevSummit was to show us as developers what is possible and how we can use Esri's technologies. Though I definitely did learn how to do some things, I know what is possible and can now go learn how to do it."

Resources

esri.com/devsummit
arcgis.com
betacommunity.esri.com

LIGHTING UP AND FLEXING AT DEVSUMMIT 2011

If you give a developer a free T-shirt, you might get an innovative app or widget in return. That was the idea behind two recent developer challenges sponsored by Esri. Both contests, the Light Up the Night Challenge and the Flex-a-Widget Challenge, resulted in many unique and inventive ideas and helped showcase some amazing developer talent in the Esri community.

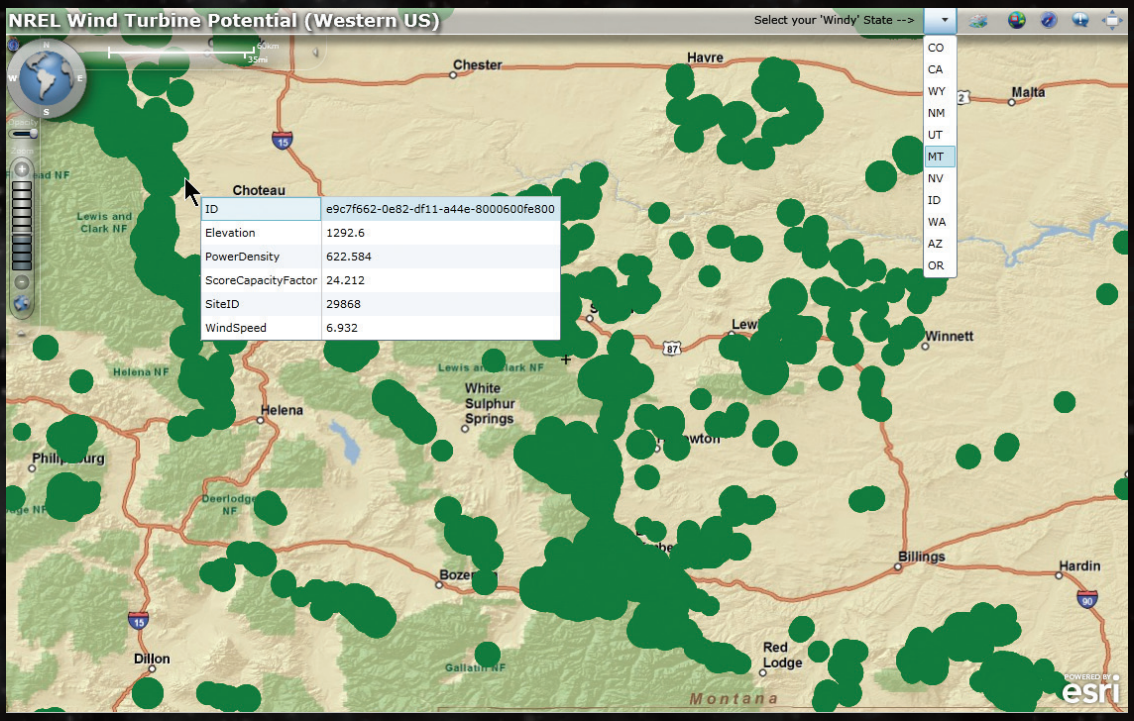
THE LIGHT UP THE NIGHT CHALLENGE

The Light Up the Night Challenge was a live, on-site event held during the evening of March 7, 2011, at the Esri Developer Summit in Palm Springs. Developers used the ArcGIS API for Silverlight to build web applications or mobile apps for the Windows Phone. Participants gathered in a theater-style room and were given three hours to solve one of three challenges.

Art Haddad, a lead software architect at Esri, served as master of ceremonies, while the entire Silverlight team was on hand to answer questions and provide support. Even though the weather outside was uncharacteristically cold, with sputtering rain, the atmosphere inside was warm and energetic. Everyone, including a lively gallery of spectators, feasted on hot pretzels and cookies while the participants coded into the night. All Light Up the Night Challenge participants and spectators received a free Light Up the Night T-shirt.

The first-place application, the NREL Wind Turbine Potential (Western US) application, was created by Jarrod Skulavik. Judges were impressed with the extensive and exceptional patterns and practices demonstrated in Skulavik's application code. His winning app used a service to access a SQL Azure database, which contains data on wind turbine potential for the western United States. The app used SQL Azure with Geography Types, RIA Data Services Toolkit with JSON and SOAP endpoints pointing to SQL Azure, ArcGIS API for Microsoft Silverlight, Entity Framework (LinqToSQL), jQuery, and AJAX (xmlhttp).

← Participants and a lively gallery of spectators feasted on hot pretzels and cookies during the Light Up the Night Challenge.



← The Light Up the Night Challenge winning application—NREL Wind Turbine Potential (Western US) by Jarrod Skulavik

Oren Gal's earthquake proximity search app took second place. The judges thought that Gal's winning application, which geolocates a client based on an IP address and shows nearby earthquakes on the map and in a table, was very extensive and fluid.

James Oliphant's ancestral mapping application took third place. Oliphant's application made it possible to find the geographic location of ancestral records via genealogy data provided by the Church of Jesus Christ of Latter-Day Saints. The information was displayed on a map with attributes available as MapTips.

Oliphant, GIS software engineer for Esri Platinum Tier partner Azteca Systems, Inc., said, "I recently began working with family history data, and this was a great opportunity to better visualize my family tree. I extracted unique US birthplaces from my GEDCOM file, used Esri's online locator service to determine the x,y locations, and displayed the graphics with an option to turn clustering on and off. *[GEDCOM (GEnealogical Data COMmunication) is a proprietary format developed by the Church of Jesus Christ of Latter-Day Saints for exchanging genealogical data between genealogy software.]* Also, the birth locations were displayed in a list that centered the point in the map as the selection changed."

Skulavik won an Xbox + Kinect (donated by Microsoft), a free pass to next year's Esri Developer Summit, and the Light Up the Night Challenge Trophy. Both Gal and Oliphant won Windows Phones donated by Microsoft.

"I developed this application in an effort to learn Microsoft Azure within a context that I know and love, namely, Esri's Silverlight API. The data resides in SQL Azure, and the geospatial web client is entirely Esri Silverlight and jQuery. For added fun, I used WCF RIA Services to serve up data from the cloud to the Esri Silverlight web application."

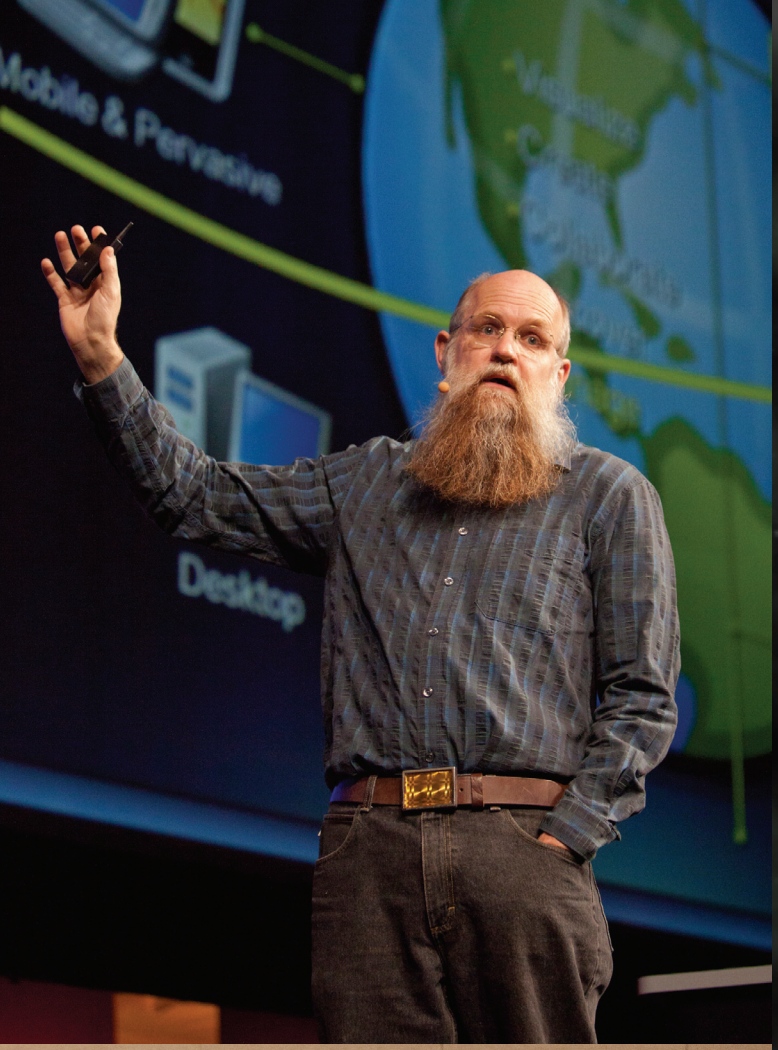
Jarrod Skulavik
Senior Developer/Architect
XeDAR Premier Data Services

"I created a Silverlight application that determined the geographic location of the client, using an IPInfoDB geolocation service, and then located earthquake history within a 300-kilometer radius. The results were shown in an interactive grid. Earthquakes were symbolized by magnitude using symbol size and color."

Oren Gal
Freelance GIS Designer and Developer

"I recently began working with family history data, and this was a great opportunity to better visualize my family tree. I extracted unique US birthplaces from my GEDCOM file, used Esri's online locator service to determine the x,y locations, and displayed the graphics with an option to turn clustering on and off. Also, the birth locations were displayed in a list that centered the point in the map as the selection changed."

James Oliphant
GIS Software Engineer
Azteca Systems, Inc.



THE FLEX-A-WIDGET CHALLENGE

For the Flex-a-Widget Challenge, developers from around the world were given several months leading up to the Developer Summit to design their own custom widgets for the ArcGIS Viewer for Flex. Participants from Australia, Canada, China, France, Luxembourg, and the United States shared their custom widgets via the ArcGIS Viewer for Flex code gallery. Prior to the summit, the Esri community voted for its three favorite widgets.

The ArcGIS Viewer for Flex, one of Esri's most popular, configurable viewers, is a free, downloadable mapping application. Widgets are often used to help the end user easily uncover new, supplemental information or perform specific tasks and analyses. They can be added to the viewer, usually without requiring programming.

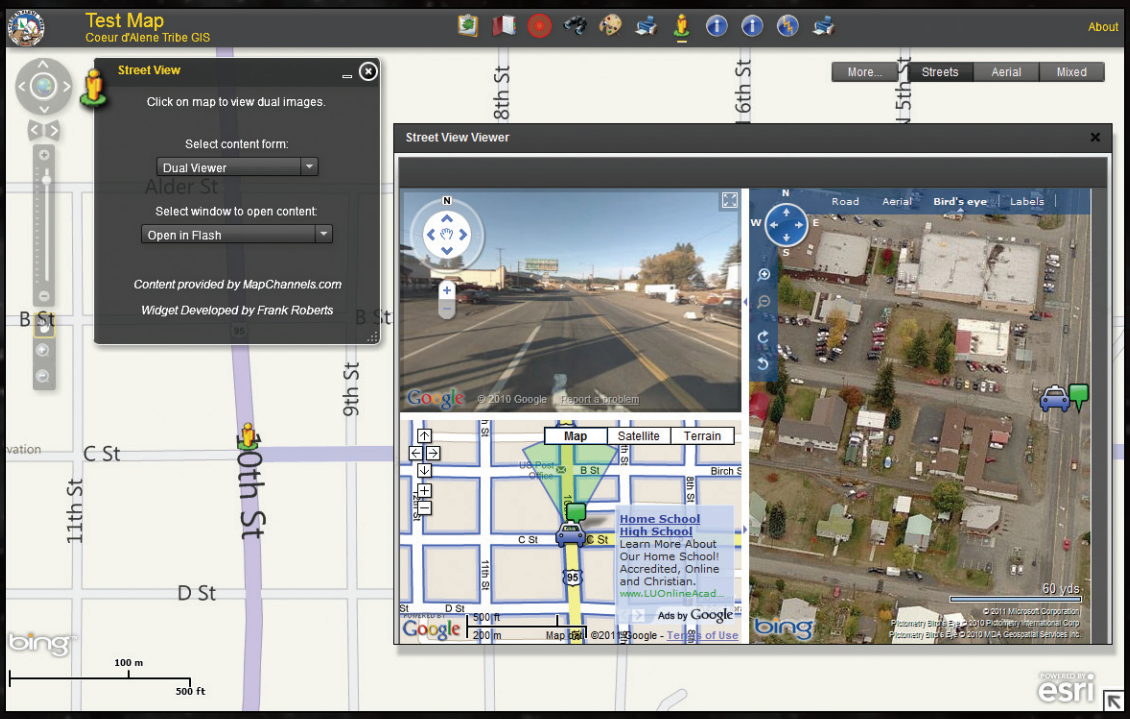
Frank Roberts' Street View and More—Widget for Flex Viewer 2.2 widget took the top prize. It allows ArcGIS Viewer for Flex users to explore and interact with a variety of ancillary images, such as Street View, Google Maps, and Bing Maps, by simply clicking a location on the map. For his widget, Roberts won a copy of Adobe's Creative Suite Web (donated by Adobe), a free pass to the 2012 Esri DevSummit, and a free Esri Developer Network (EDN) subscription.

Sasa Ivetic's widget, Export to Shapefile (AS3 Shapefile Writing Library), came in second. It displays a list of map services with query functionality and a list of layers for each map service. The user can export all the data in the map service or specify a query and export the results. All results are exported to a shapefile. Ivetic is a senior software developer for Esri partner Map It Out, Inc. For his efforts, Ivetic won a free pass to the 2012 Esri DevSummit and a free EDN subscription.

Andrew MacNaughton's Google Street View Widget for the Flex Viewer took third place. It adds Google Street View to a Flex viewer application and includes the most recent Flex Viewer with the Street View widget. MacNaughton won a free EDN subscription. And of course, all participants who submitted a widget received a Flex-a-Widget Challenge T-shirt.

↖ Scott Morehouse, Director of Software Development for Esri

↙ If you can dodge a wrench, you can dodge a ball.



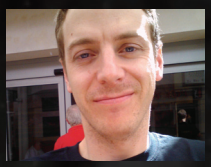
← Frank Roberts' widget, Street View and More—Widget for Flex Viewer 2.2, won the Flex-a-Widget Challenge.

WINNER'S CIRCLE

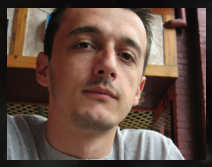
Frank Roberts

"The Street View and More widget was designed to help our clients leverage both the Google Street View data and the Pictometry oblique imagery available at Bing Maps. This widget allows the end user to view both images simultaneously by consuming data from the mapchannels.com site."

Frank Roberts
GIS Manager/Developer



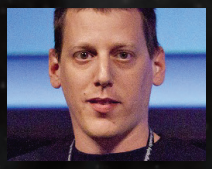
Jarrod Skulavik



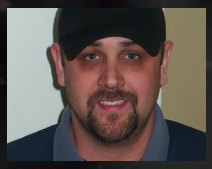
Sasa Ivetic

"I decided to write the ActionScript Shapefile widget to simplify data export—a core GIS functionality missing from the Esri Flex Viewer—while avoiding the use of server-side code, geoprocessing, and ArcObjects."

Sasa Ivetic
Senior Software Developer
Map It Out, Inc.



Oren Gal



Andrew MacNaughton

"I created this widget for ease of use. Many of the previous widgets I had downloaded were difficult to install or configure, so I wanted to post a widget that was as close as possible to copy and paste for implementation, and I think I achieved that."

Andrew MacNaughton
GIS Analyst
The Regional Municipality of Niagara

James Oliphant

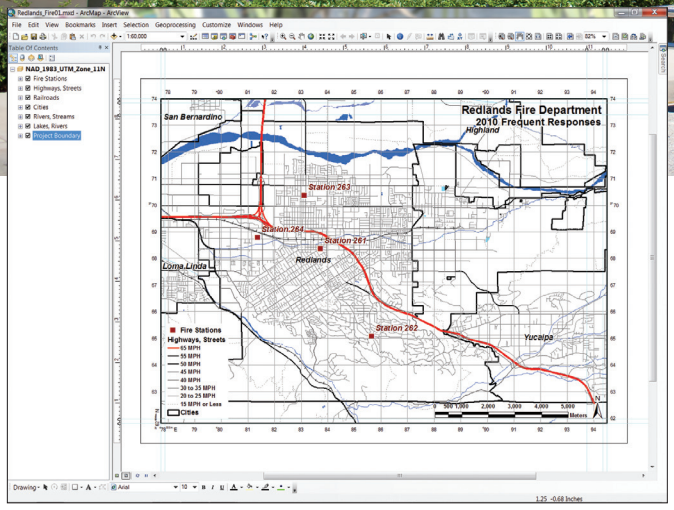
Analyzing Frequent Responses

Using a US National Grid spatial index

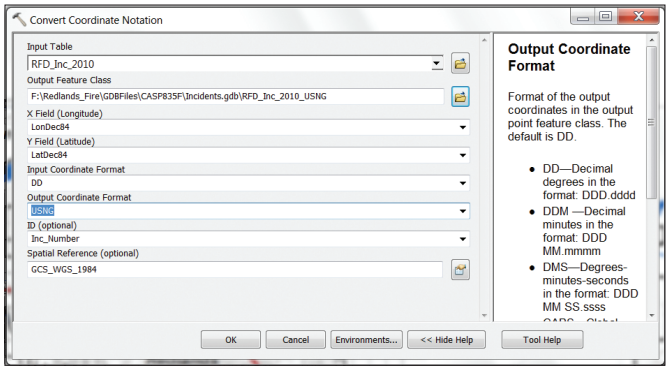
By Mike Price, Entrada/San Juan, Inc.

What you will need

- An ArcGIS Desktop 10 (ArcView, ArcEditor, or ArcInfo) license
- Sample data from the *ArcUser* website



↑ Open Redlands_Fire01.mxd. It shows highways and streets in the Redlands area and five fire stations that protect the area.



↑ Use the Convert Coordinate Notation tool to convert a table containing point coordinate fields in RFD_Inc_2010 to a point feature class with a point coordinate field in USNG.

An index of US National Grid (USNG) coordinates can be summarized to provide public safety mappers with response statistics including number of calls for service, number of units deployed, and total deployment time.

Public safety providers know that calls to certain locations occur at a much higher frequency than others. Medical centers, care homes, schools, public buildings, and hazardous transportation locations are examples of places that receive a disproportionate number of emergency responses each year. Service providers carefully monitor trip counts and time in service for these locations and schedule apparatus and personnel to accommodate the high frequency of these calls. However, to understand these demand locations requires mapping, analyzing, and summarizing them.

Modern computer-aided dispatch (CAD) centers often provide longitude and latitude coordinates for emergency destinations. In the past, these longitude and latitude strings have been concatenated, or added together, to create a single text location index.

USNG provides a unique single-string address for every location on the planet. Using USNG, a single location may be described as a 15-character string with a resolution of one meter. ArcGIS 10 provides tools for calculating USNG addresses for points when other coordinates are available. Because modern CAD centers provide destination coordinates in longitude-latitude, this data can be used to index frequent responses.

In this exercise, we will summarize recent incident data for

Redlands, California, and apply a USNG spatial index to count and summarize repeated travel to these high-demand locations. Once these frequent response locations are identified, the emergency facilities that serve these locations can be reviewed, and a preliminary understanding of typical time in service for these locations can be gained.

Getting Started: Setting Up the Redlands Fire Map

Go to the *ArcUser* website (esri.com/arcuser) and download the sample dataset for this exercise, nationalgrid.zip. Unzip it into a project folder and open Redlands_Fire01.mxd.

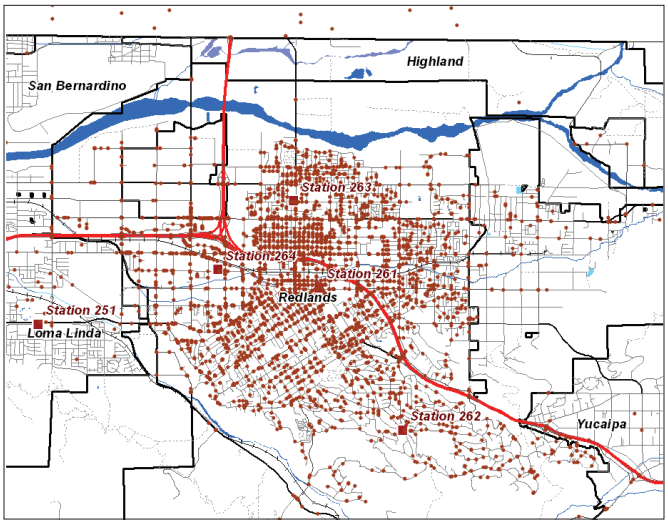
This map shows highways and streets in the Redlands area and five fire stations that protect the area. The exercise uses actual incident-level data for 2010 responses in and around Redlands. Notice that this map's coordinate system is universal transverse Mercator (UTM) North American Datum of 1983 (NAD 83) Zone 10, and the unit of measure is meters. The Redlands Fire Department typically maps in California State Plane System, but because the exercise will use USNG (which uses metric units) to index these locations, the map in the sample dataset uses UTM coordinates. Although this switch is not required, it simplifies data validation and map grid display.

Bringing Apparatus and Incident Spreadsheets into ArcGIS 10

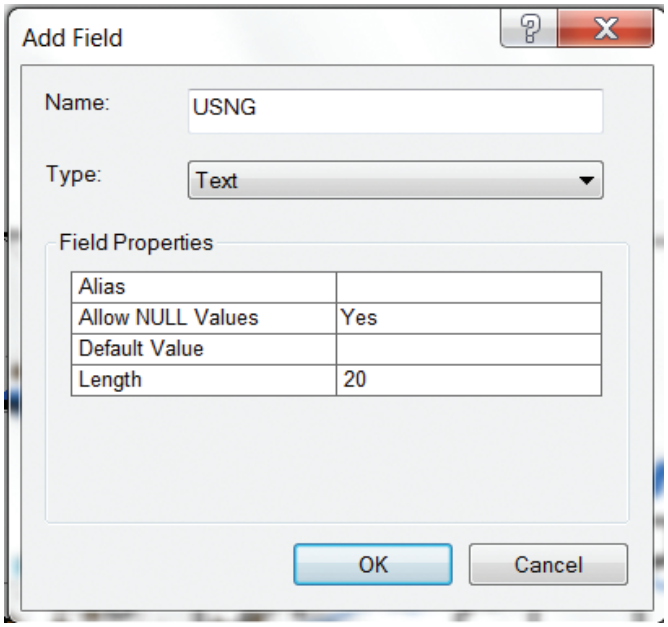
Microsoft Excel spreadsheets are often referred to as the "fire chief's database." Public safety data analysts often compile, convert, and transmit data in spreadsheets. In the past, GIS analysts often trained spreadsheets to behave like a database and exported the tabular data in dBASE format, which is compatible with the Esri shapefile format.

Newer versions of Excel (2007 and 2010) do not export dBASE files directly, so another approach was needed. ArcGIS can read Excel spreadsheets directly, but querying, editing, and other analytic functions are restricted or not possible. Using the file geodatabase, Excel worksheets can be imported into a GIS format with full table functionality.

1. Open ArcCatalog and navigate to \Redlands_Fire\XLSFiles\RFD_App_2010_Sample.xls. This sample of Redlands Fire apparatus-level data will help you better appreciate the complex nature of response data obtained from a CAD center. This spreadsheet contains one worksheet that lists several hundred sample response records for individual apparatus. Notice that each incident is assigned an incident number, alarm date, station and shift, incident type and initial dispatch code, unit ID, and numerous date/time stamps. Notice, too, that each apparatus record contains longitude-latitude coordinates and a descriptive address.
2. Scroll across the table for RFD_App_2010_Sample.xls. Because this is apparatus-level data, one incident may have more than one apparatus assigned, which generates multiple records for a single incident number. In the First_On_Scene field, the numeric code 1 indicates that this apparatus was the first to arrive at the incident. Response time for that incident will be measured by this unit's performance.
3. Preview the Database sheet for RFD_Inc_2010.xls. This incident-level data for 2010 will be imported into an ArcGIS file geodatabase. This table is a summary of more than 16,000 original records in the apparatus dataset. The total incident count for 2010 was 8,281. On average, two apparatuses were assigned to a typical incident, although many incidents required only one responding unit.
4. Sort this table on Responder_Count to see the maximum number of apparatuses assigned to each 2010 incident. This table also summarizes the total time accumulated for each incident from the time dispatched (T2) to the time cleared (T5). Look for these fields in the sample data. These times are stored in a legacy format (Lotus 1-2-3 Date/Time). They can now be managed directly in ArcGIS 10—a great enhancement for public safety analysts, for whom time is certainly of the essence.



↑ Map the new USNG point feature class.



↑ Create a new field called USNG in RFD_Inc_2010 to hold the USNG coordinates.

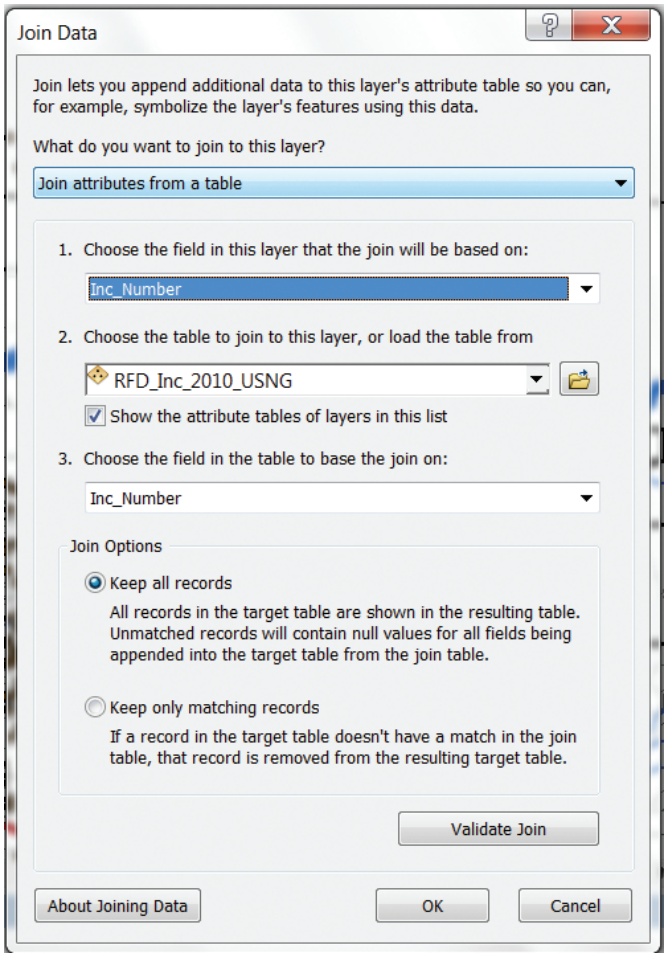
Importing an Excel Worksheet into a File Geodatabase

After reviewing the source data table, import it into an existing file geodatabase.

1. In ArcCatalog, right-click RFD_Inc_2010's Database sheet and select Export, then To Geodatabase (single). Set Output Location to \Redlands_Fire\GDBFiles\CASP835F\Incidents.gdb and name it RFD_Inc_2010. Because this spreadsheet will be exported to a geodatabase, long field names will be preserved. Click OK to export the table.
2. Open the exported table in Incidents.gdb and verify that all 8,281 records were transferred. Sort the exported table on Responder_Count to see incidents with 12 responders.
3. Look at the data in the T5_T2_Sum1 column. Sort in descending order in this field. Notice that total deployment time for all apparatuses for the first incident was more than 340 minutes, so the average time per apparatus was just under 30 minutes. This incident is coded as a vehicle accident with injuries, and it appears that many medical units were needed. The 100 series incidents are mostly structure fires (code 111), which often require many apparatuses. Close ArcCatalog and return to ArcMap.

Calculating USNG Addresses for 2010 Incidents

1. In ArcMap, switch from Layout View to Data View. Click Add Data and navigate to \Redlands_Fire\GDBFiles\CASP835F\Incidents.gdb and add the RFD_Inc_2010 table. After adding it to the map, open the table and verify that it contains 8,281 records. The next step is to assign USNG coordinates to all records as a new point feature class. Inc_Number will be the unique string used to support the tabular join performed later in the exercise that will allow USNG coordinates to be joined to the RFD_Inc_2010 table.



↑ Join the RFD_Inc_2010_USNG table to the RFD_Inc_2010 table.

2. Open ArcToolbox and choose Data Management Tools > Projections and Transformations toolset > Convert Coordinate Notation. This tool converts a table containing point coordinate fields to a point feature class. The coordinate field for the input table can be one of many notations (Global Area Reference System [GARS], Military Grid Reference System [MGRS], and others). The output point feature class contains a point coordinate field in the coordinate notation you choose—USNG in this case. Complete the dialog box as indicated in Table 1, making sure to set Output Coordinate Format to USNG.
3. Click OK to build this new point feature class. When the points are added to the map, open and inspect the table. It's pretty simple, but it is also very powerful. By joining on Inc_Number, all incidents in the table can be populated with a USNG coordinate.

Table Updates and Tabular Joins

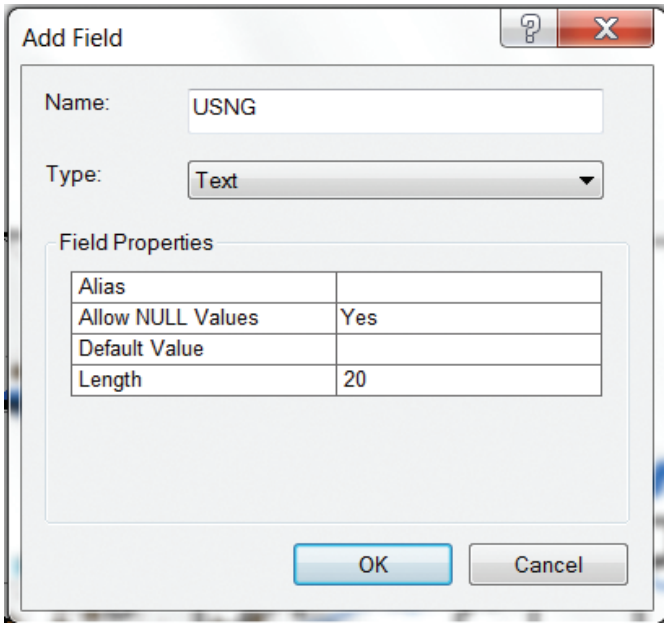
1. Add a field to RFD_Inc_2010 to store the USNG coordinate. Open the attribute table, click Table Options in the upper left corner, and select Add Field. Name the field USNG, select Text as the field type, allow NULL values, and set the width to 20 characters. As presently deployed, USNG coordinates contain up to 15 active characters. With additional space for readability, it will become slightly longer.
2. Join the RFD_Inc_2010 table to the RFD_Inc_2010_USNG table using Inc_Number as the join field. Click OK to complete the join. Inspect the work and save the project.
3. Now populate the new USNG field with coordinates obtained from the joined table. Select USNG in RFD_Inc_2010 (the host table) and open Field Calculator. Make sure VBScript is selected and use the following string to calculate this field:

```
[RDF _ Inc _ 2010 _ USNG.USNG]
```

4. Click OK and inspect the values in the USNG field. You may need to drag out the cell for the USNG field. If it has been populated with the correct values, remove the tabular join. Close ArcToolbox.

Dialog box field	Value to input
Input Table	RDF_Inc_2010
Output Feature Class	\Redlands_Fire\GDBFiles\CASP835F\Incidents.gdb\RFD_Inc_2010_USNG
X Field (Longitude)	LonDec84
Y Field (Latitude)	LatDec84
Input Coordinate Format	DD
Output Coordinate Format	USNG
ID (optional)	Inc_Number
Spatial Reference (optional)	GCS_WGS_1984

↑ Table 1: Convert Coordinate Notation dialog box



↑ After populating the new USNG field using the Field Calculator, summarize the data in that field.

Summarizing and Looking at Statistics

Because every incident contains a specific USNG address, the new USNG field can be used to summarize the total number of responses to each address. By tracking and summarizing the number of apparatuses assigned and the total deployment time for each incident, the equipment and time allocated to each location can be reviewed.

1. In the RFD_Inc_2010 table, right-click the new USNG field heading and check Summarize. In the summarize dialog box, expand Responder Count and check Sum.
2. Expand T5_T4_Sum1 and check Sum. Remember, this represents total time between dispatch and unit cleared for all apparatuses. Expand LonDec84 and LatDec84; set both to Average. Expand the Address1 text field and check First. Interestingly, many coordinate addresses have identical text addresses, but some have more. If you are curious, select Last as well and check the results. Store the summary table in \Redlands_Fire\GDBFiles\CASP835F\Incidents.gdb and name it RFD_Inc_2010_Sum1. Click OK to summarize.
3. Add and open the table; inspect your results. You should have 3,235 records. Save the map.

If you sort Count_USNG in descending order, you will see that 2010 included 129 trips to 1618 Laurel Avenue, involving 275 apparatuses and nearly 5,400 minutes (90 hours) of deployment time. There are four other addresses that generated more than 100 responses in a year. As you might imagine, these facilities are extended care/convalescent medical care facilities. In most jurisdictions, this type of facility generates the most calls. Let's put them on the map.

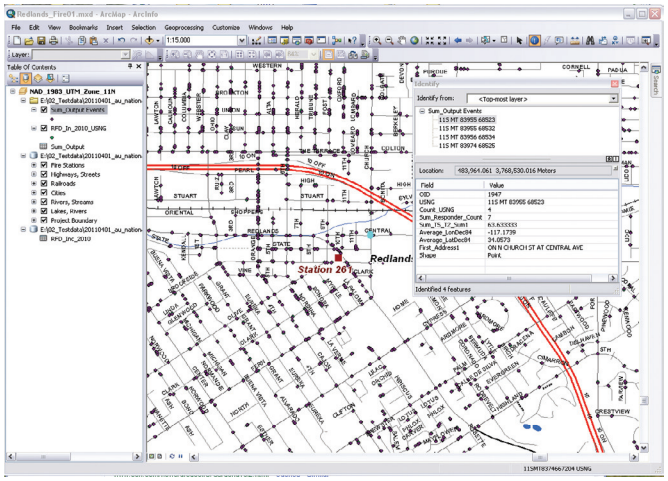
Plotting, Saving, and Symbolizing Frequent Responses

1. In the table of contents (TOC), right-click RFD_Inc_2010_Sum1 and select Display XY Data. In the dialog box, set Ave_LonDec84 as the X Field and Ave_LatDec84 as the Y Field. Click the Edit button and change the coordinate system to Geographic > World > WGS_1984. Click OK to add these points as an event theme.
2. Zoom in and query several points. In the Data Frame properties, set Display Units to US National Grid and check out point coordinates by comparing the USNG field for a point to its map coordinates. They should be identical. If not, something is wrong.
3. To test this, use the Info tool to examine the intersection of Church and Citrus. You can see how street names and addresses alone don't provide a good spatial index. When finished, zoom back out to Bookmark Redlands Fire 1:60,000. Save the project.
4. To make these points permanent, the XY theme should be exported to a geodatabase feature class. In the TOC, right-click RDF_Inc_2010_Sum1 Events and choose Data > Export Data. Export all features in the data frame's coordinate system and store them in \Redlands_Fire\GDBFiles\CASP835F\Incidents.gdb. Name the feature class RFD_Inc_2010_Sum2.
5. Add these points in the map and inspect the table. Check that all 3,235 records are properly posted, then remove the event theme and save the map again. Practice sorting and selecting records to identify locations that cause frequent and time-consuming responses.
6. Wouldn't it be nice to load a predefined legend that shows the frequent responses by size and color? If you carefully studied the sample dataset, you might have noticed a layer file named Frequent Responses.lyr. This file will apply visual symbology to the sites of frequent responses. Before loading the legend, use a definition query to exclude points that have only one response. In the TOC, right-click RFD_Inc_2010_Sum2, select Properties, and open the Definition Query tab. Create and apply a definition query stating "Cnt_USNG > 1". It should reduce the point count to 1,073 points.
7. Finally, apply a legend. Reopen Properties for RFD_Inc_2010_Sum2, select the Symbology tab, and click the Import bar. Navigate to \Redlands_Fire\GDBFiles\CASP835F\ and select Frequent Responses.lyr. Apply the Value Field to Count_USNG and click OK. Before leaving Layer Properties, return to the General tab and rename this layer Frequent Responses. Click OK to apply these changes and inspect your work.
8. Finally, switch to Layout View and add Frequent Responses to your legend. Inspect your work and save one last time.

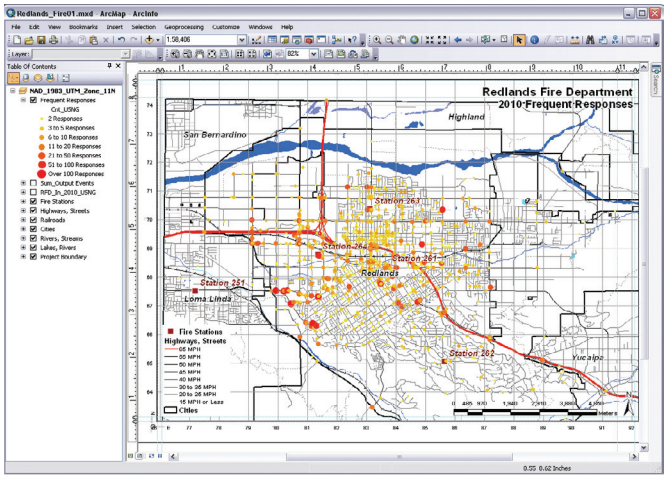
For some additional challenges, go back to the source incident data and map the responses by number of apparatuses per call or by total and average time on calls. You might even try mapping calls by National Fire Incident Reporting System (NFIRS) type. (Hint: 100 = fire; 200 = rupture or explosion; 300 = rescue or EMS; 400 = hazmat. Values above 500 are service and other calls.)

Summary

So what do you think? Is this a new use for USNG? Do you understand national grid data just a little better? For years, we have built



↑ While most locations have only one incident, extended care/convalescent medical care facilities typically have many calls.



↑ After using a definition query to suppress the locations with only one call, thematically map the remaining calls by frequency using the Frequent Responses layer.

complicated, unfriendly spatial indexes so we could efficiently summarize spatial data. Now, by simply applying a full 15-character USNG address to an incident set, we can quickly summarize and evaluate the data. Think of other ways to use this method (such as summarizing Doppler rainfall data over time). Index fire hydrants using USNG, and no two hydrants will ever have the same unique ID (unless, of course, they are on top of each other).

Additional USNG Resources

See "Introducing the United States National Grid" at esri.com/news/arcuser/0705/usng1of2.html and "Rescue behind the Rocks" at esri.com/news/arcuser/0705/files/rescue.pdf. Both articles ran in the June–September 2005 issue of *ArcUser*.

Acknowledgments

Thank the fine staff of Redlands Fire Department and City of Redlands GIS for providing this very interesting and complex dataset. The actual data you just modeled supports ongoing public safety planning and deployment analysis in Esri's hometown.

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How to Set Up an Esri Geoportal Server

Aggregate geospatial resources using open source products

By Richard Kachelriess and Christine White, Esri

Esri Geoportal Server is a suite of software modules that provides seamless communication with data services that use a wide range of communication protocols and supports searching, publishing, and managing standards-based resources. One of these components is a geoportal, which is a gateway that provides access to geospatial resources such as metadata records and catalogs, web services, Wikipedia articles, Flickr content, YouTube videos, SharePoint documents, RSS feeds, KML documents, and REST URLs.

The Esri Geoportal Server is an open source product that is free and does not require ArcGIS Desktop or ArcGIS Server licensing. The State of Montana, National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center, Norwegian Mapping Agency, and other organizations use Esri's geoportal technology to manage and publish the metadata for their geospatial resources so users can discover and connect to those resources.

About This Tutorial

This tutorial steps through implementing a geoportal on an intranet and uses base software that is also open source. This geoportal will be accessible only on your local machine or your organization's intranet. This implementation uses the PostgreSQL database and the Apache Tomcat servlet. To use a different database or servlet, please read the Geoportal wiki and installation guides online at www.esriurl.com/geoportalserver.

This tutorial assumes you can

- Navigate the computer's file system with Windows Explorer.
- Create and name new folders.
- Copy and move files between folders.
- Extract a ZIP file.
- Open a web browser and enter a URL.

What You Will Need

- Windows XP/Vista/7
- Administrator privileges
- An Internet connection to download the required software
- PDFs, downloaded from esri.com/arcuser, containing links to software locations and configuration information

What You Will Do

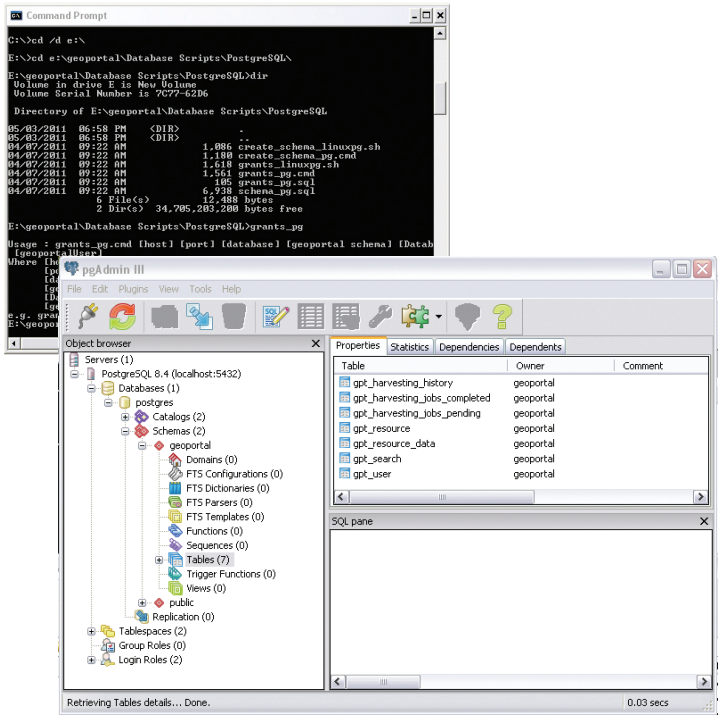
1. Download programs and files.
2. Perform preinstallation computer preparation.
3. Install PostgreSQL database.
4. Install Java Developer Kit and Runtime Environment.
5. Install Apache Tomcat.
6. Install Esri Geoportal Server.
7. Set up the user and schema for the geoportal in PostgreSQL.
8. Deploy the geoportal app.
9. Modify the gpt.xml file.
10. Modify Java Database Connectivity (JDBC) .jar file.
11. Log in to the geoportal.
12. Register ArcGIS Server with the geoportal.

1. Download Programs and Files

At minimum, the Esri Geoportal Server requires the Java Development Kit and Runtime Environment, a relational database management system (RDBMS), and a servlet container. Although the Esri Geoportal Server supports several different options for the RDBMS and web servlet, this tutorial uses the PostgreSQL RDBMS and the Apache Tomcat servlet. Download the programs and files listed in Table 1 either by searching online for the specific versions listed or by using the links provided with the documents downloaded from the *ArcUser* website.

Component	Function	Version
Esri Geoportal Server	Geoportal software	1.1
PostgreSQL	RDBMS	8.4.7
Apache Tomcat	Web servlet	6.0.32
Java Development Kit with Runtime Environment	Java controller	SE 6 Update 24 JDK
JDBC Configuration File	Connects Tomcat to Postgres	Postgresql-8.4.701-jdbc4.jar

↑ Table 1: Software required in this tutorial



↑ Run create_schema_pg from the command line to generate tables for the geoportal in the PostgreSQL database.

2. Perform Preinstallation Computer Setup

Prior to installing the Esri Geoportal Server and its components, you need to create some folders and find out some basic information about your computer. Note: The C:\ drive is used in this tutorial for simplicity; any drive on the host computer can be used to install the software for the geoportal server—just make sure to adjust any path statements appropriately. Please create the following new folders on your computer:

`C:\geoportal`

`C:\lucene`

`C:\lucene\assertion`

Although the geoportal will not be available on the Internet, you need to know the IP address of your computer. The simplest way to find this information is by typing ipconfig in the command prompt.

1. Open the Command Prompt window (Start > Programs > Accessories > Command Prompt).
2. Type `ipconfig`.
3. Write down the IP address. _____

3. Install PostgreSQL 8.4.7

The PostgreSQL RDBMS will store the geoportal user, resource metadata, and harvesting scheduling information for the geoportal.

1. Run the Windows installer for PostgreSQL version 8.4.7. Accept all defaults.
2. When asked to create a password for the postgres user, enter `postgres`. (Note: If your network has a password policy that enforces strong passwords, choose a stronger password.)
3. Verify that the PostgreSQL port number is 5432.

Configure PostgreSQL Database

You need to streamline your computer's access to the PostgreSQL database to simplify the geoportal's installation and operation.

1. Navigate to C:\Program Files\PostgreSQL\8.4\data.
2. Open pg_hba.conf in Notepad (right-click and choose Edit). Go to (Ctrl+G) line 70. This line is below the one that starts with # IPv4. Change `md5` to `trust`.
3. At the end of the file, add the following two lines, substituting your IP address (which you wrote down earlier) for <IP Address>:

```
# My computer's connection:
host    all    all    <IP Address>/32    trust
```

4. Save and close the file.

These changes open up the Postgres database to connections from your computer only. It does not open up the database to external computers. The change to line 70 simplifies connections through localhost, and the new lines allow your computer to connect to the database via a TCP/IP connection.

For the database commands that will configure the Postgres database for the geoportal to run correctly, you need to update your computer's Environmental Variables.

1. Right-click My Computer and select Properties.
2. On the Advanced tab, click Environmental Variables.
3. In the System variables section of the new window, select the PATH entry and click Edit.
4. Go to the end of the text in the Variable Value box.
5. Do not delete or overwrite any existing text! Add

```
;C:\Program Files\PostgreSQL\8.4\bin
```

to the end of the text.

Ensure that there isn't a space between the semicolon (;) that starts this line and C:\.

6. Click OK three times to save the changes.
7. Restart your computer for the changes to take effect.

4. Install the Java Developer Kit and Runtime Environment

Run the installer and accept all the defaults.

5. Install Apache Tomcat 6

Apache Tomcat 6 is web servlet software that manages web applications. You will need web servlet software to deploy the geoportal web application. Run the installer and accept all defaults. Verify that the Tomcat port number is 8080. Don't enter an administrator user name or password.

Configure Apache Tomcat 6 Service

1. Right-click My Computer and select Manage.
2. Expand Services and Applications and select Services.
3. Find Apache Tomcat 6 in the Services list and ensure that the Service Status is Started. (If not, right-click it and choose Start.)
4. Right-click the services and select Properties.
5. Change Startup type to Automatic.
6. Click OK to save the change and close.
7. Verify the installation by opening a web browser and going to http://localhost:8080. A default Tomcat page should appear.

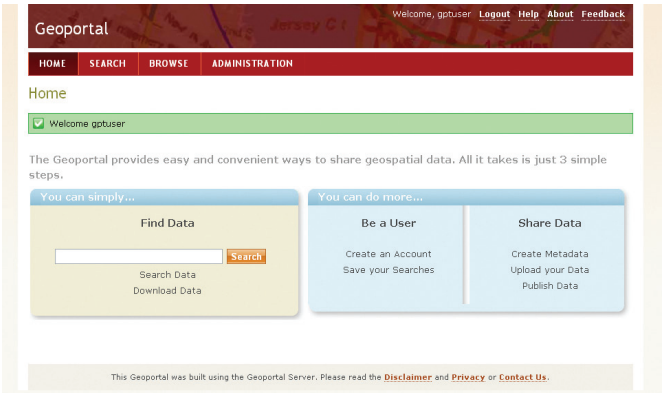
6. Install the Esri Geoportal Server

Extract the contents of geoportal-1.0.zip, the geoportal ZIP file, into the C:\geoportal folder.

7. Set up Geoportal User and Schema in PostgreSQL

Geoportal User Setup

1. Reopen the Windows Command Prompt.
2. Type `cd C:\geoportal\Database Scripts\PostgreSQL` to change to this directory. **(Hint: If the geoportal folder is not on C:\, type `cd /d` <another drive letter>:\ to change from the default C:\ prompt.)** Type `dir` to see the contents of this directory.
3. Type `grants_pg` to see usage instructions for this script. You will enter parameters according to these usage instructions in the next step.
4. Type the following parameters and press Enter. You will be prompted to create a password for Geoportal User. Use the password geoportal, unless your system requires a stronger password.
   `grants_pg localhost 5432 postgres geoportal postgres geoportal`
5. Enter the password for the new role (`geoportal`). Enter the password again (`geoportal`).
   Upon the completion of the script, it will generate a text file, grants_pg.txt, and invoke a text editor to display this file, showing the results of the script.



↑ Add an ArcGIS Server to the geoportal.

Populating Geoportal Schema in PostgreSQL

The previous section created the geoportal schema in the PostgreSQL database. This section will populate that schema with the tables the geoportal needs to function.

1. At the command prompt, type `create_schema_pg` to see usage instructions for this script. You will enter parameters according to these usage instructions in the next step.
2. Type the following parameters:

```
create_schema_pg localhost 5432 postgres
geoportal
```

For geoportal10 user, enter the same password you designated for the geoportal user when you ran the grants_pg script—in most cases, this will be geoportal. Upon the completion of the script, it will generate a text file, geoportal_schema.txt, and invoke a text editor to display the results of the script.

Verify Geoportal Tables Were Generated Correctly

1. Open Postgres System Administrator.
2. Click Start > All Programs > PostgreSQL 8.4 > pgAdmin III.
3. Double-click PostgreSQL 8.4 (localhost:5432).
4. Enter `postgres`, the password for postgres user.
5. In the table tree, navigate to Databases > postgres > Schemas > geoportal > Tables.
6. Verify that Tables contains the following seven tables:

`gpt_harvesting_history`

`gpt_harvesting_jobs_completed`

`gpt_harvesting_jobs_pending`

`gpt_resource`

`gpt_resource_data`

`gpt_search`

`gpt_user`

8. Deploy the Geoportal Web Application

Copy geoportal.war from

`c:\geoportal\Web Applications\Geoportal`

to

`c:\Program Files\Apache Software Foundation\Tomcat 6.0\webapps`

Apache Tomcat should automatically create a new folder in the webapps folder called geoportal. This is the geoportal website. If the folder is not created, open the Services window (My Computer > Manage) and restart the Apache Tomcat 6 service. Open a web browser and go to http://localhost:8080/geoportal. The default geoportal home page should appear.

9. Configure the gpt.xml File

The PDF files downloaded from the *ArcUser* website at the beginning of this exercise contain Tables 2 and 3. Look at the highlighted lines in Table 2 for the required changes to the gpt.xml file. **(Be sure to pay attention to indentation when commenting out sections.)**

1. In Windows Explorer, navigate to C:\Program Files\Apache Software Foundation\Tomcat 6.0\webapps\geoportal\WEB-INF\classes\gpt\config.
2. Open gpt.xml in Notepad.
3. Make the changes shown in Table 2 in the PDF file to the gpt.xml file.
4. Save and close gpt.xml.

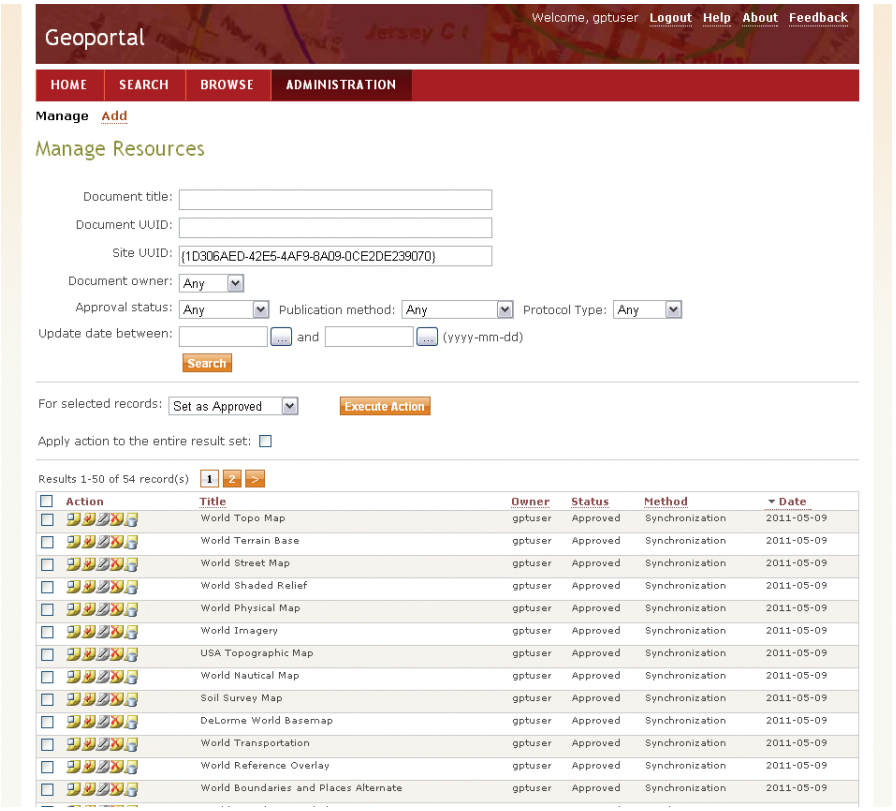
10. Modify the Java Database Connectivity (JDBC) .jar File

1. Copy postgresql-8.4-701.jdbc4.jar to C:\Program Files\Apache Software Foundation\Tomcat 6.0\lib.

2. Copy geoportal.xml from C:\Geoportal\Other\JNDI Configuration to C:\Program Files\Apache Software Foundation\Tomcat 6.0\conf\Catalina\localhost.
3. Open geoportal.xml with Notepad and make the changes shown in Table 3 in the PDF file. Note that for the password parameter, this is the password for your geoportal user. If you used a strong password when setting up the geoportal, use that password.
4. Save and close geoportal.xml.
5. Restart the Apache Tomcat 6 service.

11. Log In to the Geoportal

Your geoportal is now up and running. Open a web browser and go to http://localhost:8080/geoportal to access the geoportal's user interface. You can log in to your geoportal with the gptuser user name and gptuser password. You have logged in successfully when a green banner saying "Welcome gptuser" and the Administration tab appear. Go to geoportal.sourceforge.net for information on how to register resources with your geoportal.



↑ After adding an ArcGIS Server, synchronize it.

12. Register an ArcGIS Server with the Geoportal

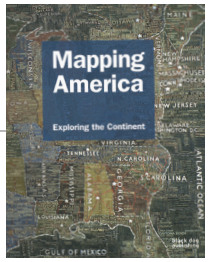
To register an ArcGIS Server and its associated services with your geoportal, use the following procedure. The ArcGIS Server can be your own or one that is publicly available. (Note: ArcGIS Server is not required to set up or manage a geoportal server. Esri Geoportal Server supports a wide range of geospatial services, including OGC services [WMS, WCS, WFS, etc.], GeoRSS, ArcGIS services, Open Archive Initiative [OAI] services, and even web-accessible folders.)

1. Log in to your geoportal. Click Administration. Click Add. Make sure Register resource on the network is selected and click Proceed.
2. Select Protocol Type ArcGIS.
3. In REST URL, type `http://services.arcgisonline.com/ArcGIS/rest/services/`.
4. In SOAP URL, type `http://services.arcgisonline.com/ArcGIS/services/`.
5. In title, type `Services from ArcGIS Online`. Click Test to verify the connection. A green banner with "Connection successfully verified" should appear.
6. Scroll down, keeping all other defaults, and click Save. A green banner with Resource data saved successfully should appear.
7. Click Manage at the top of the Administration tab. Services from ArcGIS Online should be listed. Notice that the fifth icon (Synchronize content) has been grayed out.
8. Check the box to the left of the record. Above the records list, in For selected records, choose Set as Approved and click Execute Action. The page should reload, and a green banner should display the message "1 record(s) were updated".
9. The fifth icon (Synchronize content) should now be in color; click that icon. A dialog box entitled The page at localhost 8080 says... opens up. Click OK. A green banner that indicates one resource has been qualified for synchronization should appear. Wait a few moments while the geoportal synchronizes services from the registered ArcGIS Server.
10. After a few moments, click the last icon (Show documents acquired from this repository). The returned documents are metadata records created for the services hosted on the registered ArcGIS Server and now discoverable through your geoportal.

Conclusion

This tutorial walks through the process of setting up an Esri Geoportal Server using an open source web servlet and database. For testing purposes, simple authentication was used, rather than LDAP authentication. The full functionality of user-based roles in the Esri Geoportal Server requires an LDAP-enabled Directory Server. If an existing Directory Server is not available, several open source directory servers can be used. To learn more about configuring a Directory Server and other aspects of installing and using the Esri Geoportal Server, see the *Geoportal Server 1.1 Installation Guide* part of the documentation that is included with the Esri Geoportal Server download. Also see the Esri Geoportal Server site at www.esriurl.com/geoportalserver.

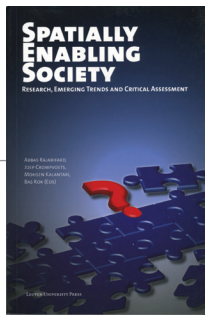
GIS Bookshelf



Mapping America: Exploring the Continent

By Fritz Kessler

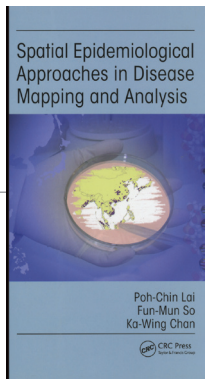
As Frank Jacobs of the popular Strange Maps blog notes in his introduction to *Mapping America: Exploring the Continent*, "In the five centuries since its discovery, and especially during its exploration, America has served as a giant blank canvas for the imagination." Maps can do many things: in this volume, they tell the story of America's transformation from an obstacle encountered on the way to the riches of the Orient to an opportunity for countries to acquire empires and wealth and for individuals to reinvent themselves. Although the name "America" was originally affixed to an area known today as Paraguay on Martin Waldseemüller's 1507 map, it applies to the landmass that stretches across the western hemisphere from the top of Canada to the tip of South America. However, this volume contains historical, thematic, diagrammatic, and personal maps of the United States of America. They range from John Foster's 1677 woodcut map of New England to Jack Kerouac's map of his travels hitchhiking in the winter of 1947–48. The contributing author, Fritz Kessler, is a professor of geography at Frostburg State University, Maryland; past editor of the journal *Cartographic Perspectives*; and a contributor to various books related to geography and cartography. While this book is of special interest to cartographers, its diverse and engrossing maps appeal to a broad audience. Black Dog Publishing, 2010, 240 pp., ISBN-13: 978-1907317088



Spatially Enabling Society: Research, Emerging Trends and Critical Assessment

Editors: Abbas Rajabifard, Joep Crompvoets, Mohsen Kalantari, and Bas Kok

The definition of spatially enabling governments, businesses, and society at large has been evolving. Previously, this meant improving data sharing through interoperability and standards. As the use of spatial technologies has become increasingly incorporated into government and business processes, *spatially enabling* is a much broader concept. This book is a collection of peer-reviewed articles on spatially enabled societies (SES) that were solicited for the Global Spatial Data Infrastructure Association (GSDI) 12 World Conference. Various aspects of SES, which was the conference theme, are addressed: the evolving concept of SES, regional activities to promote SES, developments (such as volunteered geographic information and automatic spatial metadata enrichment), and practices that will encourage the development of SES. Leuven University Press, 2010, 248 pp., ISBN-13: 978-9058678515



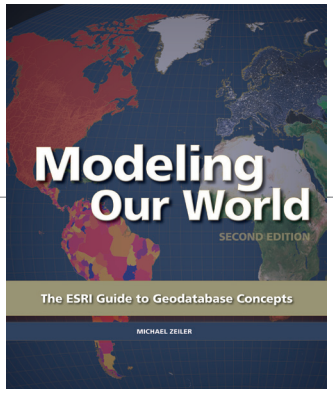
Spatial Epidemiological Approaches in Disease Mapping and Analysis

By Poh-Chin Lai, Fun-Mun So, and Ka-Wing Chan

This book differs from others on the application of GIS to epidemiological studies in that it examines the spatial resolution needed to explore the geographic dimension of a public health issue rather than building the inquiry around the scale of the data available. Although public health inquiries can be particularly constrained by the availability of data—especially data aggregated at a suitable level—this commonsense approach is valuable in addressing the demands of working with real-world data to meet contemporary epidemiological research challenges. A team of Hong Kong University geographers wrote this book to satisfy the demand for applied approaches. The examples in the book use data from Thailand and Hong Kong and GIS software in the public domain such as Epi Map (built on Esri technology). Point pattern and areal methods of disease analysis are covered as well as spatial sampling techniques such as kernel density and spatial interpolation methods. Final chapters address setting up a GIS infrastructure and current GIS research. CRC Press, 2008, 194 pp., ISBN-13: 978-1420045468

Indispensable Guide to the Geodatabase

Understanding data and how to manage it



Making the most effective use of GIS and ArcGIS software requires a solid understanding of the geodatabase, the native data structure of ArcGIS. The geodatabase provides a framework for modeling natural and manmade systems. *Modeling Our World: The Esri Guide to Geodatabase Concepts,* Second Edition, is a guide to the geodatabase at the ArcGIS 10 release.

Author Michael Zeiler communicates complex concepts through numerous graphics and compelling and clear explanations that engage the reader. This text explains geodatabase architecture and imparts understanding of all the data types that can be used by a modern GIS.

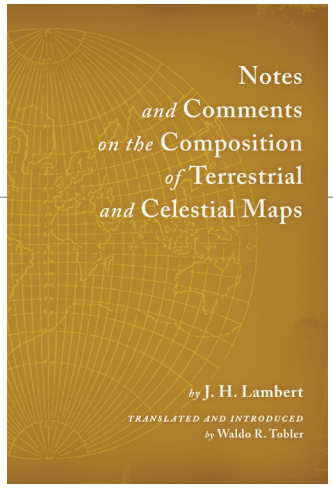
The first edition of *Modeling Our World*, published in 2000, explained how models are used to represent geographic information and introduced object-oriented modeling that had been made available in ArcInfo 8. In the intervening decade since the publication of the first edition of *Modeling Our World*, the capabilities of ArcGIS have grown enormously.

The book's second edition reflects these changes. Zeiler presents a complete survey of the geodatabase information model that reflects changes in ArcGIS. He explains how geodatabase structural elements can promote best practices for data modeling and analyses and how rules and data properties in the geodatabase can ensure spatial and attribute integrity. The book provides numerous examples of innovative applications and effective workflows.

New chapters cover linear referencing with routes, greatly expanded information on geocoding; modeling with rasters, mosaics, and terrains; and temporal modeling. Additional chapters explain versioning, replication, and workflows that use one or both strategies. Linear modeling with networks has been greatly enhanced. A final chapter describes geoprocessing using models and scripts.

Modeling Our World is not only for students but also for GIS professionals who create and manage authoritative geographic information for specific subject areas. It will help them build real-world systems that are both efficient and elegant. Esri Press, 2010, 308 pp., ISBN-13: 978-1589482784

Classic Text by a Landmark Figure in Cartography



A new edition of *Notes and Comments on the Composition of Terrestrial and Celestial Maps*, by J. H. Lambert, joins other notable titles in the Esri Press Classic Series.

The original German edition, *Anmerkungen und Zusätze zur Entwerfung der Land- und Himmelscharten*, was published in 1772. It introduced map projections created by Johann Heinrich Lambert that are still in use today. Lambert, who was forced to leave school when he was 12 years old to work in his father's tailor shop, was largely self-taught yet became one of the world's preeminent mathematicians and cartographers. His work on projections marks the beginning of the modern period in mathematical cartography.

The 1972 translation by the noted geographer Waldo R. Tobler was issued on the 200th anniversary of the publication of the original edition. That translation, unavailable for several years, was enhanced for the 2011 edition and includes an expanded preface and updated reference section. Although the availability of information on map projections has exponentially grown in the intervening years since 1972, this book remains a valuable resource.

Tobler is a professor emeritus in geography at the University of California, Santa Barbara, and has authored and coauthored many influential articles and papers on cartography and map projections.

The Classic Series, which was created to preserve important scholarship in the field of cartography by republishing seminal texts no longer in print, includes (most recently) *Semiology of Graphics: Diagrams, Networks, Maps* by Jacques Bertin; *The Look of Maps* by Arthur H. Robinson; and *Cartographic Relief Presentation* by Eduard Imhof. Esri Press, 132 pp., ISBN: 978-1589482814

Opportunities for Growth

Keep work interesting for Esri employees

Many Esri employees stay with the company for many years because they have opportunities to grow and experience new challenges. Denise King, a development technical lead in the Esri support center in Charlotte, North Carolina, talks about her career growth in this interview with Esri writer Leslie Roundy.

Roundy: What brought you to Esri?

King: My youngest child had just started kindergarten, and I was ready to return to the workforce. I contacted a temporary agency and remember not even knowing what company I was testing for. It ended up being Esri, and I was hired as the receptionist in Support Services. That was in 1997.

Roundy: Now, 14 years later, you're still here.

King: After being the receptionist for about three years, I had already decided I wanted to do more. I clearly didn't understand the terms being used, such as UNIX and C shell ("What do seashells have to do with anything?" I wondered). So I decided to go back to school and got my associate degree in arts and science in 2002.

After that, I applied for and was awarded an Esri scholarship to the University of Redlands and received my bachelor's degree in information systems in 2004. I then went through the formal application and interview process to become a support analyst. I decided to continue my education and entered the master's program in geography at Cal State Fullerton with an emphasis in GIS.

I started to really get interested in mobile technologies. I have to admit I was lured by the devices. After another analyst left, I became the most senior person in Support Services with knowledge of mobile technology. When ArcGIS Mobile came out, it was a logical decision for me to ramp up to support that product as well. Same thing with the new smartphone applications.

I became a senior support analyst in 2005 and started training other analysts. Then, when I learned that Esri was opening a support center in the Charlotte office, I applied and was selected to be one of the first four employees to establish the unit. That was in August of 2006. Today, we have more than 40 employees here.

Roundy: You're now a development technical lead. What does that entail?

King: As a development technical lead [DTL], I'm part of the User Advocacy Group. My role is to help our customers get what they want from our software, whether it is enhancements or correcting issues they're having. I interact with many different development teams, but more closely with the mobile team. One of my responsibilities is helping identify user workflows in the field. When users are designing a mobile project, there are all sorts of factors that have to be considered. So it's doing a lot of what I call best practice recommendations, looking at other resources and other companies' websites to help me make an informed decision.

Roundy: Talk a little about your interaction with the development teams in Redlands.

King: Because a DTL is the conduit between Support Services and Product Development, it's important to keep information going both ways. We tell the developers what we're seeing, trends identified through support incidents, and what users are asking to be added to the software. Conversely, Development is telling me what's coming in the software—where the product development is going to be next. I also monitor the user forums for postings on the products I support, so if there's something critical that's stumping a user, I'll pass it on to the development team if it's something I'm not as familiar with.

I also participate in the product supportability process. Any new product—for example, the Android API—goes through a process in which Support works with product engineers in Development to identify the item, see what support will be needed, identify resources, and make sure there are resources on Esri.com. All this is driven by the User Advocacy Group in collaboration with other Esri teams.

Roundy: You didn't have a GIS background. In those early days, what intrigued you and made you want to keep going with the technology?

King: A lot of it was I wanted to learn more so I'd have a better understanding of what users were calling in about. As I learned, it was like "Wow, this is amazing!" It was that interest that excited me about what our software does and how it helps people make a difference. It's that same excitement I still get when talking with customers or working with colleagues who share the same feelings about GIS, our software, and the changes we help put into place.

Follow Denise on Twitter: @DeniseKing_esri

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Why Geography Education Matters

Joseph Kerski, education manager for Esri and 2011 president of the National Council for Geographic Education (NCGE), passionately believes in the importance of geography in the curriculum. "Geography enables students to understand their world locally to globally, make wise decisions about the planet and its resources, and become critical thinkers," said Kerski. "Geography grapples with the key issues of our time—energy, water, biodiversity, climate, natural hazards, population, and much more." In the following essay, Kerski explains why geography plays such a pivotal rule in education.

Geographic questions begin with the whys of where. Why are cities, ecoregions, and earthquakes located where they are, and how are they affected by their proximity to nearby things and also by invisible global interconnections and networks?

After asking geographic questions, students acquire geographic resources. They collect data such as maps, satellite imagery, and spreadsheets from their own fieldwork. They analyze this geographic data and understand relationships across time and space.

Geographic investigations are often value laden and involve critical-thinking skills. For example, after examining a map of cotton production in the USA, students investigate the relationship between latitude, altitude, climate, land use, and cotton production. After discovering much cotton is grown in dry regions that must be irrigated, students can then ask "Why is cotton grown in these dry areas? Should cotton be grown in these dry areas? Is that the best use of water and other natural resources?"

Finally, students present the results of their investigations using geographic tools such as web GIS and desktop geographic information systems. Their investigations usually spark additional questions, and the resultant cycle is the essence of geographic investigation.

Students study geography to understand that the earth is changing. Then they scientifically and analytically think about why it is changing. And they even dig deeper than that. Should the earth be changing in these ways? Is there anything that I can do about it or that I should be doing about it? This not only captures the heart of spatial thinking—inquiry and problem-based learning—but also empowers students to become decision makers, to make a difference in this changing world of ours.

Geography therefore is not simply just a "nice to have" subject for an already-crowded educational curriculum. It underpins, in my view, the critical-thinking skills, technology skills, citizen skills, and life skills that underpin all other disciplines. It is essential for grappling with the essential issues of our time.

If you care about geography education and want to see it strengthened and supported at all levels—K–12, university, formal, informal—consider joining NCGE at www.ncge.org.

Kerski Assumes NCGE Presidency

Dr. Joseph Kerski, education manager for Esri, will serve as president of the National Council for Geographic Education (NCGE) in 2011. This nonprofit organization has been supporting geography teachers at all grade levels since 1915. The NCGE promotes professional development for geography teachers and supports research on geography education. It also aids in the development, publication, and promotion of geography learning materials and recognizes exceptional supporters and teachers of geography. To reach these goals, the NCGE also collaborates with other organizations with similar goals.

As a graduate school student, Kerski joined the NCGE in 1995. He has served the organization as a member of both the External Relations Board and Remote Sensing Task Force. From 2008 to 2010, Kerski was the NCGE vice president of external relations.

Esri has a long history of supporting the NCGE by serving on NCGE boards; advising the organization on projects such as Birds Eye Remote Sensing for grades four through six; and teaching a multiday GIS lab each year at the NCGE conference, where education team members Charlie Fitzpatrick and George Dailey have been attendees and exhibitors for nearly 20 years. For more information about the NCGE, visit www.ncge.org.

Tracking Trek Online

Wounded soldiers make historic North Pole expedition

By Carla Wheeler, Esri Writer

When Fridtjof Nansen and Hjalmar Johansen left the ship *Fram* in 1895 to try and reach the North Pole using sled dogs, no one heard from them for more than a year. Friends and relatives could only guess where they were on the map.

But when members of the Walking with the Wounded (WWTW) charity organization recently braved treacherous ice ridges, dangerous fjords, and bitter subzero temperatures to reach the geographic North Pole, people around the world were able to follow along online using an interactive map created by ESRI (UK) Ltd.

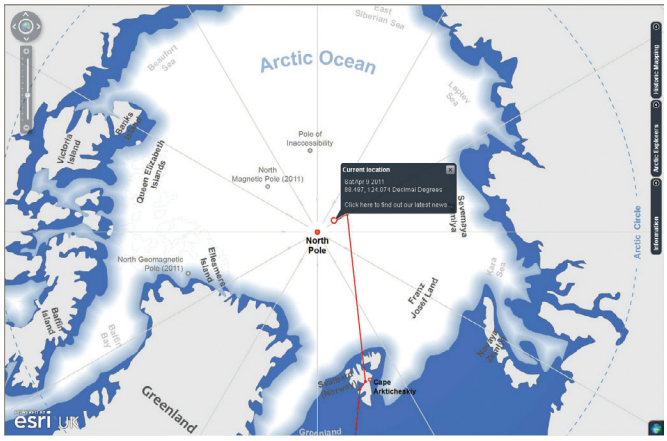
The seven expedition members included four wounded ex-servicemen from the United Kingdom. They triumphantly arrived at 90 degrees north on April 16, 2011, completing a 13-day, 200-mile trek across the frozen Arctic. The expedition made history because the team included two men who became the first amputees to reach the North Pole unaided.

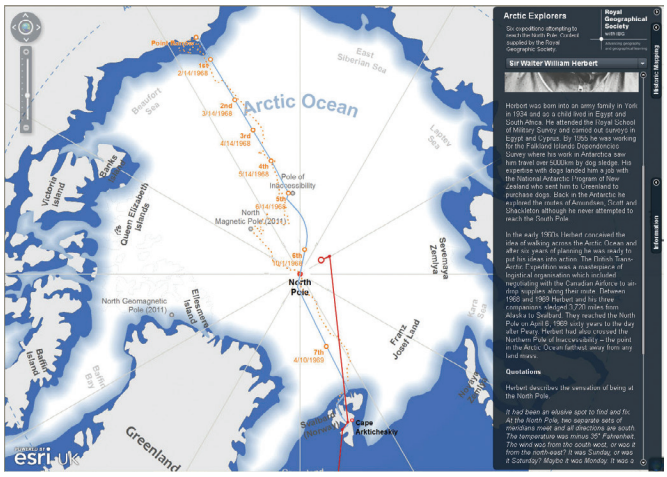
Britain's Prince Harry, the expedition's patron, joined them for the first three days of the four-week trek. The expedition raised money for training, therapy, and other types of support for British service members who return home from war injured or traumatized.

In a statement on the WWTW website, Prince Harry summed up why he supported the venture. "This extraordinary expedition [raises] awareness of the debt that this country owes to

The interactive map created by ESRI (UK) covered the Arctic region and displayed the men's location based on GPS coordinates relayed back to WWTW headquarters. It highlighted key points of interest and let visitors follow the expedition's progress in near real time.

People in the United Kingdom and elsewhere kept up with the adventure by viewing the interactive map and reading the blog that provided the latest photos and audio from the modern-day polar explorers on the WWTW website (walkingwiththewounded.org.uk).





↗ People could keep tabs on the current location of the WWTW using the online map.

↘ This historic map from the Royal Geographical Society shows the route Sir Walter William Herbert took to the North Pole.

← The skiers take a moment to look out over the Arctic. Britain's Prince Harry, a team member early in the journey, called the North Pole "the last true wilderness on Earth." (Photo courtesy of Walking with the Wounded)

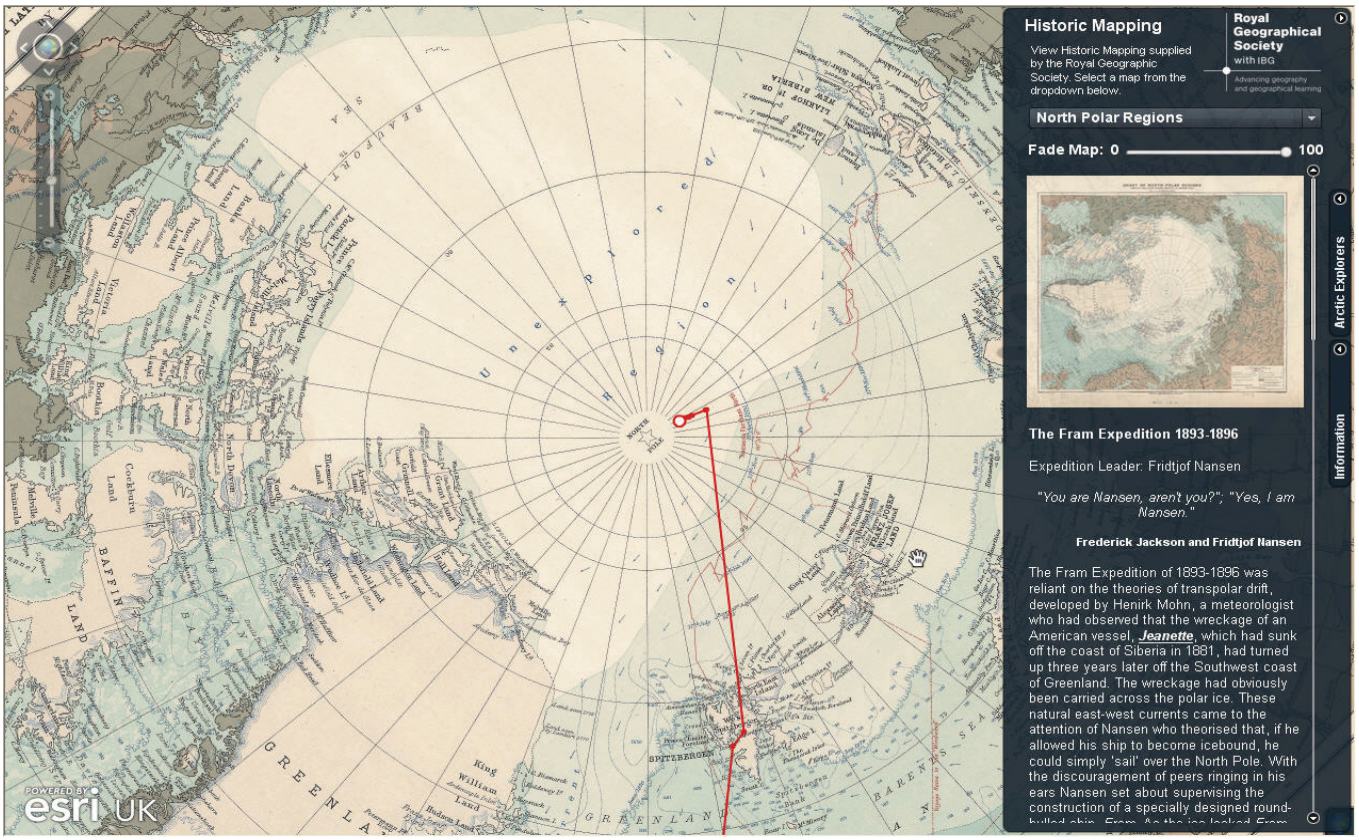
those it sends off to fight—only for them to return wounded and scarred, physically and emotionally.... This polar adventure [exemplifies] the tenacity and remarkable courage of those who serve in uniform."

The WWTW route stretched from London to Longyearbyen, Norway, where the team was initially delayed for several days due to bad weather. The explorers took a plane north on April 4, crossing the icescape to Camp Barneo, a Russian ice base, then to 87 degrees north, where the men, by now in a helicopter, landed and officially began the trek. Bundled in red, heavily insulated jackets and pants, they strapped on skis and headed off into the wilderness of snow and ice.

Map Design and Development

Using ArcGIS Server, ESRI (UK) developed an interactive mapping application that combines the WWTW team's expedition route with historic information provided by the Royal Geographical Society (RGS). The route of previous expeditions, along with historic maps and charts, can be examined online. In many cases, this has been the first opportunity for the public to examine these maps.

Users can navigate across the Arctic region and explore for themselves places such as Beaufort Sea, the Queen Elizabeth Islands, Franz Josef Land, and the Kara Sea. Visitors can also read stories about early famous polar expeditions such



↑ Using the interactive map developed by ESRI (UK), visitors can call up interesting stories about historic polar expeditions, such as the journey by Norwegian explorer Fridtjof Nansen, who attempted to reach the North Pole in the ship *Fram*.

as those of Robert Peary and Sir William Edward Parry, Roald Amundsen, and Sir Walter William Herbert.

Peter Wilkinson, head of the ESRI (UK) Technical Solutions Group, led a two-person team that designed and developed the web map viewer and widgets for WWTW. He said that adding the routes and stories of those explorers, along with historic maps and charts of the Arctic, added an educational element to the mapping application to create more interest for schoolchildren, teenagers, and adults alike.

"We wanted to create a more engaging site to help people learn more about the Arctic," Wilkinson said. "We want people to see that the Walking with the Wounded team members are following in the footsteps of some incredibly notable Arctic explorers."

The RGS archives supplied historic maps, charts, stories, and photographs of six explorers, whose attempts to reach the North Pole dated from the early 1800s to the late 1960s. ESRI (UK) worked with maps and charts scanned from the original documents in the RGS archives. "Being mapping enthusiasts, it was quite an honor to be able to work with the original maps and bring them to life with our interactive map," Wilkinson said.

Esri's ArcGIS Desktop 10 was used for data management and creating the map (MXD) documents. Wilkinson said there were a number of challenges, including sourcing up-to-date information for the Arctic region, such as the latest sea ice extents, and working in unfamiliar polar projections. "We were particularly keen to create a good-looking basemap that could form the basis of the website," he said. The team used cartography tools in ArcGIS ArcMap to get the basemap just right.

The online mapping application was built using Esri's ArcGIS Viewer for Flex 2.2, a ready-to-deploy viewer that is configurable for adding additional tools and data content. The ESRI (UK) technical team developed additional Flex widgets such as pop-up dialog boxes, fader bars, and an administration console that the WWTW staff used to update the expedition team's route on the map.

Wilkinson said that when the men's coordinates were relayed back to Britain from the Arctic, the WWTW support team added the latitude and longitude to the administration console. The points were stored in the geodatabase and displayed dynamically on the map, with a line drawn back to the last recorded location, thus creating a route. Clicking on a specific point on the route displays an information window showing the location and date and a link to the relevant WWTW blog post.

ArcGIS API for JavaScript (Compact Build) 2.2 was used to create an application that replicated the functionality of the embedded WWTW map viewer but could be accessed from a mobile device, such as Apple's iPhone or iPad, or environments where the Flex plug-in is not supported.

The WWTW expedition generated worldwide media attention, especially since Prince Harry lent his support by skiing part of the way with the WWTW team. To handle heavy traffic on the mapping application site, ESRI (UK) decided to use ArcGIS Server running on Amazon's Elastic Compute Cloud (EC2). A cloud approach was chosen for its scalability, its quick response times, and the flexibility it provided in handling fluctuations in demand.

For Wilkinson, creating the mapping application was a fascinating learning experience, in part because the project demanded using unfamiliar datasets from Canada, Russia, Norway, and the United States. Also, there were challenges associated with what Wilkinson called the "peculiarities" in the projections used to create maps of the polar regions, which required mapping the world from the top down rather than viewing the globe laterally from left to right. "But it wasn't just a challenging project; it was also extremely fulfilling, in that we knew our interactive mapping application was supporting a unique expedition led by an incredibly brave team of soldiers," he said.

North Pole Was the WWTW Goal

WWTW was founded by Simon Daglish and Edward Parker. Parker's nephew was seriously injured in Helmand Province in Afghanistan in 2009, inspiring Parker and Daglish to set up the charity organization. The charity's goal is to raise 2 million British pounds (US$3.2 million) to fund job training and recovery programs for wounded service members.

Besides being a fund-raiser, the WWTW expedition is meant to spotlight the strength, endurance, and determination of soldiers who have overcome what may seem like insurmountable obstacles to achieve such a major physical feat as reaching the North Pole: Martin Hewitt, whose right arm was paralyzed after he was shot; Steve Young, who suffered a fractured vertebra and other injuries after an improvised explosive device (IED) hit his vehicle; Guy Disney, who lost his right leg below the knee after a grenade attack; and Jaco Van Gass, who lost his left arm after he was struck by a rocket-propelled grenade. Both Daglish and Parker joined the expedition, which was led by polar guide Inge Solheim and trainer Henry Crookson.

Richard Waite, managing director for ESRI (UK), said the company was honored to create the online mapping viewer to keep people apprised of the trek's progress. "We were extremely proud to support such an inspirational expedition," Waite said. "The incredibly brave individuals who took part not only raised much-needed funds but also proved that disability is no barrier to endeavor and achievement."

↓ The 13-day trek to the North Pole took strength and endurance. (Photo courtesy of Walking with the Wounded)

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