ArcNews

Esri | Spring 2015 | Vol. 37, No. 1

Briefly Noted

Esri Cloud achieves FEDRAMP compliance
Esri Managed Cloud Services (EMCS), which provides ready-to-use instances of ArcGIS running in the cloud, achieved Federal Risk and Authorization Management Program (FedRAMP) Moderate compliance. That means EMCS that aligns with the latest rigorous security controls required for cloud systems at the moderate impact level.

Tell your story in 3D
Use the 3D Scene Viewer to combine 2D and 3D datasets, view and share existing 3D scenes created with ArcGIS Pro, and explore 3D features, such as terrain and elevation, from all angles. An ArcGIS Online subscription (paid or trial) is all that is required. Go to www.esri.com/software/arcgis/arcgisonline/evaluate for a free trial.

Intelligence in the Cloud
Lockheed Martin and Esri have deployed commercial software to Amazon Web Services Commercial Cloud Services (C2S) for the first time with an intelligence community customer, the National Geospatial-Intelligence Agency (NGA). Portal for ArcGIS provides a single environment to securely organize and share data throughout the intelligence community and Department of Defense.

Transition for Google Earth Enterprise and Map Engine
In coordination with Google, Esri has prepared a special offer for Google Earth Enterprise and Google Maps Engine customers and partners looking to transition to Esri software.

GIS Hub-Vision
Building a Data-Driven Culture of Innovation

Writer, speaker, organizer, and technologist Abhi Nemani spoke with *ArcNews* editor Monica Pratt about how GIS can help open up government data, improve government by making it more data driven, and engage citizens.

Nemani, who serves as the first Chief Data Officer for the City of Los Angeles, leads the city's efforts to build an open and data-driven Los Angeles. His current and previous positions have given him a broad perspective and many insights into the challenges that cities face and efficacy of technology in addressing those challenges.

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↑ Abhi Nemani, Chief Data Officer for the City of Los Angeles

Premium Imagery Services for ArcGIS powered by Leica Geosystems

At the 2015 Esri Federal GIS conference in February, Esri announced that the newly launched Hexagon Imagery Program, which provides ready-to-use imagery services, will be available to Esri users through the ArcGIS Marketplace. These services deliver high-resolution aerial imagery as ready-to-use basemaps and analytical subscription services.

Esri, Hexagon, and Leica have joined forces to provide premium imagery to Esri users. Hexagon is a world leader in sensor manufacturing, with its Leica family of cameras and imaging sensors. These Leica sensors have been deployed on a fleet of aircraft that continuously image the earth, providing a regularly refreshed stream of imagery delivered to your applications of choice. Powering these images is the ArcGIS platform, deployed into the Amazon Web Services (AWS) cloud.

Utilizing the expansive reach of AWS, these services are pushed to regions closest to you, providing the fastest and most responsive cloud-based imagery service experience possible. Because these services are powered by the ArcGIS platform, you have the support of a powerful, dynamic web GIS. The Hexagon Imagery Program includes two imagery services that are live and available now on the ArcGIS Marketplace as basemap and dynamic image services.

The Basemap Service is a cached basemap imagery service consisting of 30-centimeter true color imagery that is updated on an ongoing basis. This service provides a backdrop to your GIS and has been optimized to perform quickly over mobile devices and web clients. It provides fresh, fast-performing imagery that can

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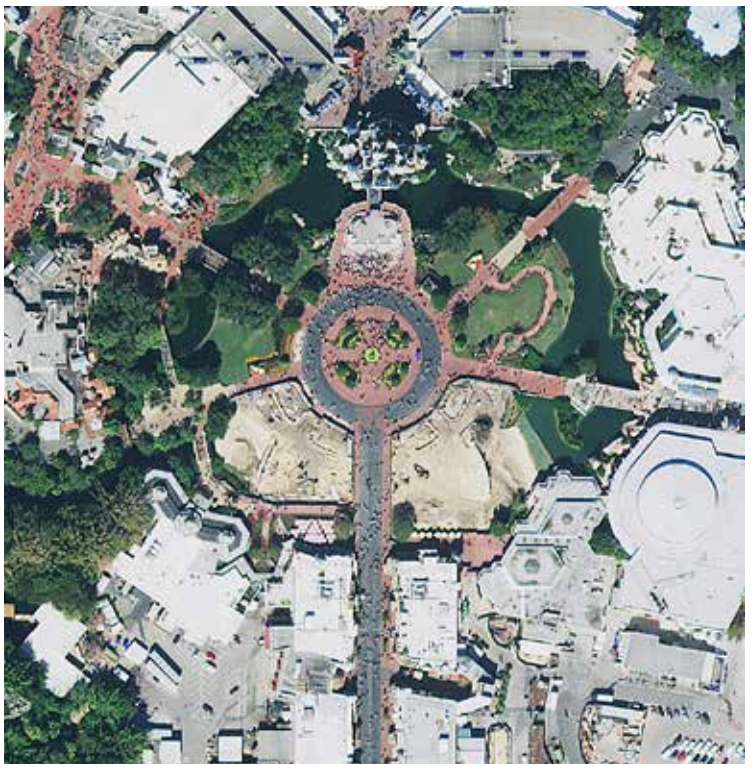

↑ This imagery showing Disney World in Florida illustrates the detail provided by ready-to-use image services from the Hexagon Imagery Program, now available to Esri users through the ArcGIS Marketplace.

Make Brilliant Maps Quickly with Confidence

As part of the February 2015 update to ArcGIS Online, Esri introduced an exciting new capability: Smart Mapping. This new approach to making maps is driven by Esri's desire help people make visually stunning and useful maps, quickly and confidently.

To do this, Esri has added new ways to symbolize data, smart defaults, and data-driven workflows to the ArcGIS Online map viewer. Continuous color ramps and proportional symbols, improved categorical mapping, heat maps, and new kinds of bivariate maps using transparency are delivered via a streamlined and updated user interface.

Smart Mapping is more than an easier way to make new kinds of maps. Esri articulated and then programmed deep cartographic first principles into ArcGIS Online that became a set of

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Abu Dhabi educators and curriculum developers are integrating GIS exercises into the sixth-grade curriculum of the New School Model. page 22.

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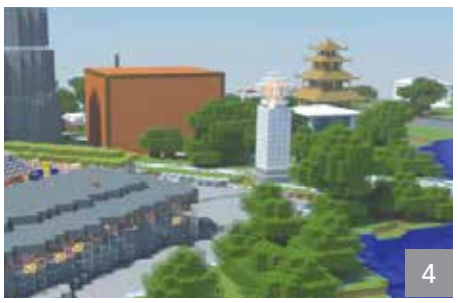

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ArcNews (ISSN 1064-6108) is published quarterly by Esri at 380 New York Street, Redlands, CA 92373-8100 USA. *ArcNews* is written for the Esri user community as well as others interested in mapping and geographic information system (GIS) technology. It contains material of interest to planners, foresters, scientists, cartographers, geographers, engineers, business professionals, and others who use spatial information.

GIS Hub-Vision—Building a Data-Driven Culture of Innovation

continued from cover

Before joining the city, he helped build, launch, and run Code for America, a nonprofit technology organization dedicated to reinventing government for the 21st century. Previously, Nemani worked for Google developing social engagement strategies. He also worked at the Rose Institute, where he managed multiple local government transparency research teams and at the Center for American Progress, where he focused on connecting a national network of public-minded advocates.

He graduated magna cum laude from Claremont McKenna College with an honors degree in philosophy, politics, and economics. He also studied political philosophy and rhetoric at the University of Oxford.

Nemani is a member of the board of directors for the OpenGov Foundation, a member of the board of advisers of Significance Labs, and has served as Innovator-in-Residence at GovDelivery. He was one of the featured speakers at the 2015 CIO Summit held March 25–26 at Esri's Redlands, California, headquarters.

Q: What is the role of GIS in opening up data and making government more efficient and open?

Place matters. Particularly for local governments. Key services ranging from policing and fire prevention to building inspections and infrastructure repair all center around a place—a location, geography. GIS serves as a local government's guide to navigate and understand a place, and what's happening there. Accordingly, massive amounts of data are attached to a place, and that data is critical both to agencies aiming to find efficiencies and innovations and citizens hoping to understand the work of their government. Already, we are seeing governments and citizens use GIS data to improve the quality of life by doing things like reducing blight, tracking and responding to citizen requests, and boosting new business development.

Q: What unique opportunities do big cities offer for applying technology and exploiting data to deliver better government?

Commonly, it's seen that the opportunity in big cities is their scale and size. I would argue their diversity is more interesting. So many different cultures, places of origin, and ways of life. Nowhere is this more true than Los Angeles, a city so very rich in its diversity. This means that as we consider the use of technology and data, profound and deep empathy is hard but essential, which I suspect will make the tools we create that much more meaningful.

Q: Are the models for applying technology in small and large jurisdictions different?

There's no question that between large and small jurisdictions the capacity for technology development varies. Yet now, the emergence of reusable tools and software as a service levels the playing field. Now what's built in a big city could be used in a small one. A start-up built anywhere could be used by a big or a small city. What's important for this new model to work, however, is the cultivation of a vibrant civic technology ecosystem any city can participate in.

Q: Government is being described as a platform these days. Is GIS a vital part of that platform?

The notion of government as a platform fundamentally means that innovation can come from anywhere—inside government or out. That's because the data that had typically been locked within Capitol walls is now openly available for anyone to use, remix, and build upon. This only works if citizens are interested and willing to step up and get involved. And they are, particularly when there is an opportunity related to a place where they live and care about. That's why opening geospatial data is so attractive for those wishing to make government more of a platform. People care about the buildings near them, the schools their kids are eligible for, or the new businesses on their block. More than that, they care about how all of those sum to a picture of the health and well-being of their community. GIS helps paint that picture.

Q: You've written about the need to integrate public data more deeply into citizens' lives? What do you mean?

I firmly believe the best way to connect with someone is to go to where they are. Thus, I also believe the next step for open data is to go more proactively to where citizens are. That means not just posting the restaurant inspection scores on an open data portal, but integrating those scores with restaurant search engines such as YELP. It means publishing building inspection records on Zillow. It means incorporating traffic and transit information on Google, Waze, and Apple. All these things are, in fact, already happening. Indeed, I think it's just the start. What's next is exciting: what are the other consumer apps that could be made more civic?

Q: How can existing GIS implementations in a city support working with startups to solve problems unique to urban areas?

An often overlooked potential consumer of open government data is the start-up community. As we have seen with start-ups such as OpenCounter, BlightStatus, and others, geospatial information is critical to their success. GIS leaders in a city would do well to proactively reach out to the entrepreneurs in the city to see whether they might be able to help make the notion of their government as a platform more real.

Q: You and others have said that a key strategy for improving government technology and its ability to solve big problems with limited resources is following Apple's example of building an ecosystem of apps. How do GIS and mapping fit into this ecosystem?

Platforms like the Apple iOS and Android systems work because there are common devices, software, and systems for them to run on. An iOS developer can build in one language for one device and know it can scale to hundreds of millions of users. In the public sector, this kind of confidence is often lacking, given the texture of the legacy IT landscape, jurisdiction to jurisdiction. GIS systems, however, cut across jurisdictional lines with common tools, schemas, and software, providing a platform for scalable innovation.

Q: Your vision for better government technology emphasizes not just coming up with workable solutions but also creating agile and elegant software that benefits not only the public but public servants. Could you talk about why this is important and how this relates to GIS?

Not only should we be creating beautiful and elegant citizen-facing solutions but also developing better tools for public servants to better serve the public: data analysis tools to prioritize service delivery, workflow systems to streamline communications, or data collection tools to speed up on-the-ground reporting, just to name a few. These are force multipliers. They enable public servants to serve more people better, faster, and smarter.

Q: What will it take to move government in this direction?

Governments already are moving in this direction. Here in the City of Los Angeles just recently the Department of Sanitation, for example, just deployed a GIS-based mapping and routing platform, replacing their previous paper-based system; both the police department and fire department use geo-based platforms for their real-time, responsive management systems; and others use GIS to plan out how effective, equitable, and useful new initiatives will be. What's needed is to take examples such as these, and others, to build the momentum for a more data-driven culture of innovation in every city.

A Larger Tent for Geodesign

By Carla Wheeler, Esri Writer

"Geodesign is both an ancient idea and a new idea supported by new and advancing technology," said Esri president Jack Dangermond, as he welcomed more than 300 people from around the world to the 2015 Geodesign Summit in Redlands, California. "I see GIS integrating into almost anything we do."

Geodesign combines the art of design with the science of geospatial technologies—such as GIS—to find smart and sustainable design solutions. Most often these solutions have focused on landscape architecture, urban planning, and environmental conservation, but the geodesign tent is getting bigger. Geodesign is also being increasingly embraced, albeit on a smaller scale, as an approach to economic development, urban transportation, and even gaming. And geodesign is increasingly being done in 3D.

The summit, which was held January 22–23, is in its sixth year. It was obvious from the breadth of topics covered in the presentations and Lightning Talks that modern geodesign concepts, practices, technologies, and education are maturing quickly. Geodesign in 3D also had a big wow factor. Keynote speaker Noel Cressie, distinguished professor at the University of Wollongong in Australia, also added spatiotemporal statistics and the importance of conditional probabilities to the geodesign equation.

Keynote speaker Noel Cressie, distinguished professor at the University of Wollongong in Australia.

Game for Geodesign?

Gamers (and the parents of gamers) in the audience were intrigued by Ulf Månsson's presentation that showed how geodesign was integrated into the popular video game Minecraft.

Månsson, a senior project manager for the Swedish sustainable engineering and design firm Sweco, was a gamer as a youth. His son and his friends now build things together in Minecraft. They create 3D virtual worlds. Inspired by seeing his son doing what was essentially the same design work he does at the office, Månsson created a method to stream geospatial data into the Minecraft server.

Assisted by his Sweco colleagues, Månsson used GIS tools to build the land data that would form part of the foundation for Blockholm, a replica of Stockholm, Sweden, that would be added to Minecraft. They used Esri's ArcGIS Data Interoperability, an extension for ArcGIS for Desktop, to process real spatial data, such as topography, waterways, roads, and property information, and generate it in 3D.

Blockholm, a project conceived by the Swedish Centre for Architecture and Design, essentially married geo and design in a virtual world. More than 10,000 Minecraft players later used its roadways, water features, and property information as a foundation to rebuild Stockholm as they envisioned it.

Because the ArcGIS Data Interoperability extension now natively supports Minecraft formats, the data can also be read back. "So if you set up a project like this where you invite players to rebuild a world, you can compare *(worlds)* before and after and just take out the pieces that have changed and bring them back to a GIS system such as CityEngine," Månsson said. "You could go from a CityEngine model to Minecraft, have it edited there, and then bring those edits back to CityEngine."

Geodesign of Land-Use Patterns

Joseph Minicozzi, architect, urban designer, and principal of the econometric consulting firm Urban3 in Ashville, North Carolina, gave a featured presentation. He uses geodesign to show officials and citizens how downtown areas in cities can be economically vital and viable as compared to strip malls.

"What is a city? For me, a city is a finite boundary of land that has to be managed," said Minicozzi. "It is essentially a farm that grows a crop of buildings. There is a cash flow behind all of that. My task here is to explain that cash flow."

In ArcScene viewer, an application that is part of the ArcGIS 3D Analyst extension, Minicozzi's maps showed the taxable value per acre of land as elevations. He showed a map of Travis County, Texas. The highest extrusion was located in downtown Austin, the county seat. Another map showed a high spike for alcohol sales in downtown versus the mall areas in the suburbs.

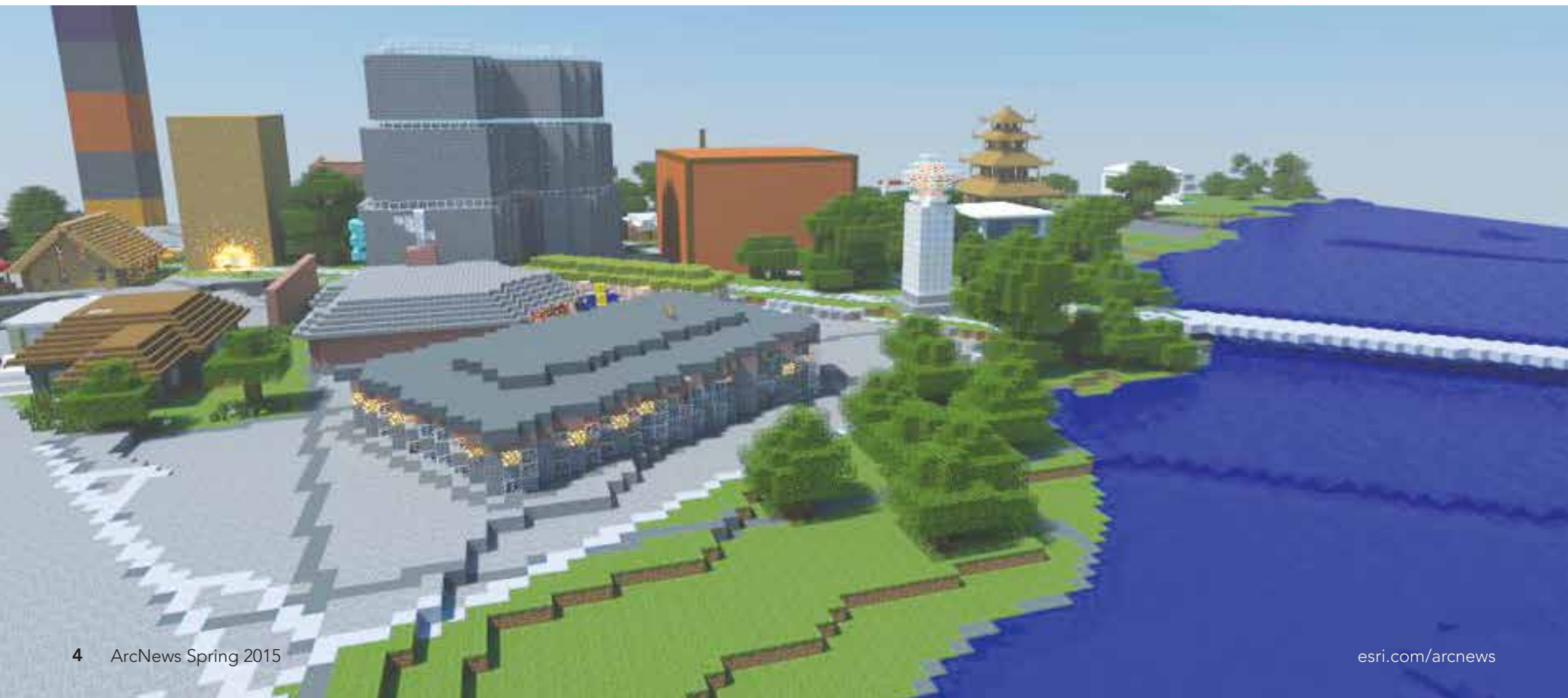
He mapped other tax data for Travis County, including mixed beverage and food sales per acre. "You see downtown popping off the map," Minicozzi said. The maps starkly illustrate how buildings downtown can often generate much more property tax and city retail tax revenue than suburban strip malls.

Minicozzi recalled hearing Dangermond once say, "If you put it on a map, people get it quickly." That made an impression. "We've seen this time and time again; when we make these three-dimensional models of the taxes, people get it," said Minicozzi.

Later he handed out stickers to the audience with cards displaying an image. One was of Count von Count from the children's television show *Sesame Street*, with the catchphrase "Do the Math." The other was Dangermond with the slogan "Do the Map." The audience chuckled, but the value of the message was obvious.

Creating the Future

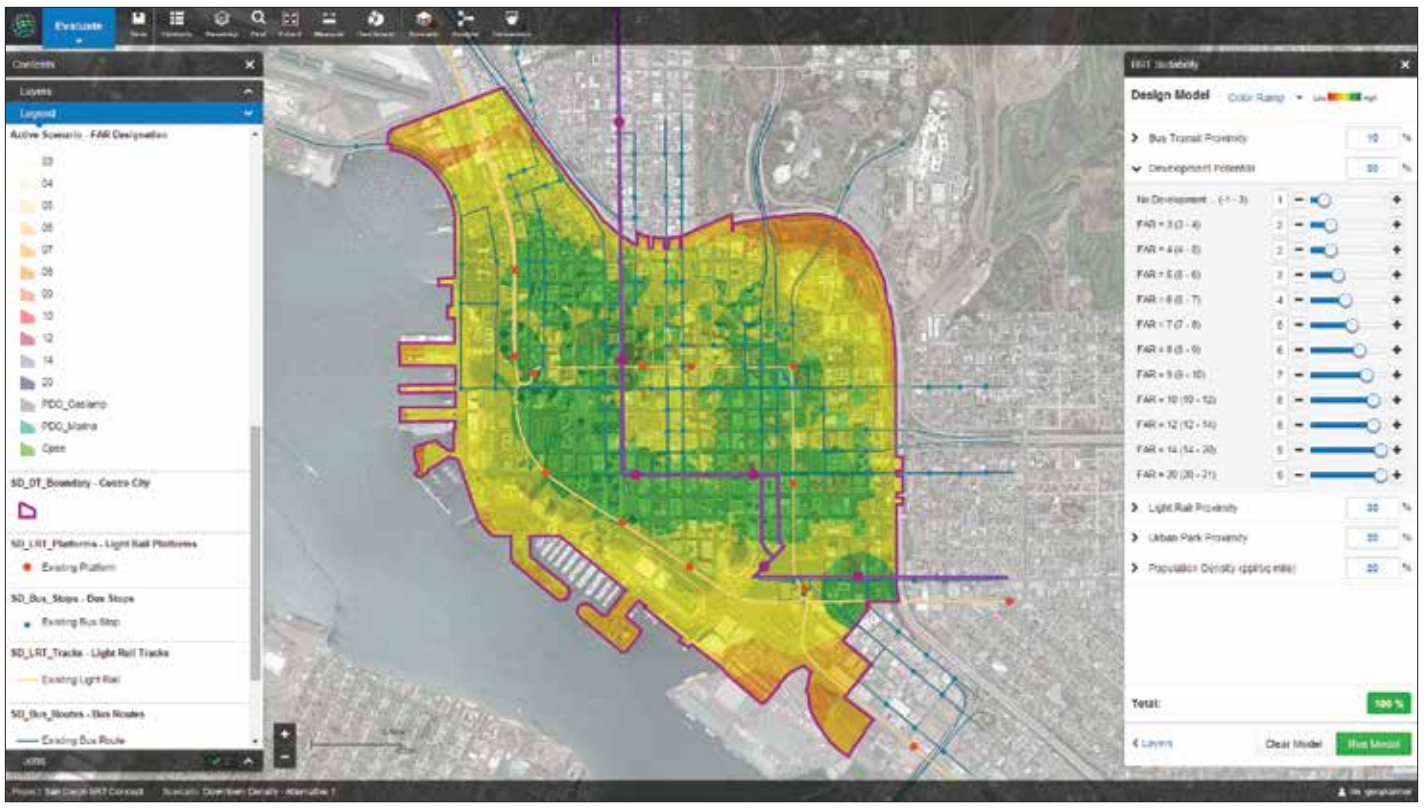
The Geodesign Summit emphasized smart



↓ Ulf Månsson, a senior project manager for Sweco, created a method for incorporating geospatial data into the Minecraft game.

Joseph Minicozzi, architect, urban designer, and principal of the econometric consulting firm Urban3, gave a featured presentation, maps tax revenue in 3D.

↑ In one demo of CityEngine, the Complete Streets sample was used to quickly generate visualizations of bike lanes, curbs, and trees in 3D.



↑ A demo of GeoPlanner for ArcGIS showed how a hypothetical Bus Rapid Transit (BRT) route could be created through downtown San Diego, California, leveraging a geodesign approach.

growth, sustainability, and habitat protection, underscored by an interesting and thought-provoking lineup of speakers that included David Early from PlaceWorks, Colby M. Brown from Citilabs, Zach Ferdaña from The Nature Conservancy, David Rouse from American Planning Association, and Mark Reiner from Non Sequitur.

Dangermond emphasized the importance of geodesign from the standpoint of sustainability. He related that he and botanist Peter Raven had joined Paul R. Ehrlich, author of *The Population Bomb*, to speak to a gathering of the California Native Plants Association. "It was a thrilling conference with thousands of people who were biophiliacs interested in plants and living things," Dangermond said.

Ehrlich told the audience that there was only about a 10 percent chance that in 100 years humanity would still go on. "This was very controversial to this audience," said Dangermond, adding that Raven disagreed with Ehrlich—claiming it would only be a 1 percent chance.

This is where geodesign, supported by geographic science and technologies such as GIS, helps decision makers create smarter communities and a more sustainable earth. Dangermond said that attendees were here to "talk about how we create the future rather than be at the *(mercy)* of the future."

Geodesign Technologies Demonstrated

As Dangermond noted during the summit, Esri has worked hard to develop new and nimble geodesign tools including GeoPlanner for ArcGIS, the ArcGIS Pro application in ArcGIS for Desktop, and Esri CityEngine.

Esri's Rob Matthews demonstrated GeoPlanner for ArcGIS. He used the app's tools to create a hypothetical Bus Rapid Transit (BRT) route through downtown San Diego, California, leveraging a geodesign approach. Next he used the tools in the app to study planning issues at multiple scales, from a city-wide BRT routing to the fine-grained placement of stations and the evaluation of land-use regulations to support Transit Oriented Development (TOD) at the site scale.

GeoPlanner for ArcGIS provides web-based tools for sketching alternative development scenarios while getting real-time feedback on the suitability of the design when measured against important planning metrics such as proximity to existing transit, parks, jobs, and households.

He also demonstrated the app's capability to do live analysis in the cloud, such as walk times from proposed BRT stations, enriching design schemes with curated demographic data, and suitability for BRT station placement using a weighted raster overlay service.

Matthews then demonstrated how the app can be used to compare project alternatives using a dashboard for key performance indicators. Finally, he prepared a higher density development option to export to ArcGIS Pro for further refinement in 3D.

In his demo, Esri's Nathan Shephard used ArcGIS Pro to take this downtown San Diego design to a larger scale. Existing 3D buildings (courtesy of Pictometry) provided context around potential building development sites.

A proposed building outline was digitized in 2D using precision editing tools. A synchronized 3D view rendered the simple shape as a constructed 3D building—complete with realistic texturing.

A simple spatial query identified which buildings would impact existing underground water mains. The results of previously run solar and wind analyses were explored to see if the design would create areas that could cause heat islands. A few such areas, which had high solar radiation and low wind speed, were identified. Rather than use ArcGIS Pro interactively to place individual trees to reduce the heat, Shephard said the problem was better attacked parametrically, as part of the street design process.

Shephard then turned the demo over to his colleague Brooks Patrick, who demonstrated the 3D capabilities in Esri CityEngine. CityEngine supports rapid design iterations, giving users the tools and rules to create a city, neighborhood, or even a street.

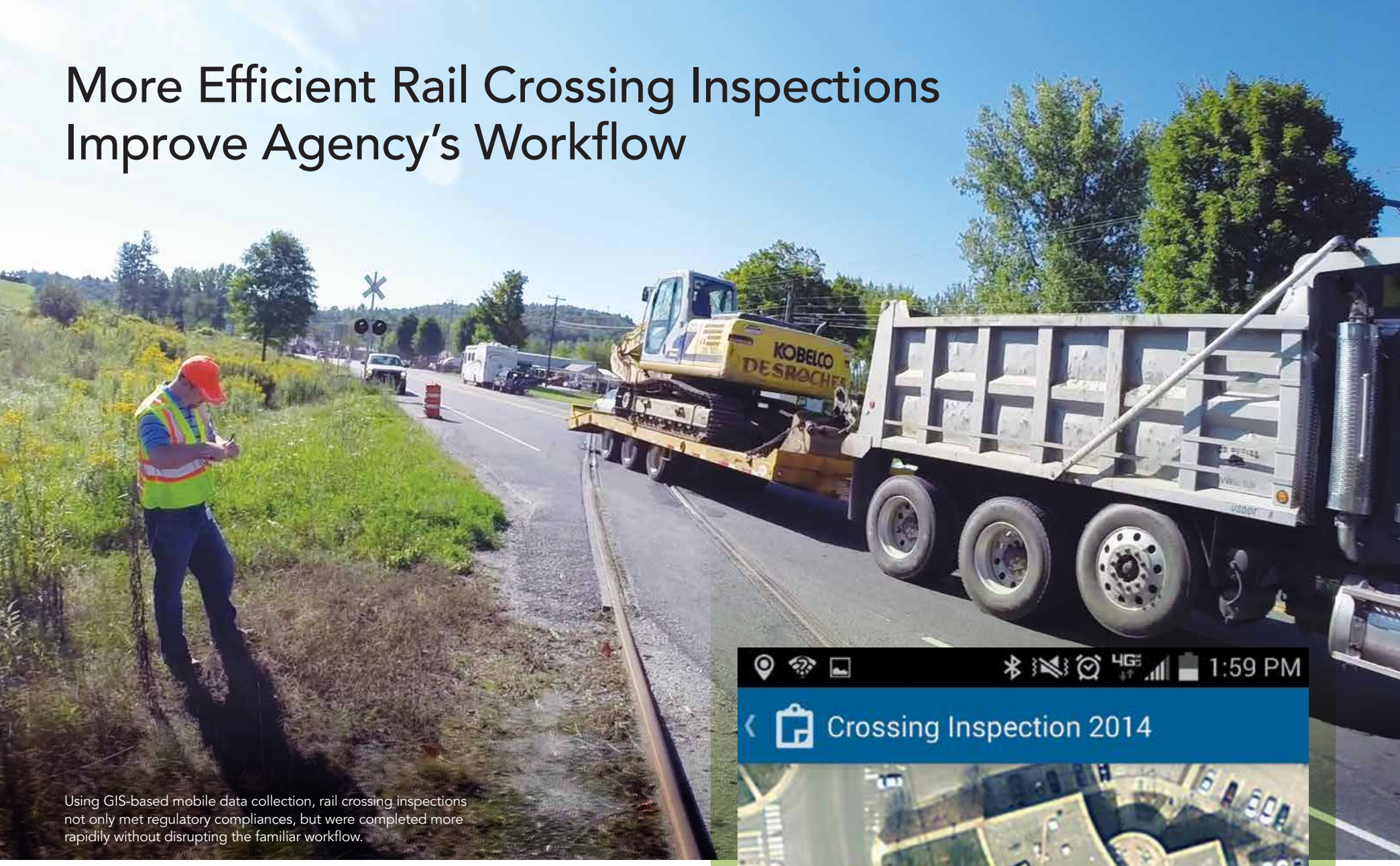
"This is made possible with CityEngine's procedural 3D modeling. If efficiency is important to your 3D pipeline, then you are really going to like this," Patrick said.

Using data from Shephard's downtown San Diego demonstration, Patrick showed the audience Complete Streets, a procedural street example that incorporates knowledge and ideas from transportation planning guidelines and standards. He used it to generate a default street, then added 2.5-meter-wide bike lanes with 1.2 meter buffers for each lane and planters, curbs, and trees. Not only can Complete Streets be used to visualize the bike lanes, curbs, and trees in 3D, it can also generate analytical reports on various aspects of the street's geometry, which is useful in coming up with rough cost estimates for construction work.

"Planning our environment carefully—leveraging GIS, 3D, and the best possible design practices—will be critical for building a sustainable future," said Esri's Eric Wittner.

Make plans early for next year's Geodesign Summit, which will be held in January 27–28, 2016. Workshops and educational meetings will be held January 25–26. Check in regularly at geodesignsummit.com or contact geodesignsummit@esri.com. And be sure to follow happenings on Twitter at @geodesignsummit.

More Efficient Rail Crossing Inspections Improve Agency's Workflow



Using GIS-based mobile data collection, rail crossing inspections not only met regulatory compliances, but were completed more rapidly without disrupting the familiar workflow.

The Vermont Agency of Transportation (VTrans) adopted a GIS-based mobile data collection system for its rail crossing inspections that cut the time required for inspections by 75 percent.

VTrans is fairly unique in that it owns and manages more than 600 miles of active rail lines and trails. It is responsible for maintaining 214 bridges, 401 crossings, and more than 1,000 culverts. To fulfill its mission to move goods and people safely and efficiently, VTrans recently modernized its railroad crossing inspections.

In the past, VTrans had used a "squeaky wheel" approach to addressing crossing maintenance concerns. According to Stephen Smith, GIS project supervisor, the public, the town, or the railroad would report areas that needed work, then Vermont would fix it.

That was the process until 2011. That year, Hurricane Irene was a huge wake-up call for the whole state. It caused hundreds of millions of dollars in damage to highways, rail, and bridges.

In response, GIS professionals from across the agency came together to produce maps for emergency responders that enabled them to prioritize work and respond quickly as new information came in. The rail section used GIS to track damage sites and provide maps and other information to the Federal Emergency Management Agency (FEMA). While VTrans had used GIS since the mid 1990s, it really came to the forefront during the emergency.

After the successful use of GIS in recovering from Hurricane Irene, the agency realized its rail section would benefit from having its own GIS team. After a successful six-month pilot, VTrans hired Smith in fall 2012 to focus exclusively on the GIS needs of the rail section.

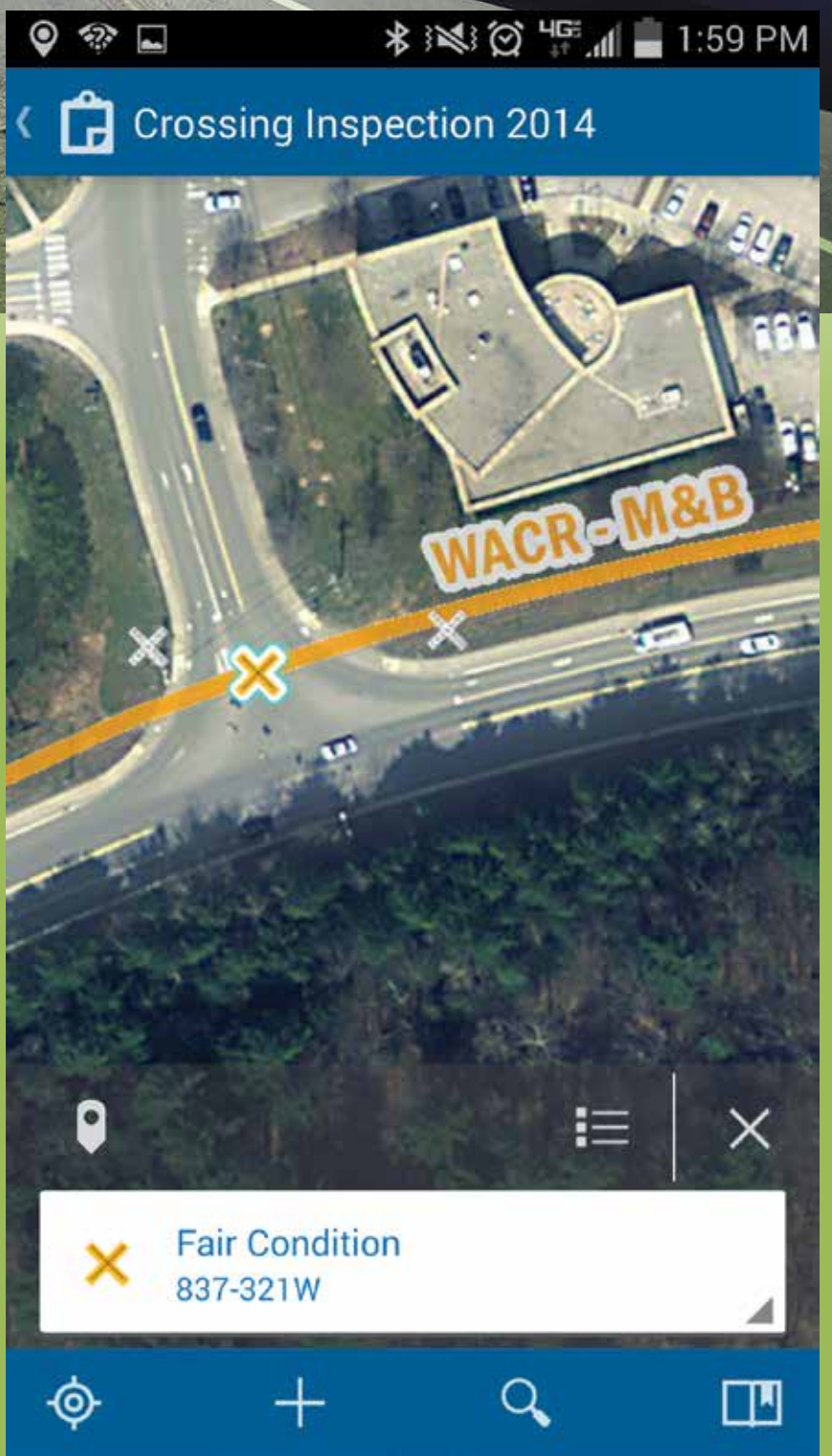
Smith worked with the subject matter experts in the section to build a system that not only responded to emergencies but also better used the resources of a limited budget to target areas of high need. "With the spatial component in mind, we could clearly visualize our plan to management, executives, and the legislature," Smith said.

Laptop Limitations

To collect and improve GIS data, VTrans hired a student intern, Aaron Wiener, from the University of Vermont. Wiener's task was to identify and inspect all public, at-grade crossings. He used Federal Railroad Administration (FRA) crossing data, cross-referenced with Vermont's listed inventory and other historic data. Over four months, Wiener collected information on 385 crossings using a combination of laptop-accessed spreadsheets, printed map screen shots, and a pen and notepad.

At active crossings, Wiener recorded signs, devices, surface materials, and additional notes in more than 30 spreadsheet columns on his laptop. He took pictures and manually uploaded them.

"Aaron did a great job," Smith said. "But there was definitely some room for improving efficiency." The process had drawbacks. Sometimes FRA data was out of date. In addition, Wiener could spend hours entering handwritten data and uploading photos using his laptop. To get from one crossing to the next, he cross-referenced the printed maps, so it took a long time to get to crossings.



Tapping the mobile screen selects a crossing feature during field inspections.

→ Picture pop-ups let the office team see what the field inspector sees in near real time. Using Operations Dashboard for ArcGIS via ArcGIS Online, Smith could monitor Wiener's progress in real time.

Seventy-Five Percent Faster

By the next summer, VTrans had found a faster method. In the spring, VTrans got some help from Esri transportation experts in configuring the Collector for ArcGIS app for mobile data collection.

Staff built a dataset with intuitive, readable field names (e.g., GateCount and SurfaceType) and domains. Data entry was optimized with as many drop-downs as possible to reduce the chance of collection error. Then they published these datasets as map and feature services through ArcGIS Online and VTrans secured ArcGIS for Server. Smith got support from the IT department at Vtrans for scripting and managing the server and database.

The result was a user-friendly data collection system that Wiener could use. When Wiener came back to help on the project, his laptop and notebook didn't go with him into the field. With this system, Wiener's smartphone displayed current rail property and asset information in easily consumed map viewers. With up-to-date asset data and a device that synced photos over Wi-Fi, he avoided the hassles of cross-referencing data, manually estimating the quickest inspection routes, and manually uploading photo files.

The new system also required less from Wiener physically. He no longer had to return to his car to pull out his laptop and enter data. "There was a comfort in knowing that rather than having to deal with all these bits and pieces of everything and trying to piece together these maps, I had it all right here. It was considerably easier," Wiener said.

If Wiener had to move a crossing location, he could update the GIS with a few taps. "He had all of that extraneous work taken away," Smith said. "The inspection time went from four months to four weeks." Wiener stayed on for the rest of the summer to document his process by creating the first official Annual Grade Crossing Report, which summarized his findings.

Previously, Smith had to wait months to get a spreadsheet report of Wiener's work to review inspection findings. With Collector for ArcGIS feeding to an operations dashboard via ArcGIS Online, Smith could monitor Wiener's progress in real time. "If I thought he missed a crossing along the road, I could send him a text," Smith said. "It was sort of a live quality control."

Smith could evaluate photos in real time too. If a crossing was in bad condition, he could reference data on an upcoming project to see if crews were already scheduled to work on those assets. If work wasn't scheduled but the asset needed immediate service, he could put in a request. "We were able to address maintenance issues on the fly if we needed to," Smith said.

Wiener completed approximately 92 crossings a week over a large geographic area. The results were also visible to the public and other VTrans personnel via convenient web maps. Rail crossing inspections not only met regulatory compliances, they were quick, easy, transparent, and completed with massive time savings without disrupting the familiar workflow.

Ground Transportation in the Cloud

Since its initial success switching to the cloud, the rail section has continued to leverage more features from Collector for ArcGIS and Operations Dashboard for ArcGIS. It has begun performing higher-level analyses of crossing conditions and added relevant widgets to track updates with graphs, gauges, bar charts, pie charts, and other ways to visualize statistics.

The inspection process was expanded by adding signs to the summer 2014 inspection. Data on more than 2,400 regulatory and advanced warning signs, including photos and condition information, was collected during the summer of 2014. Even though there were more thorough inspections, the process took just nine weeks.

The complete rail crossing inventory has informed the agency's prioritization of maintenance, repair, and other improvement projects. For more information, contact Stephen Smith at stephen.smith@state.vt.us.

Premium Imagery Services for ArcGIS Powered by Leica Geosystems

continued from cover

be loaded onto web applications and mobile devices.

These cached tiles follow the same design as the existing basemaps in ArcGIS Online. This means that users can switch back and forth between the Hexagon Imagery Program Basemap Service and the free ArcGIS Online basemaps and see the same level of detail at each scale level. This premium basemap is ideal for use in the field for infrastructure inspections and in organizational basemaps used in focused web applications as well as a foundation to derive context for other GIS layers.

The Multispectral Imagery Service provides access to the original pixel values for all four bands (red, green, blue, and near infrared) of the 30-centimeter imagery. This dynamic image service is ready to use for rich image analysis and exploitation activities in ArcGIS for Desktop, ArcGIS Pro, web and mobile apps, and supported Esri partner applications. Native to this service are several views to aid in analysis. Users can view this service as color infrared, color normalized difference vegetation index (NDVI), and scientific NDVI.

While there are many types of imagery sources available on the market today, high-resolution aerial imagery provides an unprecedented quality and resolution that is not available from spaceborne sensors. These services are designed to support a wide range of industry needs.

With the increasing population throughout the world, effective agricultural and natural resource monitoring is critical. Through the use of these multispectral services, natural resource professionals can quickly and efficiently create information products such as species identification and forest stand maps as well as answer questions such as why crop yields aren't meeting current forecasts.

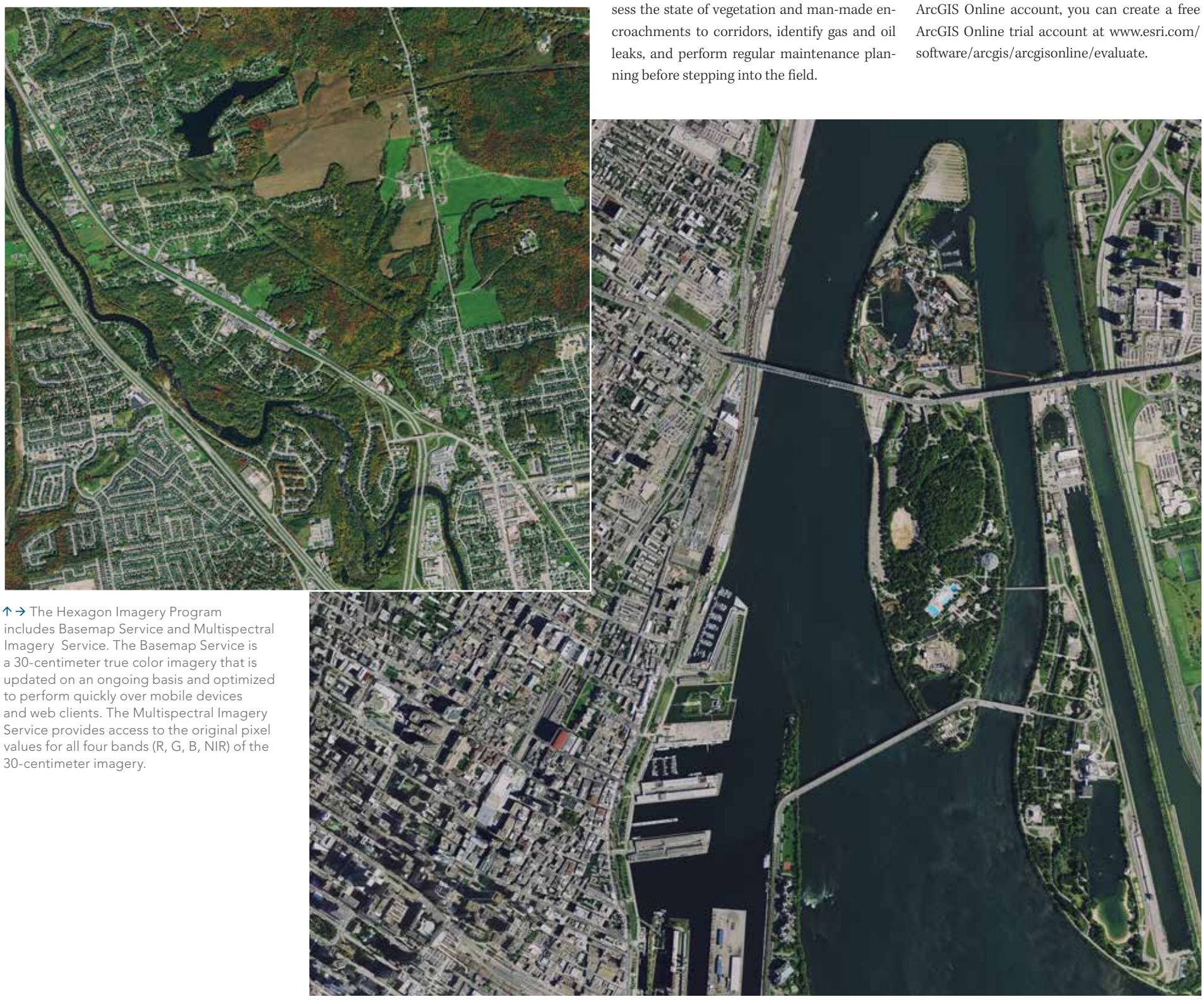
Local governments rely on aerial imagery for many critical tasks including tax assessment, emergency services, planning, and resource management. The time to contract for imagery collection, processing, and delivery has proved to be longer than most local governments would like. Additionally, the cost to store, manage, and serve this imagery to users has not been trivial. Through the Hexagon Imagery Program, the collection, storage, and serving of imagery have been streamlined through a set of cloud-based subscription services, freeing up staff to perform the critical tasks that keep our communities running smoothly.

Utilities manage assets that power our world. Many of these assets exist in locations that present extreme accessibility challenges. Instead of risking personnel, utilities rely on high-quality imagery to monitor and assess the condition of assets. Utilizing Hexagon Imagery Program subscription services, utilities can remotely assess the state of vegetation and man-made encroachments to corridors, identify gas and oil leaks, and perform regular maintenance planning before stepping into the field.

Access to these services is available through the ArcGIS Marketplace. These services are sold on a subscription basis for your areas of interest. A single subscription includes access to both the Basemap and Multispectral Imagery services. This unique bundling of capabilities lets organizations deliver both fast-performing basemaps and analytically capable multispectral services using just one subscription.

To see a sample of these two imagery services, go to the ArcGIS Marketplace and search Hexagon Imagery Program. Free 30-day trials are available to test drive the *Hexagon Imagery Program*. When a free trial is requested, it is provisioned within 5 to 15 minutes. Once ordered, the imagery service becomes available in 24 to 48 hours.

For more information, go to the ArcGIS Marketplace (marketplace.arcgis.com), find the Hexagon Imagery Program offerings, and select *Free Trial*. If you don't already have an ArcGIS Online account, you can create a free ArcGIS Online trial account at www.esri.com/software/arcgis/arcgisonline/evaluate.



↑ → The Hexagon Imagery Program includes Basemap Service and Multispectral Imagery Service. The Basemap Service is a 30-centimeter true color imagery that is updated on an ongoing basis and optimized to perform quickly over mobile devices and web clients. The Multispectral Imagery Service provides access to the original pixel values for all four bands (R, G, B, NIR) of the 30-centimeter imagery.

Demographic Data Expanded to 137 Countries

Accessible across the ArcGIS Platform

In December 2014, data for 57 more countries, including Latin America and Africa, was added to Esri Demographics global data. Each dataset is available across the ArcGIS platform in a variety of ways including ready-to-use maps and detailed reports. These datasets can also be exported in a file using GeoEnrichment services and combined with other data in a spreadsheet. The data is also available on ArcGIS Online and via apps such as Esri Maps, Esri Business Analyst Online, Esri Community Analyst, and Esri Insights.

The Canadian data was also updated to include the 2014 demographic updates. Three Advanced databases for Germany, India, and Australia offer more detailed attributes at lower geography levels and complement the data for these countries that is already available on the ArcGIS platform.

The Advanced database for Germany contains detailed data on age, purchasing power, ancestry, household size, tenure, lifestyle, vehicles available, and summarized business data—more than 400 attributes. This database is available at the Neighborhoods, Municipalities, Counties, and States geography levels. The data is available on the ArcGIS platform, through the GeoEnrichment services and in some web maps on ArcGIS Online.

The Advanced database for India contains data on age, employment, and caste and detailed data on housing, sources of drinking water, lighting, cooking, and latrine facilities. More than 80 attributes are included in this 2012 database at the Subdistricts, Districts, States, and Country geography levels.

Data for Australia includes a key subset of more than 820 variables available from the 2011 Australian Census of Population and Housing. The data is available at these geography levels:

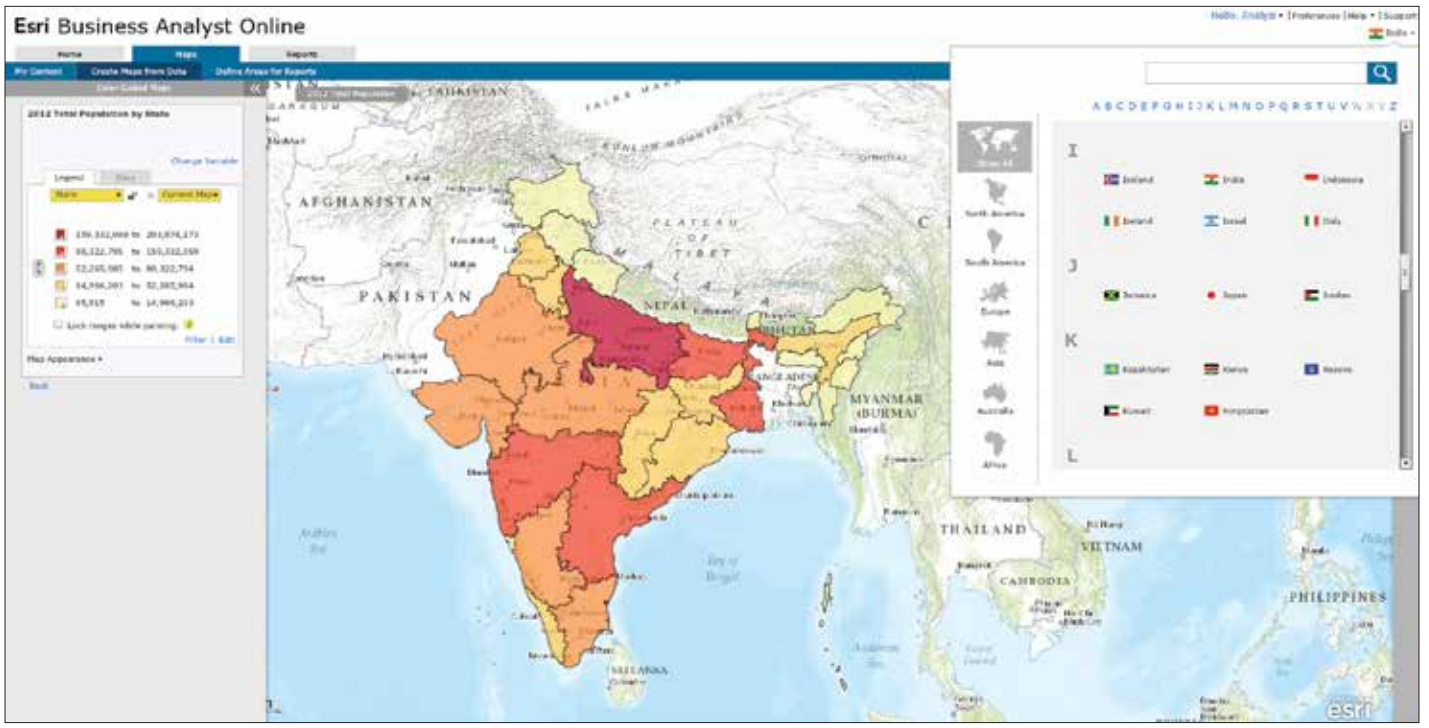
- Statistical Area Level 1
- Statistical Area Level 2
- Statistical Area Level 3
- Statistical Area Level 4
- Greater Capital City Statistical Areas
- States
- Country

The database contains detailed data on age, marital status, country of birth, language, religious affiliation, educational attainment, income, family composition, occupations, and dwelling structures. You can also access a selection of demographic web maps for Australia on ArcGIS Online.

New global data for Australia, France, Germany, and India is available from Esri Business Analyst Online or Esri Community Analyst. This data includes

- Summary reports for Household and Population for Australia.
- Summary reports for Business, Housing, and Household and Population for France.
- Summary reports for Business and Retail Centrality, Households, and Population for Germany.
- The Demographic Summary report for India.

For more information on accessing Esri Demographics global data, call 1-800-447-9778.



↑ The Advanced database for India contains data on more than 80 attributes at the Subdistricts, Districts, States, and Country geography levels. This map shows medical spending by district.

Make Brilliant Maps Quickly *with Confidence*

continued from cover

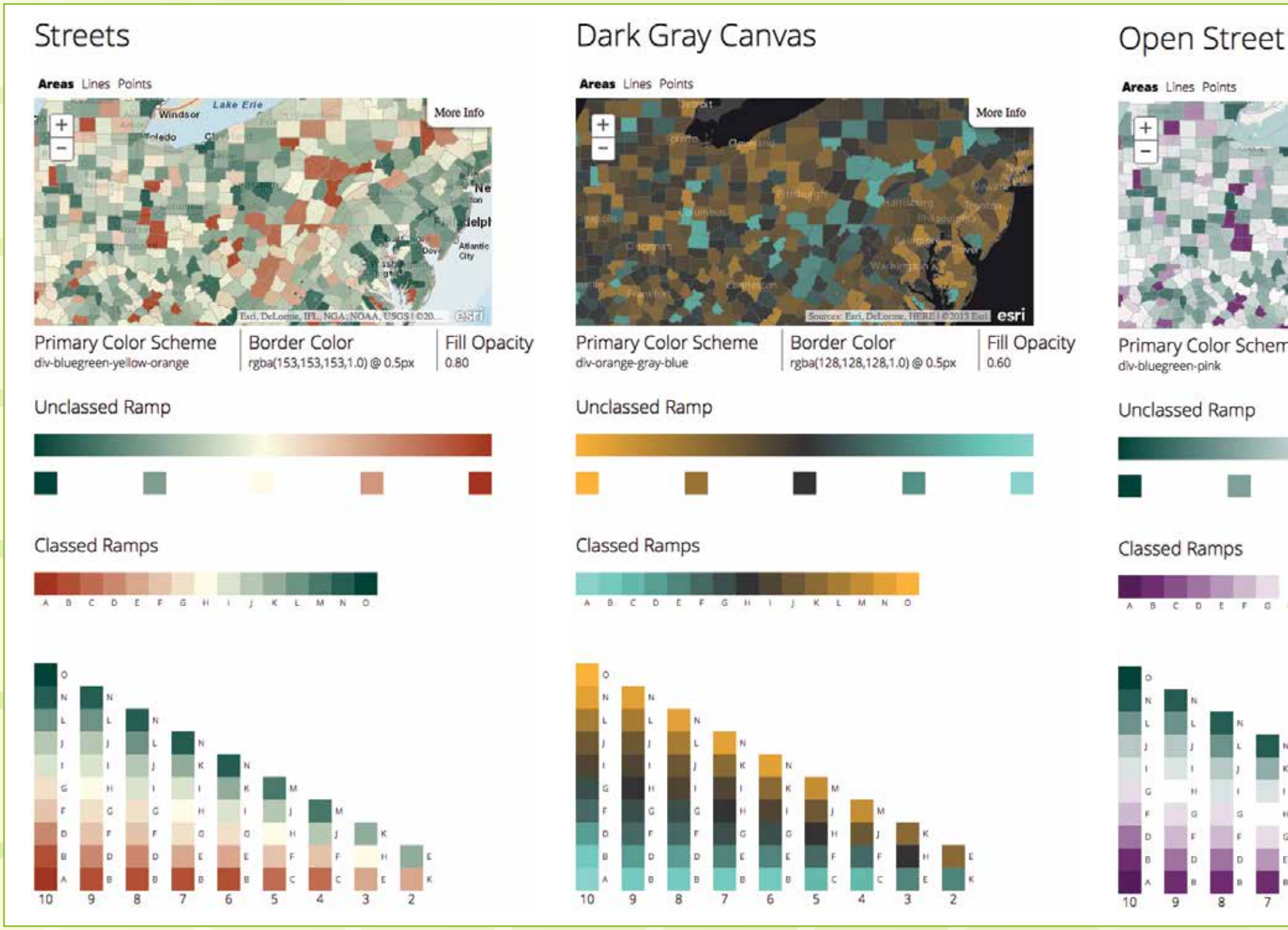
interconnected smart defaults that create data-driven workflows. Unlike dumb software defaults that are the same every time, smart defaults offer the right choices for the context.

The software analyzes data in the map viewer quickly in a variety of ways to display choices that are driven by the type of data in the map, the kind of map you want to create, and the kind of story you want to tell. For example, if you are making a map to show places that are above and below the national average for some characteristic, Smart Mapping makes this easy.

Esri's goal is to take the guesswork out of the hundreds of available settings and choices so your maps are cartographically appropriate and look wonderful. Even if you don't have a degree in cartography or GIS, you will be successful. This also means you can work much faster because you spend less time iterating versions of your maps.

Smart Mapping does not take control away from map authors or dumb down the map authoring experience. It just offers smarter initial parameters for the map (e.g., color, scale, styling). Mapping pros still have full control over map creation. Esri simply improved the process and removed defaults that provide the wrong choices for your data and story. Whenever possible, Esri has embraced a live styling philosophy so you can see the changes you're making almost immediately on-screen. Design is visual, so authoring tools should provide visual feedback. That's why Smart Mapping benefits novices and experts, making both more productive.

For example, Bounded Proportional Ramps is innovation added to handle the problem of extreme values and outliers overly influencing unclassed color ramps and proportional symbol maps. Rather than mindessly stretching a color ramp (or expanding the size of the symbols) to include the smallest and largest data values, the map author can now visually explore how colors and sizing are applied to the data, using the handles that are available in the histogram and ramp view. Values can be grouped together or certain parts of the data range emphasized. The initial position

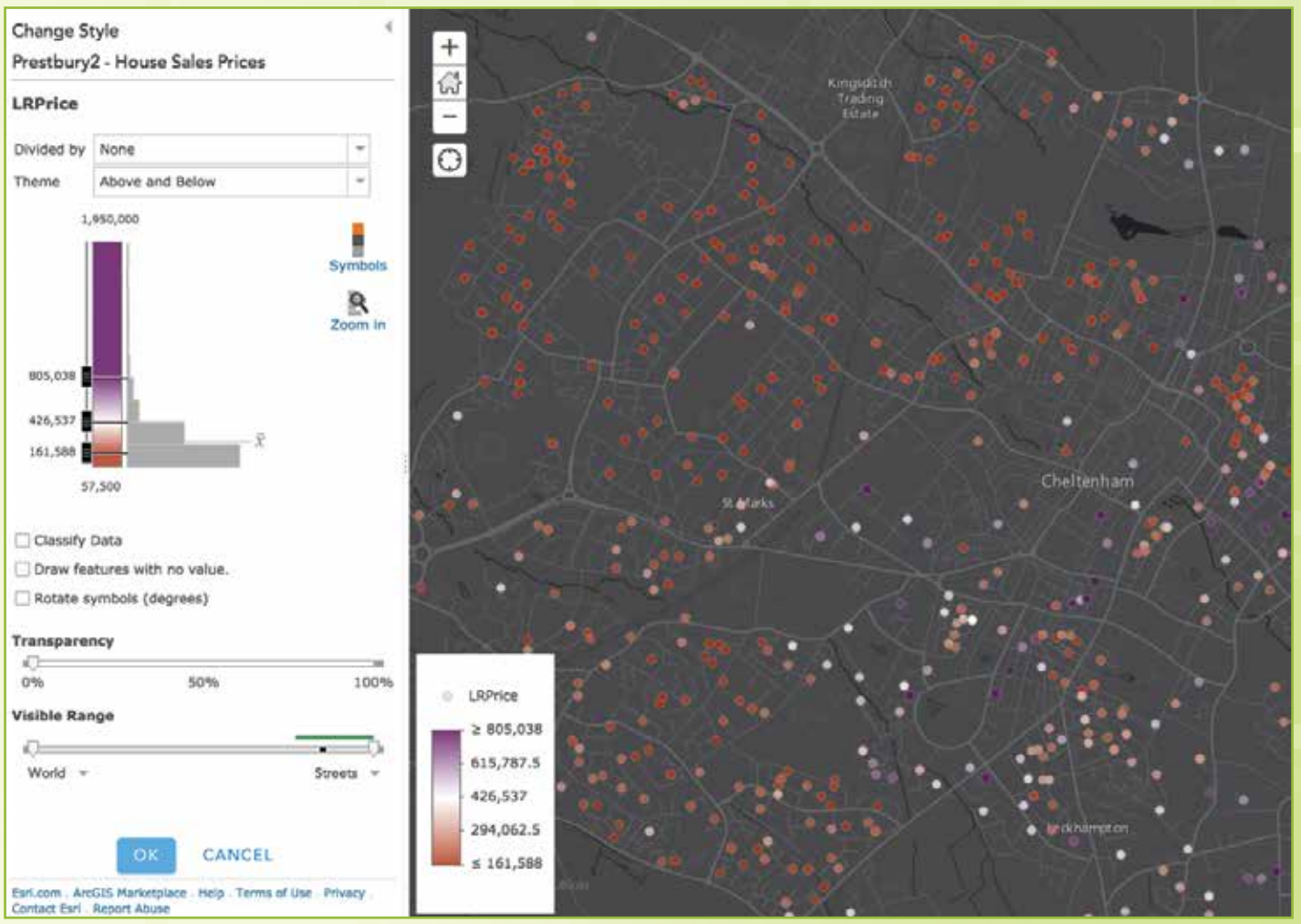


ArcGIS Online
What's New

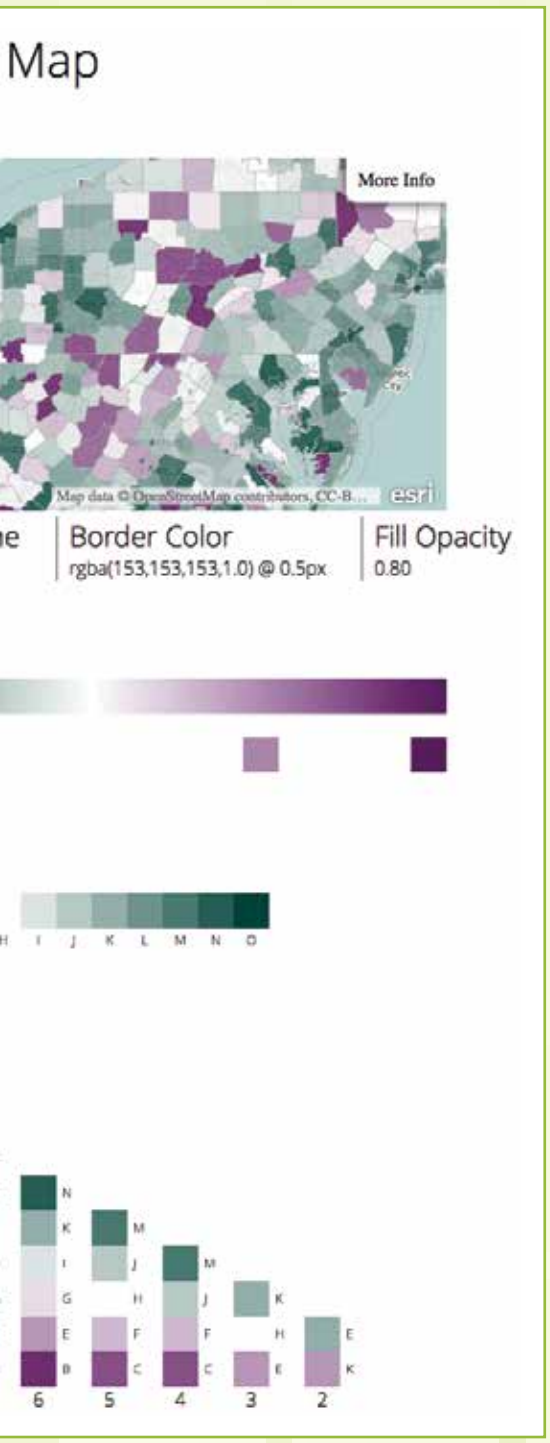
Some Questions with Answers

of the sliders is automatically determined by smart data-driven defaults that are based on a statistical analysis of the data.

Smart Mapping capabilities can support and improve your mapmaking. To learn about all the details of the ArcGIS Online February update, visit ArcGIS Online Help What's New at links.esri.com/arcgisnew.



↑ Smart Mapping provides cartographically sound defaults based on the data in the map viewer.



↑ The color ramps provided by Smart Mapping defaults are keyed to the basemap you are using so everything will harmonize.

Can ArcGIS Online make cartographic choices, such as picking the right colors, line weights, and opacity, so they harmonize with the basemap I am using (e.g., World Topographic Map or National Geographic World Map)?

By automatically coordinating styling to harmonize with basemap tiles, Esri gives you pro-level design right out of the box. No single default color scheme or color ramp looks good or performs well on all basemap tile sets. Esri has taken the guesswork out of this process by creating professional and reliable colors and styling specs (line weights, border colors, opacity amounts) custom designed to pair with data displayed on Esri basemaps. This builds on the earlier success of the Color Brewer schemes by introducing a new series of professional multihued, perceptually graded color schemes for categorical, sequential, and diverging color ramps, along with improved unique value and single symbol color specs.

Although this is its first appearance, Smart Mapping is a new mapping philosophy and approach to cartography that will infuse all of Esri's mapping tools.

Can ArcGIS Online automatically determine and set the appropriate zoom levels for this map based on my data?

Yes. Interactive maps must have a maximum and minimum zoom level (also known as the visible range). Setting these scale limits properly is essential but somewhat tricky, but ArcGIS Online handles this for you.

How can I identify appropriate ways for mapping my data?

The new gallery browser in the map viewer will let you quickly determine which choices will be appropriate so you can decide which will give you the best way to represent your data.

New to ArcGIS Online?

Sign up for a free trial. As part of your ArcGIS trial, you also get to try out ArcGIS for Desktop, which includes ArcGIS Pro and a number of other apps, such as Explorer for ArcGIS, Collector for ArcGIS, Operations Dashboard for ArcGIS, and Esri Maps for Office. Plus you get to invite up to four other colleagues to the trial, so you can see how easy it is to make maps and share content. Sign up today at esri.com/agoleval.

National Statisticians Embracing Location-Based Information

By Dr. Paul Cheung, National University of Singapore

In August 2014, the official statisticians of 75 countries joined their geoinformation counterparts in a United Nations (UN) Global Forum to find common ground for integrating geospatial and statistical information.

This is the culmination of a process initiated in 2011 when the United Nations approved a new intergovernmental body to deal with Global Geospatial Information Management (UN-GGIM) and organized the first-ever discussion among the statistical and geoinformation communities on the potential integration of data processes and protocols. In 2013, the United Nations Statistical Commission, in its 44th session, officially endorsed a program of work to develop a statistical-spatial framework as "a global standard for the integration of statistical and geospatial information."

In many countries, the process of working together across disciplines and organizations to integrate multiple sources of information to meet user needs has gained momentum and recognition. The urgent need to introduce global standards will add impetus to this momentum.

A Paradigm Shift

National Statistical Organizations (NSOs) are the governmental institutions responsible for the collection and dissemination of economic, social, and environmental statistics. NSOs are not new to location-based information. The enumeration districts (EDs), a key deliverable produced from NSOs, supply the backbone for organizing population, housing, agriculture, and economic censuses.

EDs form the basis of statistical maps and delineate polygons used for data input. They are designed for a practical purpose. EDs divide enumeration work into manageable groups of units. However, ED boundary lines do not necessarily coincide with the administrative boundaries, so census maps very often have their own with distinct boundaries and characteristics. Most NSOs use basemaps obtained from their national mapping agency and modify them as necessary to create EDs. Organizationally, a small unit in an NSO will update EDs and other geospatial features.

Establishing global standards for integrating official statistics with geospatial information builds on the existing contributions of the statistical community through establishing a hierarchy of EDs. This bold move will unlock potential contributions by the statistical community and the vast pool of data it compiles and manages.

In the past, NSOs have tended to focus on the compilation and release of national-level data, rather than location-based information or small area geography. International data dissemination protocols have yet to address best practices in the release of local-level location information. The statistical community recognizes that there is much to be done and has reviewed a range of important topics, from institutional arrangements and regulatory compliance to technical data issues.

Global Standards

Two issues have emerged as priority areas for further discussion. The first issue concerns the size of the smallest statistical area in the hierarchy of statistical units for public release. Censuses are increasingly collecting information based on x,y coordinates, implying the geocoding of individual households or establishments. While this is extremely useful for backroom compilation and analysis, it poses a problem when used as the basis of data aggregation and analysis because of confidentiality concerns.

Safeguarding the confidentiality of information is a key element of the official statistical system. The Fundamental Principles of Official Statistics, first drafted in 1994 and recently endorsed by the United Nations General Assembly, states clearly that "individual data collected by statistical agencies for statistical compilation are to be strictly confidential and used exclusively for statistical purposes." This international standard has a profound constraining impact on how NSOs manage their data and how they define the smallest statistical area. It is obvious that data based on x,y coordinates will never be publicly released as the basis of data aggregation.

The official statistical community understands there is an urgent need to do something and to link "socioeconomic and spatial information to improve the relevance of the evidence, on the basis of which decisions will be made," as stated by the UN Statistical Commission. It further recognizes the merits of employing consistent practices in defining a common set of hierarchical geographic boundaries, which coincide with the hierarchy of statistical areas.

At present, official statisticians appear to be comfortable with defining the smallest geographic area as comprising about 300 to 400 people. This will be a significant improvement from current ED-based statistical maps.

To create this hierarchy of statistical areas, there is still much work to be done to improve the geocoding framework of many countries. A consistent system of house addresses—the simplest form of geocoding—is still lacking in many countries.

How should a country design an efficient geocoding system for public use? What should be the key features of such a system? Can we make them comparable across countries? These questions are critical for the development of comparable and consistent systems of statistical areas across countries.

The second technical issue to emerge addresses the relative merits of grid versus administrative boundaries as the basis for aggregating statistical areas. The grid system builds on the Nomenclature of Territorial Units for Statistics (NUTS) protocol endorsed by the European Commission, which uses a grid to divide Europe into uniform areas, disregarding administrative boundaries.

However, the administrative boundaries system is more commonly used. The two systems could be developed simultaneously for meeting different needs. A grid system could ultimately evolve into a global grid that divides the world into uniform areas with measurable socioeconomic characteristics.

A New Information Era

The world of information is changing rapidly. NSOs are aware that they need to move with the times to meet the needs of users. A new information architecture—comprising official statistics, geoinformation, and unstructured big data—will be the new order of the day. Official statisticians will no doubt play an important role in this new world as they modernize their practices and bring a wealth of information to bear in support of evidence-based decision making. There are important technical and governance issues to be resolved. Will NSOs take up this challenge and capture center stage in this new information architecture?

For more information, contact Dr. Paul Cheung at paul.cheung@nus.edu.sg.

About the Author

Professor Paul Cheung, a national of Singapore, is professor of social policy and analytics at the National University of Singapore. He also serves as an adviser to many governments. In 2013, he returned to Singapore after serving for nine years as the director of the United Nations Statistics Division (UNSD). In that position, he facilitated the development of the global statistical system and coordinated the work of the UNSD. In 2011, his initiative established an intergovernmental platform to address issues on Global Geospatial Information Management that was endorsed by the UN. This global multilateral mechanism addresses critical issues on geospatial information, and a series of high-level meetings have been held. Prior to his appointment at the UN, he served as chief statistician of the Government of Singapore (1991–2004) and is currently the chair of International Steering Committee on Global Mapping, an intergovernmental body with secretariat in Japan. He has received many national and professional awards.

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An Operational Platform Fit for a Kingdom

Data for the seven million customers who rely on the Saudi Electric Company (SEC) for power generation, transmission, and distribution was transferred from paper maps and CAD files to a GIS so it could be used for monitoring and optimizing operations and integrated with other business systems.

Marked-up maps proved to be an unwieldy method for managing asset data for SEC's rapidly growing customer base. These maps held data for a transmission network which exceeds 30,000 miles (54,000 km) and a distribution network that is approaching 300,000 miles (465,500 km) in length.

SEC turned to German-based AED-SICAD, maker of the Esri-based ArcFM UT solution. ArcFM UT is a product suite that integrates utility data for spatial applications. AED-SICAD, its local business partner Al Moammar Information Systems (MIS), and Esri helped SEC make ArcFM UT its framework for managing the utility's explosive operational needs.

Converting the Paper Trail

SEC and its three solution providers kicked off the project. To start, they established a common data model. Based on this model, they configured ArcFM UT. Then the hard work started.

SEC data lived on paper maps and in CAD files. The hard-copy maps had survived but were covered with numerous scribbled corrections in various inks. Converting this data required many hours of tedious work.

An offshore conversion team regularly touched base with SEC to resolve data discrepancies between the paper maps and CAD files. For example, Substation XYZ might be located between parcel 51 and parcel 53 on a scanned paper map but be shown between parcels 53 and 55 in the CAD file. Other times, Substation 123 on a hard-copy map might be labeled as Substation 234 in the CAD file.

The offshore team and the solution providers worked together to ensure data integrity. MIS electrical engineers oversaw the offshore team. The utility's employees made regular offshore visits to fully supervise data digitization. With the maps converted, the teams were ready for the pilot phase.

A Capital Plan

SEC chose Saudi Arabia's capital city, Riyadh, for the pilot rollout. Riyadh has 1.5 million SEC customers—more than a fifth of the utility's customer base.

The teams installed ArcFM UT Web, a portal that lets a utility distribute data internally and externally. ArcFM UT Web runs on ArcGIS for Server. With it, desktop users at SEC's regional Riyadh offices could access the central database with Citrix clients.

SEC needed some customization so AED-SICAD and MIS tailored an interface for the utility's proprietary mainframe database. The mainframe contained all SEC's customer and meter information in alphanumeric format. AED-SICAD and MIS configured automatic updates at regular intervals on ArcFM UT. They developed the product suite further to display the sum of all loads for each component in the database. Engineers could quickly scan loads on feeders, transformers, service points, and other assets for connectivity answers. If an asset exceeded its load, the solution generated a warning.

Repeating the Rollout Regionally

The Riyadh pilot was a success. SEC entered into an enterprise license agreement (ELA) with Esri and AED-SICAD and rolled out the ArcFM UT solution regionally. In phase two, the solution went live in Jubail and Hufuf in the east. Next it was rolled out in the south region of Abha and Jizan. The remaining regions sometimes lacked data so SEC collected field data before implementing ArcFM UT.

SEC refined and unified the data model throughout all regions. "The data model is the backbone of the GIS," said Omar Al-Twaijri, GIS manager of SEC Central Office. "New requirements, like telco objects, had to be integrated. The enterprise unified data model will be further updated in a strict versioning scheme."

With the new database, all the utility's stakeholders can contribute information or make requests to the data model. The SEC's central office also upgraded to 10.2.1, the latest version of ArcFM UT.

More Integration Planned

SEC has planned to integrate ArcFM UT with other IT systems. These systems include the utility's internal business workflows, which guide the connection of new service points and the unified distribution system (UDS) that informs internal workflows, as-built documentation, and more. Finally, SEC is integrating ArcFM UT with its network calculation packages and field force management system.

ArcFM UT offers full integration with these and other systems.

SEC credits the ArcFM UT solution with making "a tremendous effort to bring the first project phase, implementation of Riyadh, to a successful end." Considering this "a very good achievement," SEC plans greater exploitation of ArcFM UT as Saudi Arabia continues to grow.

For more information, contact Omar Al-Twaijri of SEC at oatwaijri@se.com.sa or +966 (11) 8079037; Mahmoud Sadeak of MIS at mahmoud.sadeak@mis.com.sa or +966 920000334800; or Florian Brandi-Dohrn of AED-SICAD at Florian.brandi-dohrn@aed-sicad.de or +49 (89) 45026 217.

→ Paper maps contained vast amounts of complex data but were burdened with numerous inked-in corrections, improvements, and updates.

↓ An SEC GIS analyst works on new service points with the ArcFM UT solution on the Esri platform.

Collaboration Key in Corridor Selection

By Sarah Alban, Esri Writer

An Australian utility adopted a GIS-based process for siting corridors for its transmission lines that is successful because it fosters collaboration and represents all stakeholders' concerns.

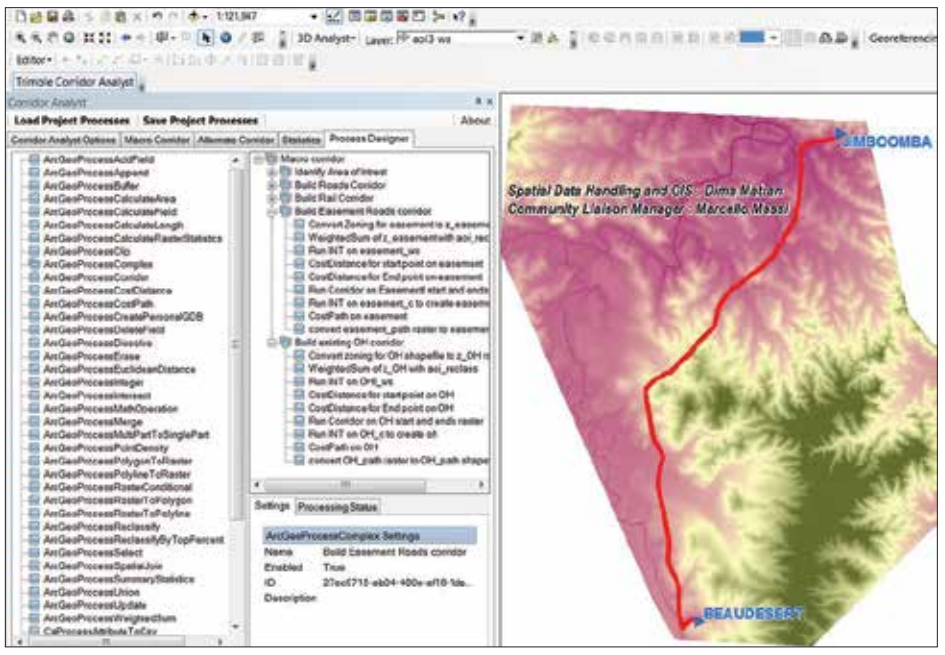
Energex produces and distributes electricity to 3.2 million customers in South East Queensland, Australia, which is one of the country's fastest-growing communities. Government owned, Energex has seen explosive growth the past 10 years. The utility has grown by 30 percent during that time. Its asset base, which is now worth about US$11 billion (AUS $13 billion), includes 650,000 overhead poles and more than 36,000 miles (58,000 kilometers) of wire and cable.

Previously, Energex outsourced its corridor-expansion selection. Outsourcing had its benefits, but the reports generated were costly and offered just one recommendation, based on one moment in time. Each report cost US$70,000 to $130,000 (AUS $80,000 to $150,000).

ideas and visually communicate them. It needed to efficiently get stakeholder buy-in so the project would be accepted more quickly.

Energex found the solution in Trimble's Corridor Analyst, an ArcGIS extension that is built on the ArcGIS Spatial Analyst extension. Corridor Analyst is more than a robust line-siting tool—it was the gateway to a collaborative, methodical framework that Energex needed to engage its internal and external stakeholders. The liaison team believed the tool provided a framework that empowered both groups with partial ownership over the route selection process.

To gain internal buy-in, the liaison team took Corridor Analyst on an internal road show, demonstrating the software's capabilities. Colleagues in the environmental, planning, strategic planning, detail design, and construction departments could see that Corridor Analyst incorporated their department's unique requirements and data.



↑ Trimble Corridor Analyst generates maps that show a corridor choice from environmental, technical, and social perspectives.

Since the report came from an external source, it was hard to foster ownership of it or its conclusions, and buy-in was generally low. This made it difficult for Energex to defend proposed corridor plans to communities, and projects became vulnerable to stalling.

But all that changed in 2012. The public and regulators were scrutinizing transmission projects more closely at a time when the growth in energy demand had slowed. The Community Liaison Group at Energex saw this as an opportunity.

At issue was how to engage internal and external stakeholders without increasing project timelines. The liaison team wanted a more inclusive, flexible, analytical—and thus defensible—approach to corridor selection. The team wanted an efficient solution that enabled key groups at Energex to collaborate at the start of each selection project so that the process could grow organically.

The solution needed to be cost-effective, accommodate multiple needs, and support regular modifications. It needed to illustrate proposed

The road show redefined Energex's understanding of collaboration. Corridor Analyst connected critical data pipes across the company. It chose transmission routes based on accurate, comprehensive data that included internal requirements and community input.

Collaborating on Corridors

In the past, Energex worked from a static report that furnished a single solution. Now Energex works from a dynamic report generated by the Corridor Analyst extension. Teams study multiple linear routing scenarios and refine calculations to plot the path of least resistance.

At the beginning of the corridor selection process, the Community Liaison Group gathers environmental, social, and technical datasets and uses ArcGIS to generate a map of the area. Based on known constraints, technical teams rank the suitability of different features. A national park, for instance, generates a score of 10, indicating that this is the least suitable area for placing an overhead power line. In contrast, rural land generates a score of about 3 because it is a more suitable location for overhead power lines.

The software uses these scores to calculate optimal corridors that are displayed as a color-coded heat map. The heat map illustrates the best corridor locations from environmental, technical, and social perspectives. The team then shows these options to internal and external stakeholders, who refine them. Each consultation adds considerations that help better assess and rank a corridor. After incorporating these considerations, Corridor Analyst generates another map.

With the refined corridor map, Energex personnel build route alignment alternatives, using more detailed data. The final transmission line, an amalgamation of the top environmental, technical, and social choices, best represents all stakeholders' concerns.

Local authorities and residents can now contribute to regional development as part of the corridor selection process. Costly project stalls are less likely because this collaborative corridor selection process lets everyone involved in siting make decisions that are better informed and more objective. Optimal corridors are built using a flexible framework that incorporates quantifiable and defensible methods. Clearly, selecting a tool that emphasizes collaboration with all key stakeholders has been a sound route to take.

↑ By providing a framework to involve external stakeholders and evaluate siting criteria, the rapidly growing utility, Energex, can provide objective guidance and reduce the risk of delays caused by objections to corridor alignments.

Crime Analysis That Goes Beyond Dots on a Map

By Jonathan Gross, Baltimore City Health Department, and Shannon Cosgrove, Deputy Director, Mayor's Office on Criminal Justice

In its law enforcement efforts, the City of Baltimore uses mapping and spatial analysis as a fundamental tool for making decisions and efficiently targeting resources.

Violent crime is a significant problem in the United States. According to national figures compiled by the FBI, homicides claimed more than 14,000 lives in 2013 with 69 percent of those deaths attributed to firearms. Youth are disproportionally affected. Homicide was listed by the Centers for Disease Control and Prevention as the second leading cause of death among 15 to 24-year-olds in 2012.

Mapping and spatial analysis of crime and risk-related data is an essential part of any violence prevention program, whether driven by law enforcement, public health, other government agencies, community-based organizations, or nonprofits. Many of these organizations work on multiple projects together. Maps are a great way to communicate the many effects of crime on health and well-being to all audiences.

Although there are many research studies about using GIS for crime prevention and health analysis, applying GIS to the prevention of youth violence is not a well-covered topic. Using maps to tell this story can be a powerful tool for intervention.

Unfortunately, crime data is not always mapped and visualized efficiently. There is an overreliance on certain techniques, such as density methods. Each spatial technique has advantages and disadvantages. Many mapping and analysis capabilities in ArcGIS have been used by the city to help visualize the relationship between crime incidents, risks, victims, and offenders and tell a timely story from outreach workers to senior city leadership.

In the Baltimore City Health Department, three youth violence prevention programs—Operation Safe Kids, Safe Streets, and Dating Matters—use ArcGIS Online, publicly available data from Open Baltimore (data.baltimorecity.gov/), and confidential data. Many of these spatial products created are used to guide city-wide prevention efforts, such as the Violent Crime Reduction Enhancement Initiative led by Mayor Stephanie Rawlings-Blake.

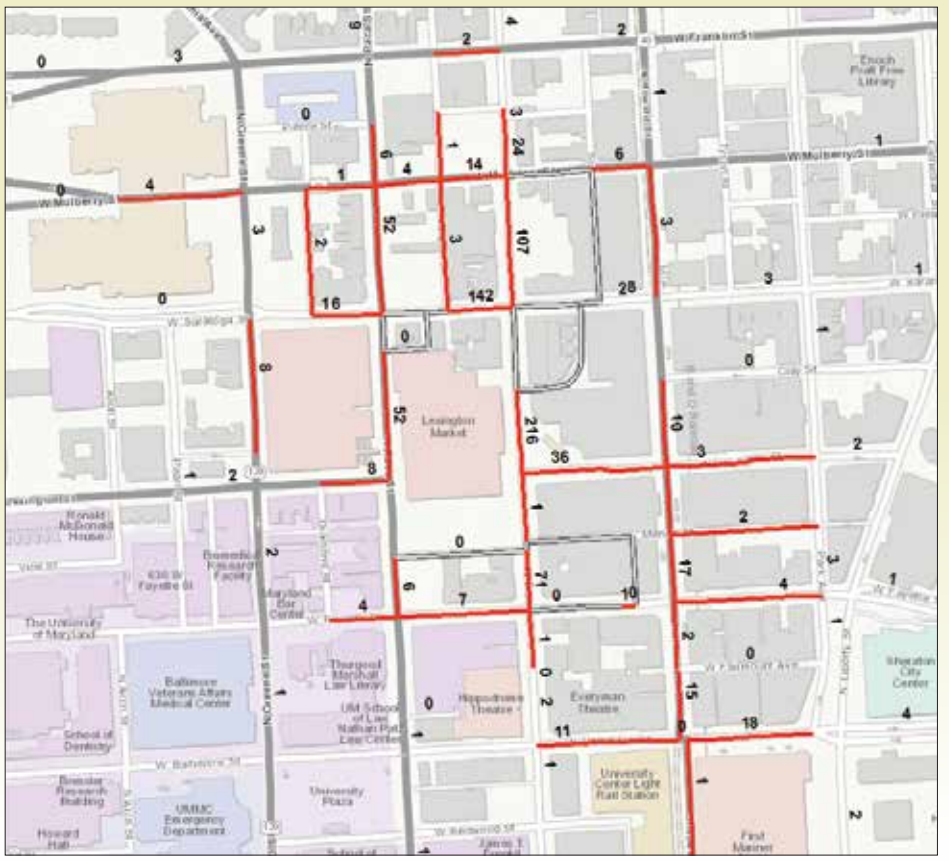
Safe Streets Baltimore (health.baltimorecity.gov/safestreets), an integral part of violence prevention in Baltimore, is a community-based outreach and conflict mediation program designed to prevent shootings. Outreach workers and specialized violence interrupters are given maps showing the locations where violent crimes have been committed and hot spots maps showing areas with high concentrations of crimes to guide them.

The Baltimore Community Map on ArcGIS Online provides a quick and easily understood view of the community. The default crime symbology in ArcGIS can be edited to display the locations of violent crimes. Pop-ups can be configured to supply the dates of occurrence and other information. Crime data often overlaps, so changing symbol levels in ArcMap layer properties and using Maplex Label Engine (now included with ArcGIS for Desktop) helps prioritize certain types of crimes such as shootings and homicides. When looking for gun offenders and other key individuals, effective labeling helps to make maps more readable.

Plan for Today and the Future

Site selection is crucial for violence prevention programs. Selecting sites based on a set of criteria improves the efficiency and effectiveness of program operations. In addition, maps and map products can be a requirement for obtaining federal violence prevention grants.

Another of the city's youth violence prevention programs, Dating Matters, is a Centers for Disease Control and Prevention-funded research and educational program for middle school students. Using ArcGIS, schools for the program are identified based on factors such as location in an area with high poverty levels



↑ Spatially joining point data for arrests with street segments helps illustrate the concentration of drug arrests in a single year around Lexington Market, which has been declared ground zero in the war on crime by Baltimore's police commissioner.
Data source: Open Baltimore, BPD Arrests

or location in or near areas with high occurrence of violence. This data is given to project directors.

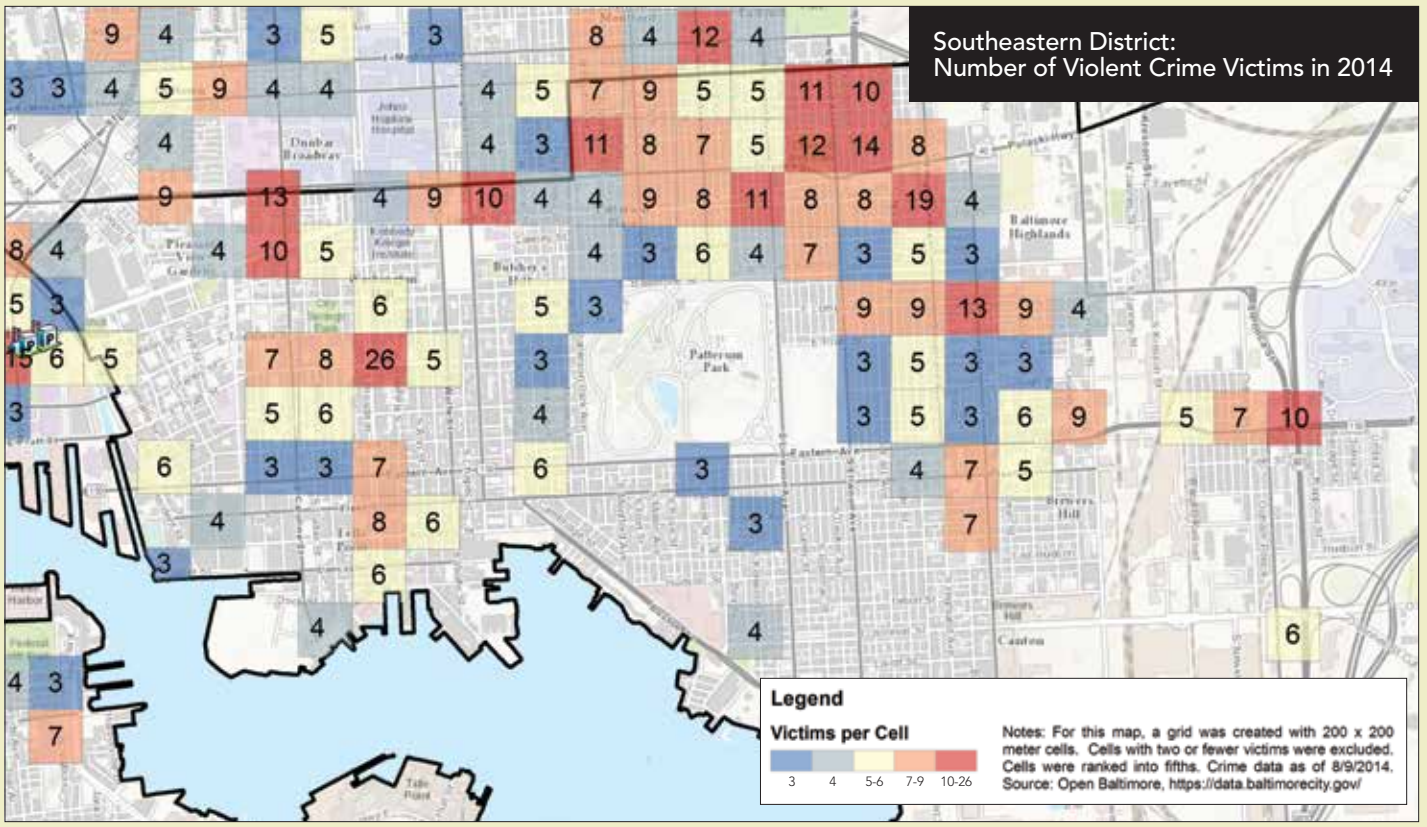
Site selection maps produced in ArcGIS have also been recently used in two successful grant applications made by the city. One of the maps showed rates for youth under 25 years of age, who were shot, clustered using local indicators of spatial autocorrelation (LISA). Another map illustrated shooting victim locations over a period of several years, grouped by police posts and displayed using bar or column charts.

More Than Dots on a Map

Lastly, maps are key to the strategic decision-making process for reducing violent crime and troubleshooting nuisance areas where crime frequently occurs. In addition to density mapping, ArcGIS has other functionality for visualizing crime and risk-related data. Mean and median centers of shootings by year can be created using tools in the Spatial Statistics toolbox. The Integrate and Collect Events tools help visualize repeat addresses.

Creating a fishnet (grid) in ArcGIS allows various types of crime data to be summarized and compared using spatial joins. One advantage of this technique over density mapping is that the number of crimes in each equal-sized cell can be labeled. Fishnet maps are an easy way to communicate the concentrations of crime in specific areas to senior leaders.

Crimes and enforcement efforts are often concentrated in specific segments of streets or microplaces. Spatially joining point data to street segments can show this. Other pattern-oriented tools available in ArcGIS include global and local LISAs and regression tools that provide support for choosing one area over another for an intervention. In addition, these analyses can help explain why local variation occurs, even in high-risk areas.



↑ With the Fishnet tool, the number of crime victims can be summed for an area, classified, and labeled. Data for one of the gridded hot spots, McElderry Park, is being used not only to build relationships with the police but also to bolster development as a strategy for warding off crime. Data source: Open Baltimore, Part I Crime Data

Mapping Risks of Future Crimes

Traditionally, crime incident data has been mapped to include offender and victim information. However, many researchers and practitioners are also mapping risks or creating risk terrain models—namely shootings and homicides—to predict crimes. Densities of different risks can be overlaid and summed using the Raster Calculator and other raster-based functionality. Data in models can include locations for gun offenders, liquor stores, and vacant residences. Raster layers can be transformed using vectorization. Past, present, and future crime incidents can be summed to help validate the model.

Getting Maps Online

Mapping more than crime incidents is important. Ultimately, getting good maps of crime, risk, protective factors, and community assets online can help all partners better troubleshoot crime's causes and distribution, whether that distribution is spatial, temporal, or both. ArcGIS Online is a great way to create an interactive map that displays the names of assets and contact information on the fly for planning purposes or sharing with a wider audience.

For more information, contact Jonathan Gross at Jonathan.gross@baltimorecity.gov.

About the Authors

Jonathan Gross is an epidemiologist with the Baltimore City Health Department, Office of Youth Violence Prevention.

Shannon Cosgrove is the deputy director of the Mayor's Office on Criminal Justice.

A Plan for Cleaning Up Disaster Debris

By Matt Werner and Catherine Bohn

Following Hurricane Sandy in 2012, the City of Philadelphia, Pennsylvania, began developing its first comprehensive debris management plan to provide coordinated and efficient debris removal. Esri partner Dewberry, a consulting firm, used ArcGIS to evaluate sites that would be used to process disaster-generated debris.

Not only would better debris removal expedite recovery efforts, it would improve opportunities for reimbursement through the Federal Emergency Management Agency (FEMA) Public Assistance Grant program.

As part of this major planning effort, the City of Philadelphia Office of Emergency Management (OEM) recognized that the advance selection of suitable debris management sites—temporary locations to store, reduce, segregate, and process debris before final disposition—would be critical to effective recovery efforts following a major disaster. *Public Assistance: Debris Management Guide* published by FEMA identifies the advance selection of debris management sites as a best practice for debris management planning.

OEM, in coordination with the Southeastern Pennsylvania Regional Task Force, selected the consulting firm of Dewberry to evaluate available space in the city to process disaster-generated debris. The scope of this effort included forecasting potential quantities of debris that might be generated under select scenarios and assessing the suitability of 30 potential locations. The geospatial analytic capabilities in ArcGIS were instrumental in Dewberry's efforts to develop the forecasts, analyze the sites, provide detailed documentation, and meet the deadline. OEM will use the data gathered from this project to identify and activate the most suitable temporary debris sites during a disaster.

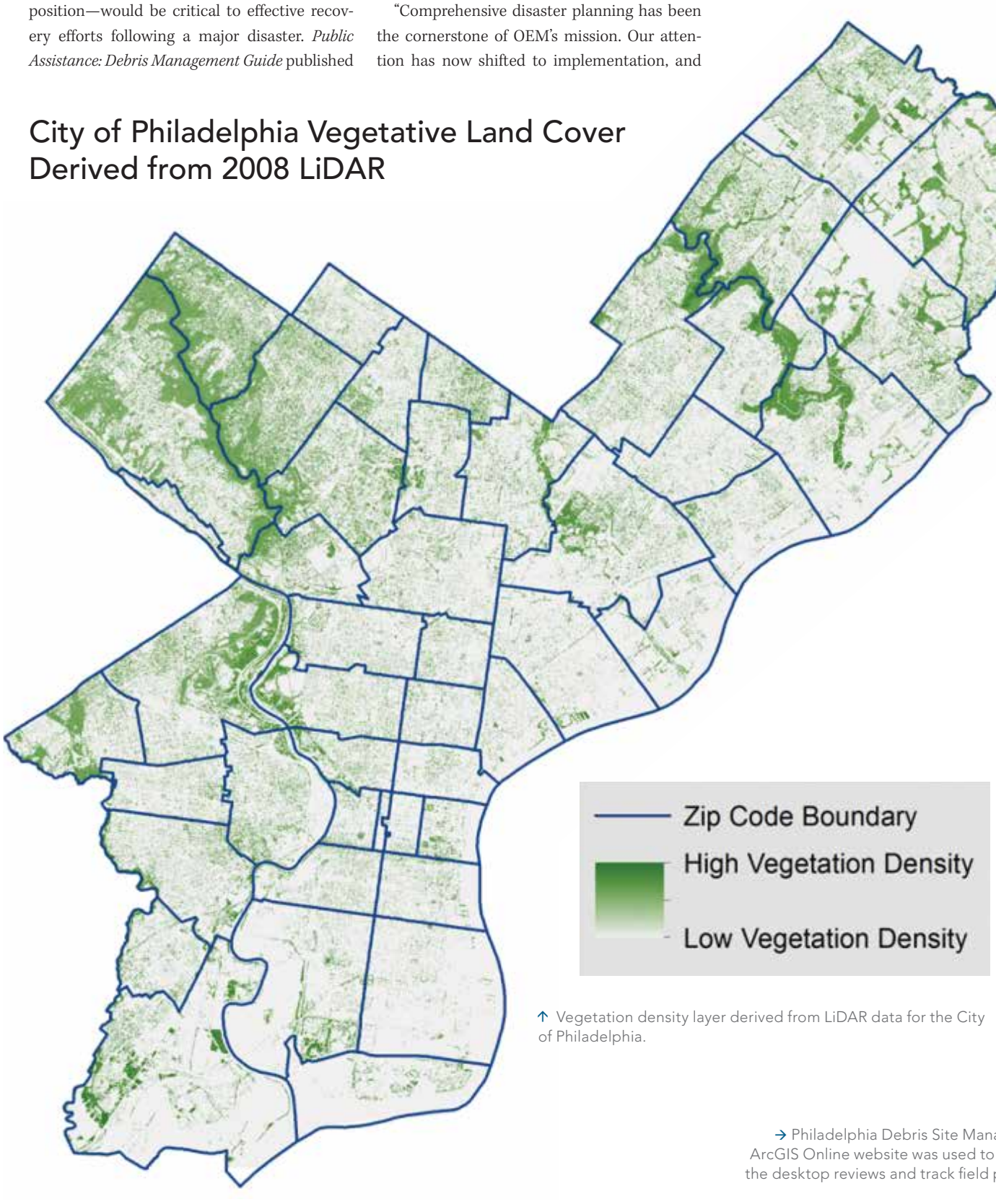
"Comprehensive disaster planning has been the cornerstone of OEM's mission. Our attention has now shifted to implementation, and we specially focus on the operational integrity of our plans. This study is a great example of ensuring operational integrity and supports our ability to deal with debris in a major event," said Samantha Phillips, director of emegency management for the city.

Site Screening and Debris Forecasts

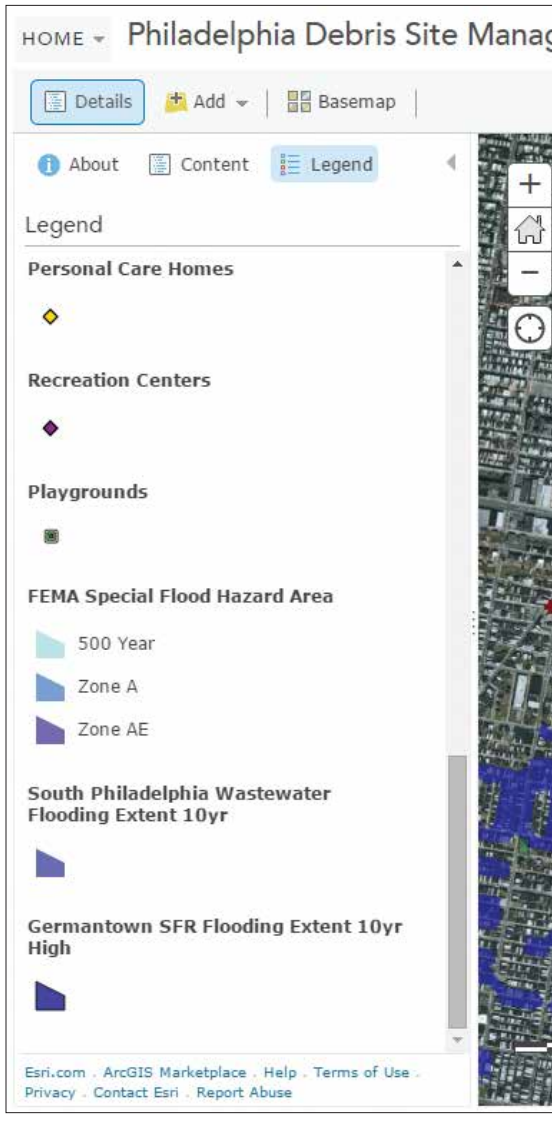
The list of 30 potential debris management sites (DMS) was prepared with the input of nearly a dozen agencies, including OEM, the Philadelphia Planning Commission, Streets Department, Water Department, Department of Parks and Recreation, the Pennsylvania Department of Environmental Protection, and the Pennsylvania Emergency Management Agency. In generating this initial list, the city's evaluation criteria included the size and capacity of the property, its type of ownership (publicly owned properties were preferable), whether or not the site was paved, ease of access, and potential issues with prior environmental contamination.

During the first phase of analysis, Dewberry applied debris volume forecast models based on three disaster scenarios selected by OEM. These scenarios—a 1-inch ice storm, a 500-year flood event, and a Category 1 hurricane—are events that the city could likely experience. Forecast findings provided a basis for determining overall DMS acreage requirements and assessing individual site suitability. In addition to general debris forecasts, the team assessed potential quantities of debris that would become the city's responsibility, such as debris in parks as well as debris located in roadways and right-of-way areas that would be eligible for FEMA funding.

The information gathered about potential sites and assessed included details such as proximity to fire departments and landfills; proximity to sensitive areas such as residential neighborhoods, schools, and hospitals and position relative to prevailing winds; environmental sensitivity; and preexisting site characteristics including site security, fencing, utilities, roads, drainage, lighting, and proximity to major roadways. Using the tools in ArcGIS, a combination of LiDAR and a vegetation cover data layer was used to determine the density of vegetation. This enabled the team to project the



↑ Vegetation density layer derived from LiDAR data for the City of Philadelphia.



→ Philadelphia Debris Site Management ArcGIS Online website was used to perform the desktop reviews and track field progress.

potential for downed trees in roadways, which was a more likely scenario in the northeast and northwest parts of the city.

Dewberry then screened for each site based on GIS data provided by several of the agencies. The Philadelphia Debris Site Management ArcGIS Online website was used for screening of sites as well as tracking the progress of the field surveys and viewing geospatial data while in the field.

In addition to the city's initial criteria, factors such as current zoning and land use; environmental and historic preservation issues; and proximity to residential zones, critical facilities, and other sensitive locations were also considered. Proximity of potential sites to other locations was calculated using a shortest route analysis available from ArcGIS Online. Data for historic districts and properties was also made available through the ArcGIS web application.

Field Assessment

Following the desktop reviews, Dewberry team members conducted field surveys to collect and verify additional data. During the field surveys, several photographs were taken of each site. For a select number of sites, interviews were conducted with personnel who were familiar with the site layout and its operational challenges. A diagram was created for each site detailing its entry and exit points; the direction of travel within the site; the location of monitoring towers; dumping and processing areas; and staging areas for household hazardous waste. These diagrams will help the city ensure a turnkey process for debris operations in a major event.

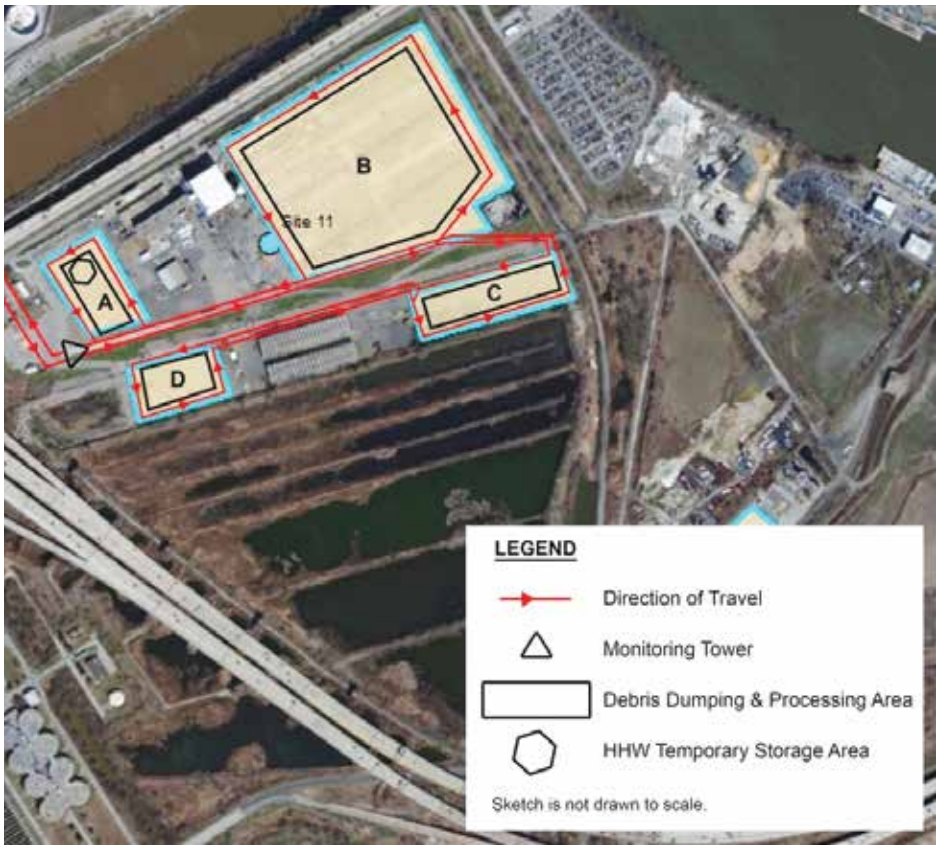
Categorizing Debris Types

With this extensive data, the team produced a qualitative assessment of the types of debris that could be processed or stored on each DMS. Debris types were categorized according to the *Public Assistance: Debris Management Guide* and included categories such as vegetative, construction and demolition, white goods, household hazardous waste, and electronic waste.

Processing activities were also examined. They included staging, chipping, and grinding; disposal; and recycling. A calculation was performed to determine the total land area requirements needed to remove the debris generated from the forecasted scenarios. This analysis took into account the rate at which processed debris would be hauled from the site, which would then allow additional collected debris to be dumped at each location. The information was compared with the available acreage at each DMS and the equipment required to meet a 90-day removal time frame.

Final Recommendations

With the forecasts and thorough site evaluations in hand, Dewberry presented the findings to the city's multiagency planning team. Dewberry delivered the data in an ArcGIS geodatabase. It included detailed site diagrams

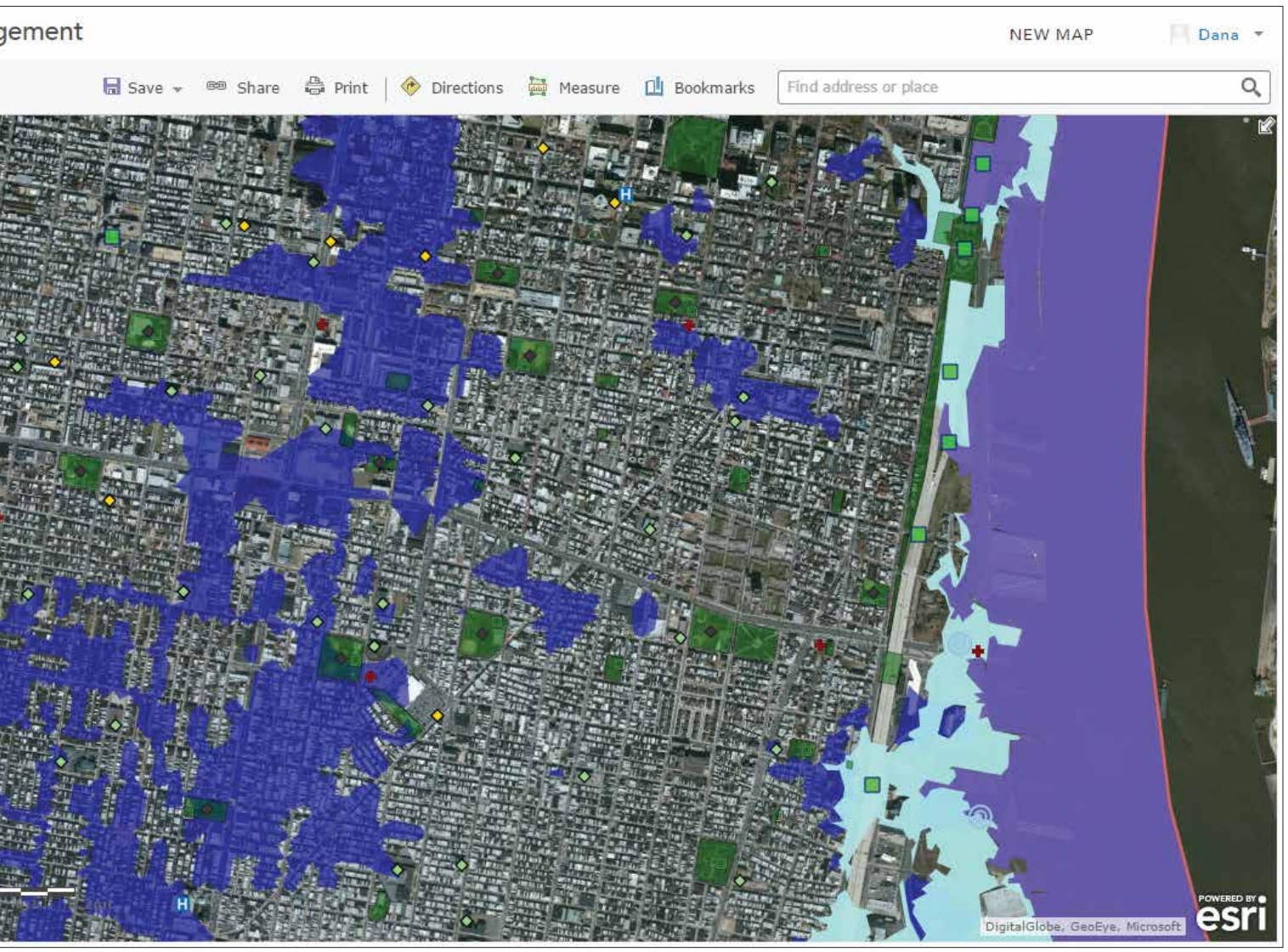


↑ A site sketch on the ArcGIS Online site depicting the location of monitoring towers, dumping areas, and the direction of travel within potential debris management sites

that showed the optimum setup for each DMS. A suitability matrix was provided that ranked sites based on proximity to debris, size, ownership, existing use, public impacts, site layout, and environmental sensitivity. The firm also presented more than 20 recommendations for additional planning and ongoing updates.

OEM is currently working with its partners to approve the site list to prepare for DMS operations in a major event. The final report from Dewberry, developed with ArcGIS tools, enabled the City of Philadelphia to make informed decisions as it prepares for potential natural disasters in the years ahead.

For more information, contact Matt Werner, infrastructure program manager for the City of Philadelphia Office of Emergency Management, at Matthew.Werner@Phila.gov, or Catherine Bohn, senior project manager at Dewberry, at cbohn@dewberry.com.



Painting a Clearer Picture of Shale Gas Development

By Jake Slyder, James Whitacre, and John Wenzel

More than 150 years after the first commercial oil well in the United States was drilled in Titusville, Pennsylvania, the state finds itself in another major energy boom.

While oil, gas, and coal extraction have been ongoing across the state since that time, advances in shale gas drilling have increased Pennsylvania's gross natural gas withdrawals from approximately 175,000 thousand cubic feet (Mcf) in 2006 to more than 3.2 million Mcf in 2013 (US Energy Information Administration).

The proliferation of drilling has sparked concerns about health and environmental impacts, underscoring the need for accurate, accessible data. For nearly four years, the GIS Lab at the Carnegie Museum of Natural History (CMNH) has utilized the ArcGIS platform to collate, check, and present data from Pennsylvania's Department of Environmental Protection (DEP) in a more accessible and functional format.

Identifying the Problem

It all started with a simple question in 2011—how many Marcellus shale wells are there in Pennsylvania? [*Marcellus shale is black, low density, carbonaceous shale from the Middle Devonian age that occurs beneath much of Ohio, West Virginia, Pennsylvania, and New York as well as small areas of Maryland, Kentucky, Tennessee, and Virginia. (Geology.com)]* Finding the answer proved to be much trickier than expected.

Early on, researchers in the GIS Lab found evidence that the press and other organizations were drastically overestimating drilling because they were using the number of well permits to indicate the number of wells drilled. Even for relevant datasets, the rapid expansion in drilling overwhelmed the regulatory infrastructure, which led to inconsistencies between datasets regarding Marcellus shale classification as well as clerical errors of all sorts.

Increased attention to detail from the DEP and a new data distribution system led to improvements over previous years in which the number of well reporting errors went from more than 10 percent to less than 2 percent. However the data is still not offered in an intuitive format that facilitates examination by industry, regulators, policy makers, or landowners.

To get a clearer picture of shale gas development across the state, researchers in the GIS Lab decided to unify the publicly available reports into a more cohesive dataset that was assessed for accuracy and completeness and allowed users to access any information on Pennsylvania wells with simple queries. The small staff in the GIS Lab needed an easily repeatable process to keep the dataset current with the growing natural gas industry.

Repeatable Processes and Clear Documentation

Researchers started organizing the datasets using ArcGIS for Desktop. They soon found ModelBuilder to be an invaluable tool for clear documentation and process reproducibility. They used ModelBuilder to develop a set of four models that reorganize the state-issued shapefiles and comma-separated values (CSV) files into a geodatabase while also generating summary fields on key topics.

Within the models, custom error-checking Python scripts cross-reference between datasets, ensuring a level of scrutiny beyond simply reorganizing the data. For example, a producing gas well that is lacking a SPUD date (the date drilling was initiated) would be flagged as having a SPUD error. Researchers wanted to highlight wells with errors so that dataset users could handle those cases as they saw fit. This also allows identification of operators or locations that have a history of performance concerns.

The final geodatabase contains a point feature class of unconventional (e.g., horizontal or hydrofractured shale) gas wells, broken down into permitted, drilled, or producing wells (or unknown if records are unclear). Each well is linked to associated records within 10 supplementary tables via relationship classes. These tables include data from all related reports, such as gas production, waste, and compliance.

Most important, ModelBuilder made the process easily repeatable and drastically reduced update time. Although the first dataset took more than 10 months to produce and nearly two weeks to update, subsequent updates with ModelBuilder generally take only a few hours.

Elucidating Trends in Gas Development

Using ArcGIS to transform the available data into a more intuitive format has facilitated research within CMNH and beyond. For example, comparison of the final unconventional wells dataset with an intermediate all wells dataset makes it clear that while there has been a boom in gas production, the state has seen an approximately 50 percent reduction in the number of gas wells drilled annually as fewer conventional vertical wells are drilled.

Researchers in the GIS Lab have also used the dataset to demonstrate the importance of existing road and pipeline infrastructure in determining well placement. Using the Near tool in ArcToolbox, researchers calculated the distance of all 467 Marcellus wells and 1,000 replicates of 467 random points to the nearest major road and pipeline within a four-county study area. Not surprisingly, gas wells were clustered significantly closer to existing pipelines and major roads. Beyond CMNH, GIS professionals working across industry, government, and nongovernmental organizations (NGOs) have embraced the dataset for their own analyses. At last count there were more than 250 regular users of the dataset.

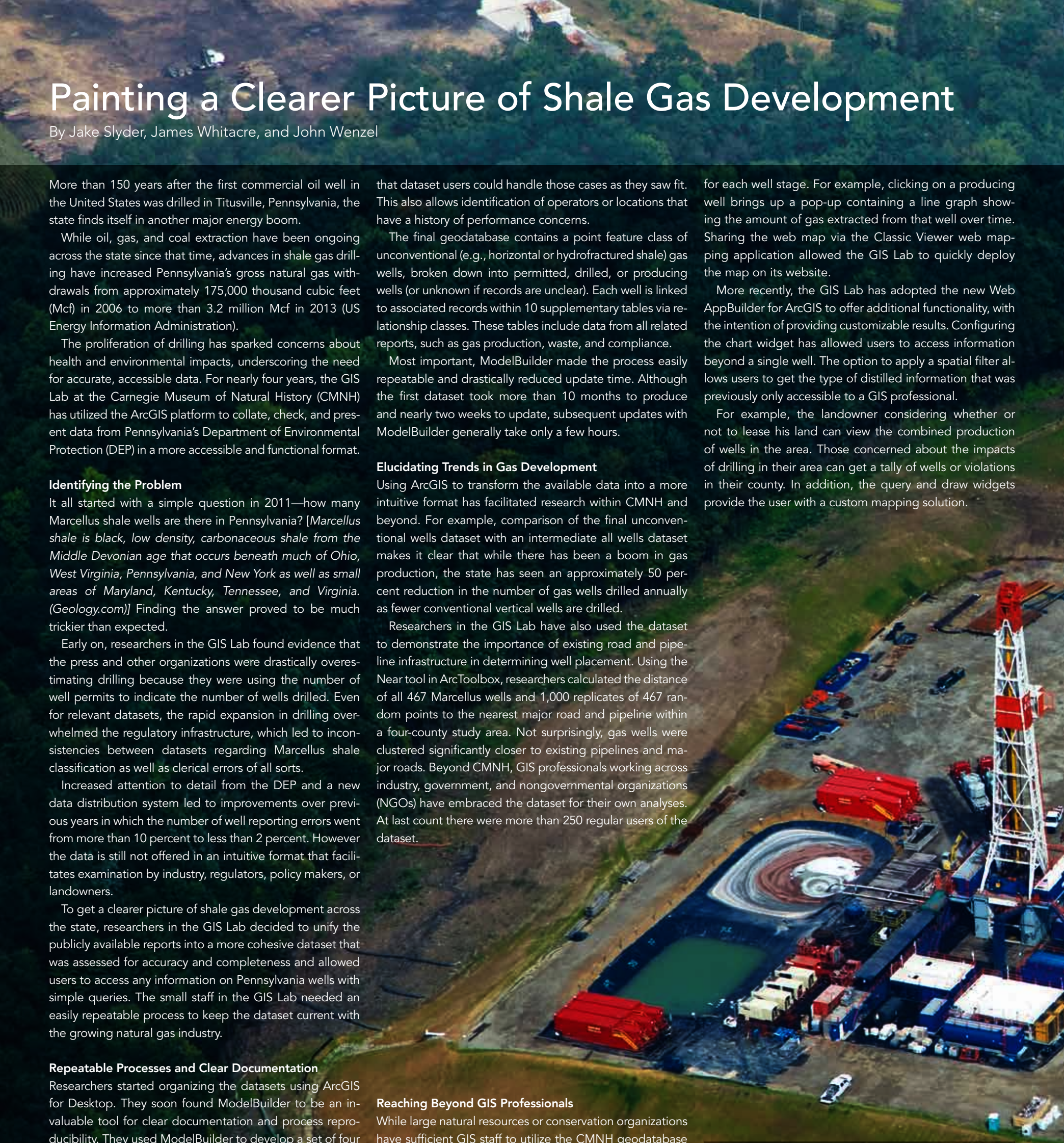
Reaching Beyond GIS Professionals

While large natural resources or conservation organizations have sufficient GIS staff to utilize the CMNH geodatabase or produce their own dataset, small organizations and private landowners typically do not have access to these resources. For this reason, the GIS Lab has been leveraging ArcGIS for Server and ArcGIS Online web maps and applications to share not only the data but also information to a broader audience.

Using these tools, the GIS Lab created a map service that was added to an ArcGIS Online map. Using data filters, the lab created custom pop-ups that are unique for each well stage. For example, clicking on a producing well brings up a pop-up containing a line graph showing the amount of gas extracted from that well over time. Sharing the web map via the Classic Viewer web mapping application allowed the GIS Lab to quickly deploy the map on its website.

More recently, the GIS Lab has adopted the new Web AppBuilder for ArcGIS to offer additional functionality, with the intention of providing customizable results. Configuring the chart widget has allowed users to access information beyond a single well. The option to apply a spatial filter allows users to get the type of distilled information that was previously only accessible to a GIS professional.

For example, the landowner considering whether or not to lease his land can view the combined production of wells in the area. Those concerned about the impacts of drilling in their area can get a tally of wells or violations in their county. In addition, the query and draw widgets provide the user with a custom mapping solution.



About the Authors

Jake Slyder is the GIS manager at the Carnegie Museum of Natural History.

James Whitacre is a GIS specialist at the University of Illinois.

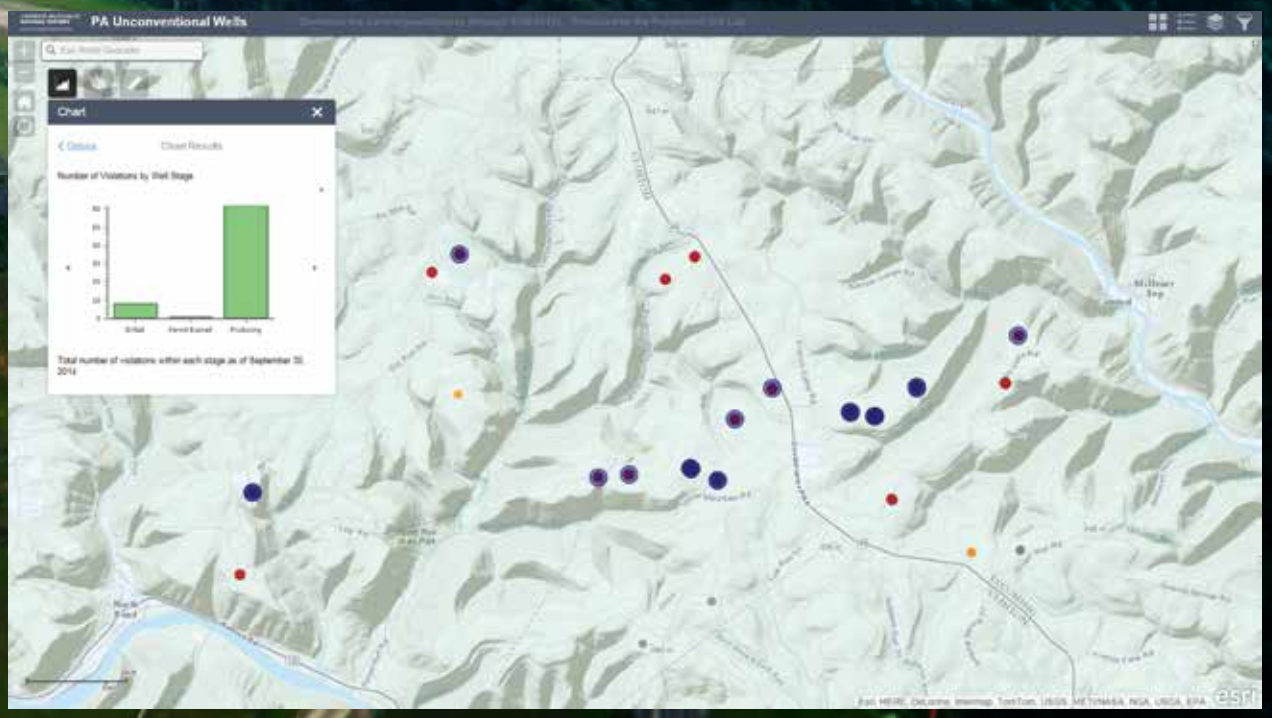
John Wenzel is the director of Powdermill Nature Reserve at the Carnegie Museum of Natural History.

Background image: A Marcellus shale well being drilled in Westmoreland County, Pennsylvania. Photo courtesy of Josh Wenzel

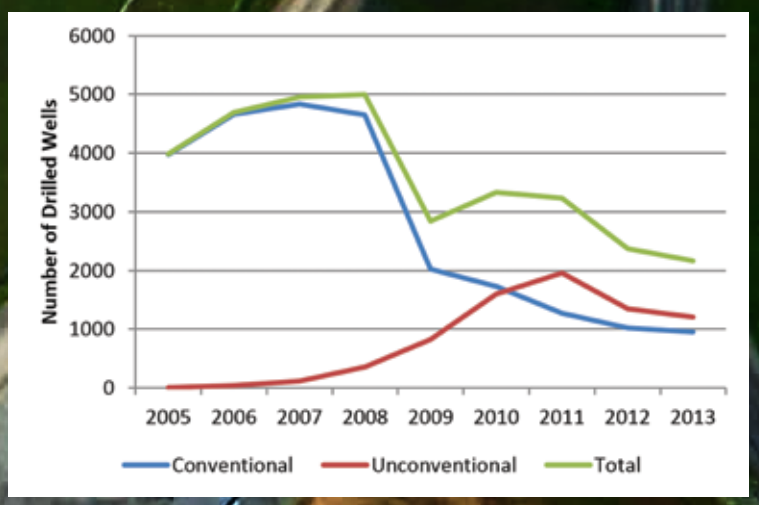
Using GIS to More Clearly Present Data

Recently, Pennsylvania auditor general Eugene DePasquale cited the clarity of the CMNH dataset in a review of the state's own efforts tracking development. He stated, "The researchers at the Carnegie have demonstrated that it is possible to provide a more cohesive picture of shale gas drilling in Pennsylvania." This praise and the widespread use of this dataset are a testament to the power of GIS to more effectively present data on energy development. While spreadsheets with coordinates are an easy way to store and share data, mapping these points and their associated information makes the trends immediately clear.

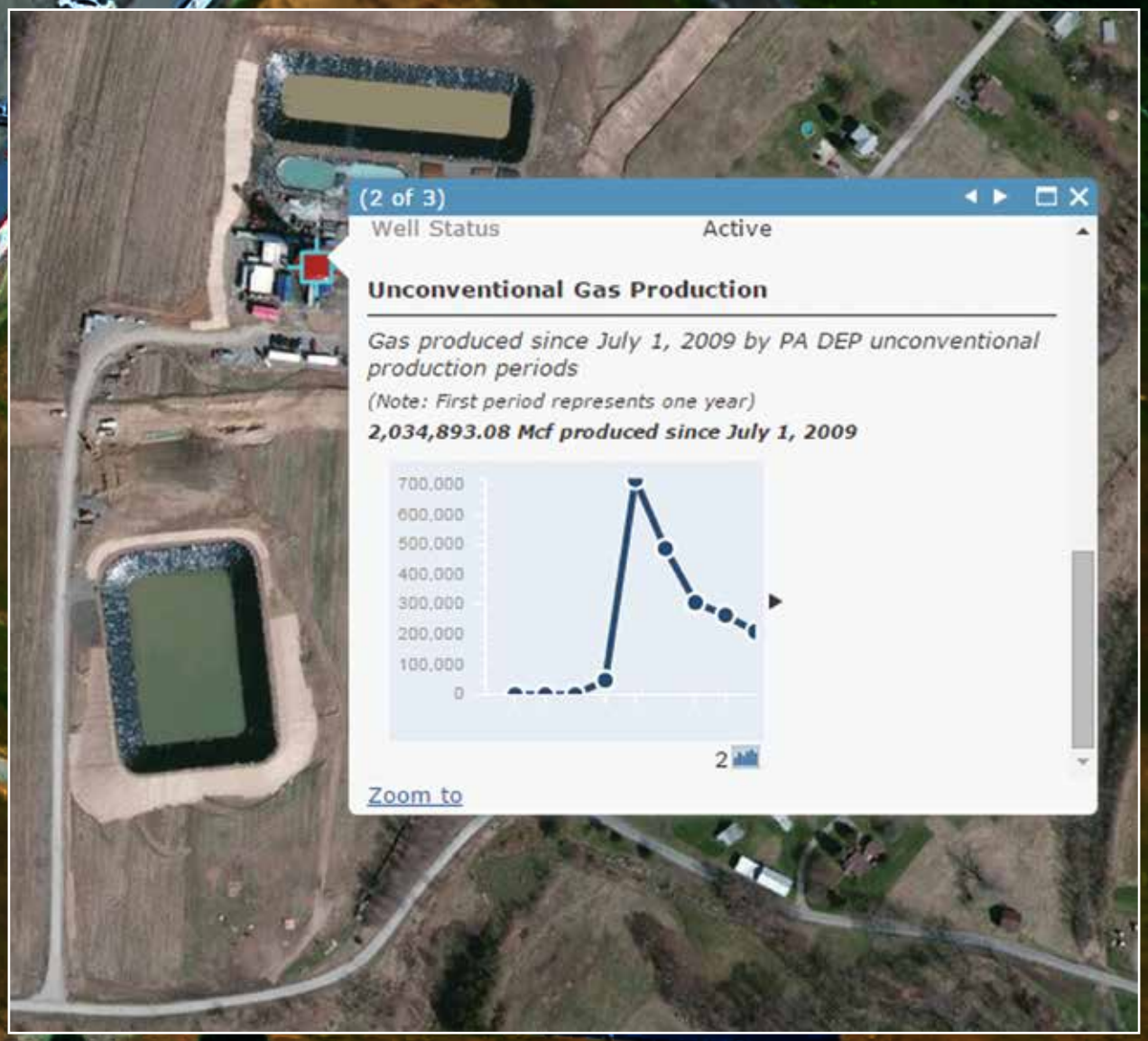
For more information, visit maps.carnegiemnh.org or contact Jake Slyder, GIS manager at the Carnegie Museum of Natural History, at slyderj@carnegiemnh.org.



↑ The chart widget lets users get current information either statewide or for a specific region of interest. This pop-up shows the number of violations, broken down by well stage, for an area of Clinton and Lycoming counties.



← The gas boom in Pennsylvania has actually seen a steady decline in the number of drilled wells over the last nine years as fewer, less productive conventional wells are drilled.



→ Pop-ups can be customized so the map presents information relevant to the particular well stage. For example, clicking on a producing well displays the total gas produced at that well and a line graph showing production over time.

Abu Dhabi's Education Council Finds New Applications for GIS

By Jim Baumann, Esri Writer

An agreement between Abu Dhabi and Esri has enabled the Abu Dhabi Education Council (ADEC) to expand its use of GIS from managing infrastructure to supporting e-learning modules in the curriculum.

Abu Dhabi is the capital of the United Arab Emirates, a federation founded in 1971 from seven ancient Arabian Peninsula sheikhdoms. Using the wealth derived from its extensive hydrocarbon deposits, Abu Dhabi has developed a modern, forward-thinking state that embraces its past while preparing for the future. One of its long-term initiatives is the development of a comprehensive information infrastructure to serve the entire emirate, much as a utility company provides electricity, gas, or water.

The Abu Dhabi Systems & Information Centre (ADSIC) was created in 2005 by Abu Dhabi's Executive Council. The role of the ADSIC is to develop and support various government initiatives in the establishment of a modern, efficient, citizen-centric e-government platform.

In this exercise, sixth-grade students learned how to use GPS.

"We began using ArcGIS in 2009. Our first project was the School Finder. Data for this project was very easy to obtain, since we are part of the AD-SDI program. So we got ready-made basemaps, the road network, census data, and so on. SDI really helps extend the use of GIS in Abu Dhabi."

Pakrad Balabanian, GIS Team Leader at ADEC

← Using a measuring wheel, students measured the perimeter of the school as part of another GIS-based project.

↓ Students collected data about the mangrove trees and the land surrounding them.

↓ As part of a science lesson, students kayaked to Mangrove Island to collect data about the trees.

Spatial Data Infrastructure Initiative Launched

With the expanding use of GIS throughout the country, ADSIC launched the Abu Dhabi Spatial Data Infrastructure (AD-SDI) initiative in 2007 with a mission to facilitate the sharing of geospatial data among government agencies and other stakeholders. The AD-SDI initiative is made up of 56 government and private agencies including nearly all industries and agencies in the emirate. AD-SDI mandates that all members share their spatial data with each other, excluding data related to Abu Dhabi's security.

ADEC, a member of AD-SDI, has used Esri's ArcGIS software for several years. "We began using ArcGIS in 2009," said Pakrad Balabanian, GIS team leader at the ADEC. "Our first project was the School Finder. Data for this project was very easy to obtain, since we are part of the AD-SDI program. So we got ready-made basemaps, the road network, census data, and so on. SDI really helps extend the use of GIS in Abu Dhabi."

ADEC Moves GIS Outside the Box

ADEC's School Finder allows residents to explore schools throughout Abu Dhabi, using various criteria such as location, type, grade level, and gender. The regular influx of new families to the emirate who are looking for schools for their children makes this an important and popular application that helps them get settled more easily.

Realizing the advantages of geoenabling its entire student database, ADEC integrated ArcGIS with its enterprise student information system. This system contains detailed data about Abu Dhabi's approximately 350,000 students, 18,000 teachers, and 450 schools. Administrators now can easily monitor student performance at specific schools, compare general progress among neighboring schools, or track the qualifications and workload of an individual teacher.

In addition, ADEC's Facilities and Infrastructure department is using GIS for land and facilities management. "The government had allocated plots of land to the ADEC for educational purposes, but there was uncertainty about the exact location of the plots and their current use," said Balabanian. "We created the Land Bank application to manage and analyze these plots. We are also using this application for the 10-year ADEC master plan so that we can determine where we should be building new schools and refurbishing older ones."

Supporting New School Model Goals

In 2012, Abu Dhabi signed a nationwide memorandum of understanding (MOU) with Esri to further expand the country's use of GIS. The MOU provides access to all Esri GIS software products to every government agency and school in the emirate.

"With the implementation of the MOU with Esri, we began to explore other possibilities for GIS at the ADEC," said Balabanian. "We saw great opportunities to include it in the e-learning modules of our New School Model."

Recently introduced in Abu Dhabi public schools, the New School Model was developed by local educators and consultants over several years. This student-centered learning approach engages students using a technology-rich environment that is responsive to the abilities and needs of individual students. The goal is to foster students' critical thinking, communication, and problem-solving capabilities while preparing them with skills for future education and employment.

Because the New School Model is being gradually phased into the entire school curriculum, ArcGIS Online was introduced in a pilot project for sixth-grade students. These students, usually between 11 and 12 years old, have some experience with digital technology, so applying GIS in classroom assignments can help increase their understanding of other subjects during their secondary school education.

Esri education team members and staff from GISetc, a private GIS educational consultancy, worked with Abu Dhabi educators and ADEC curriculum developers to integrate GIS exercises into the sixth-grade curriculum of the New School Model. Five exercises were developed that included mathematical concepts such as map scale, linear measurements, and perimeter calculation, as well as science and geography lessons.

Collector for ArcGIS a Hit with Students

Students were very interested in collecting data about local mangrove trees and plotting that data on maps for a science lesson. Mangrove trees live in salt water along the Abu Dhabi coastline. They provide important animal habitat and erosion control.

To complete this lesson, students paddled kayaks about a mile to Mangrove Island, where they made various measurements such as determining the height and number of trees in a specified location, as well as collecting information about the land surrounding the trees. Both boys and girls participated. "We were really happy to receive the encouragement and support from the parents of our students," said Balabanian. "GIS is a twenty-first-century technology, and all of our students can benefit from learning and applying it."

Students used Collector for ArcGIS on their smartphones to record their data for later use with ArcGIS Online. Their familiarity with smartphones helped lower barriers to learning this new technology.

After an academic review, the pilot project was deemed a success, and ADEC plans to implement GIS lessons in all sixth-grade classrooms next year. It is currently developing new exercises for the seventh-grade pilot project and plans to incrementally add GIS-related exercises for all students from the sixth through twelfth grade.

The Future of GIS at the ADEC

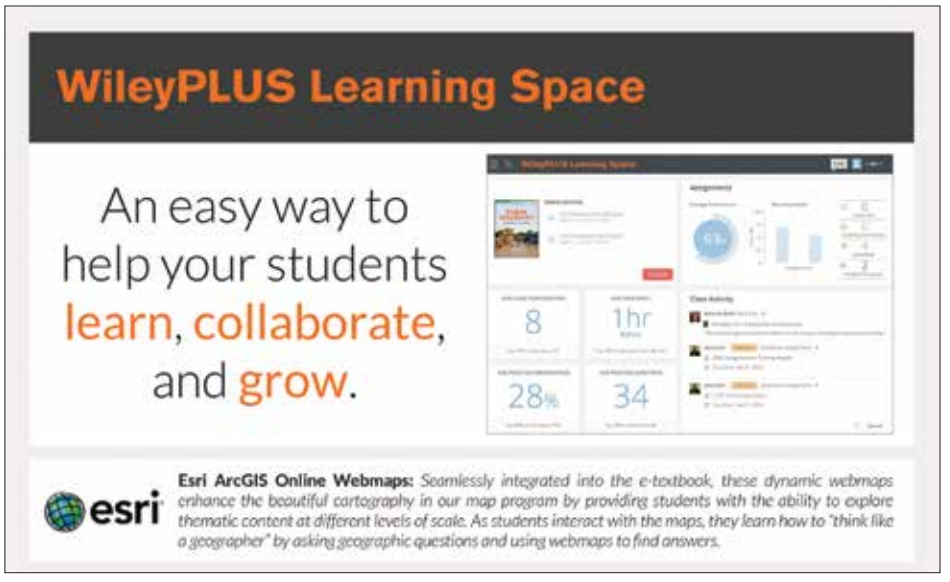
"Our goal is to enable students to use GIS like any other digital tool, such as Microsoft Word or an Excel spreadsheet," said Balabanian. "We don't see teaching GIS as a separate subject; we want to instill in them the concept of spatial thinking so that using maps is part of the way they naturally work. We want them to critically examine phenomena and help effect change when needed. GIS can help our students become responsible members of the global community."

Geoenabling Education

Looking at next generation textbooks

By David DiBiase, Esri Director of Education

Integrating interactive web maps with other digital content will make nextgen textbooks come alive.



↑ WileyPLUS Learning Space is an example of a proprietary learning management system. © John Wiley & Sons. Used with permission.

Textbooks are changing. So is the textbook industry, which accounted for almost $14 billion in US sales in 2013. The high cost of printed texts is driving change. The Student Public Interest Research Group estimates that full-time US college students, on average, spend nearly $1,200 per year on textbooks.

Mounting public concern over the high cost of education in general, and textbooks in particular, is forcing publishers away from printed books toward a new generation of less expensive digital products. Esri is interested in the future of textbooks because they affect millions of young people every year and because Esri web maps have the potential to make textbook maps come alive.

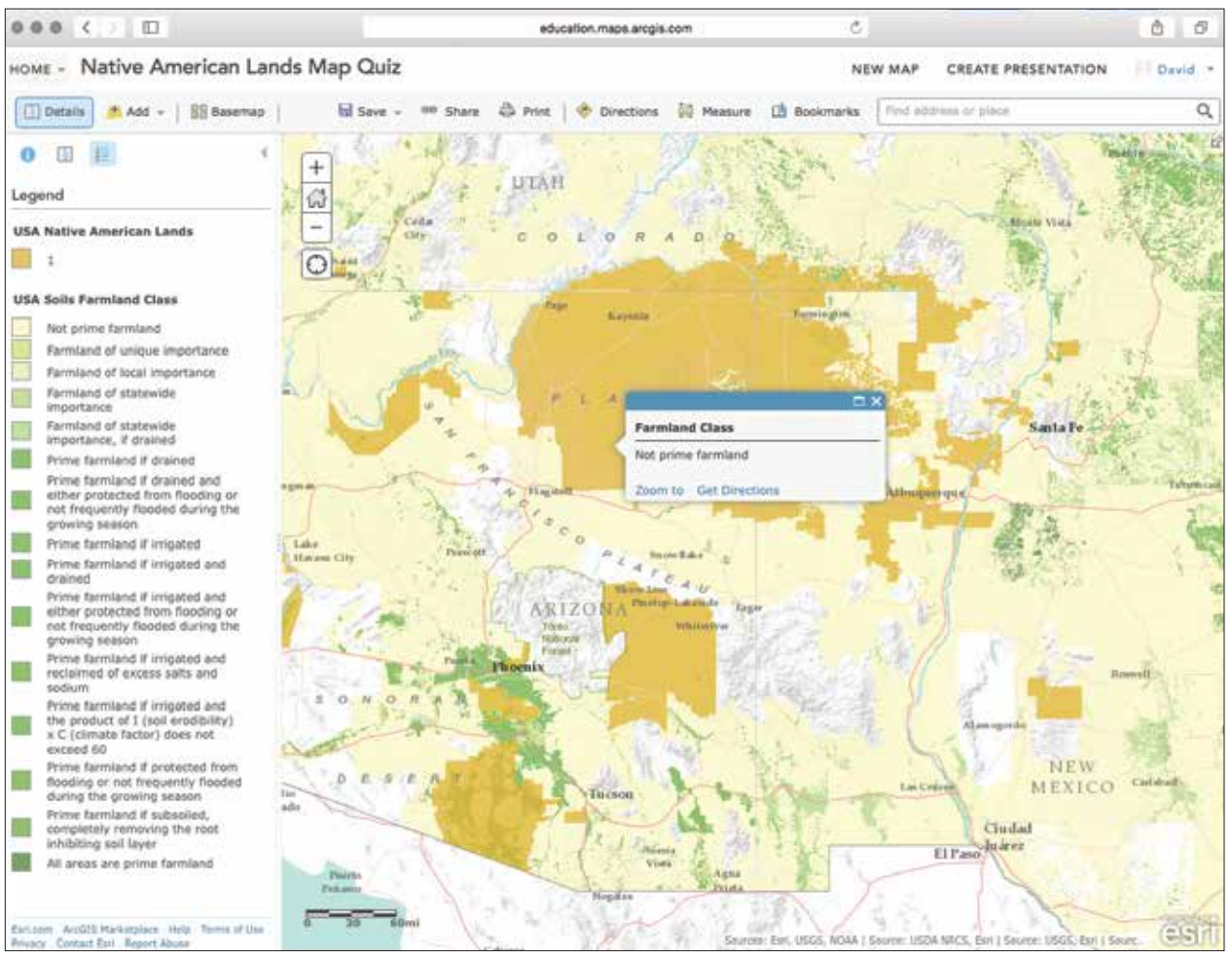
In 2013, *The Chronicle of Higher Education* published an article called "The Object Formerly Known as Textbook." This article and others like it report that textbook publishers are actively rethinking what textbooks and the textbook business should be. For years, textbooks have been marketed as bundles of content—primarily print, but with digital ancillaries—rather than just books. While this rethinking process is in progress, one thing is clear: the mix of digital and print content in next generation, or nextgen, textbooks will flip.

Most of us assume that the digital alternative is an e-book that retains much of the look and feel of printed textbooks but with added features like highlighting and note-taking, links to web resources, and compatibility with mobile devices. Plenty of e-textbook titles are available, including those available from Barnes and Noble for its Yuzu platform; from Amazon.com; and especially CourseSmart, which claims to offer access to e-textbooks for more than 90 percent of the core content higher education titles at up to 60 percent off the cost of print editions. Other content providers offering digital alternatives include Inkling, Kno.com, and Discovery Education.

However, as Digital Book World observed, "students just aren't taking to e-textbooks … but they are taking to what higher education publishing insiders call 'integrated learning systems'" that bring together a variety of resources. A 2013 EDUCAUSE report observed "once e-textbooks embrace the full capabilities of digital formats, the possibilities are extensive and may even be transformational."

Nextgen Textbooks

That's why "the object formerly known as textbook" is beginning to resemble an online course more than an e-book. Leading textbook publishers like McGraw-Hill Education (Networks), Houghton Mifflin Harcourt (Dashboards), and John Wiley & Sons (WileyPLUS Learning Space) are all launching proprietary learning management systems (LMSs). LMSs typically combine digital content with assessment tools like quizzing, instructor dashboards, grade management tools, course e-mail, and other support for social learning.



↑ An example of a web map that expands the usability of a map illustration that appears in a leading US history textbook. The web map enables students to explore, interpret, and explain the environmental and economic conditions within Native American lands.

Esri sees an opportunity to make a difference in these nextgen learning environments by integrating interactive web maps with other digital content. For example, Esri is currently working with John Wiley & Sons and partner Maps.com to integrate ArcGIS Online web maps into a forthcoming nextgen text on world regional geography.

The Learning Tools Interoperability specification enables seamless and secure integration of web maps with other LMS functionality. Integration with online quizzing and discussion enables educators to transform maps from mere illustrations to a learning technology that facilitates geographic inquiry. As a result of this process, Esri sees the potential to help transform geography—as it is commonly misunderstood by many students and teachers—from triviality to importance in texts on many subjects.

Nextgen Students

Changes in the textbook industry will play out over the coming decade. Observers predict that students now in middle school will expect digital alternatives by the time they reach college. Supporting this prediction is the fact that while only 2 to 3 percent of textbook sales at college bookstores were fully digital in 2010 (according to a survey cited in *The Chronicle of Higher Education* article), revenues from digital products for K–12 schools increased 46 percent from 2008–10 and 18.4 percent in 2011 alone.

These digital products aren't just e-texts. Some already include web maps. For example, Maps.com's Field Trip Library uses Esri Story Map apps to present media-rich narratives for teaching and learning history, geography, science, and popular culture. More digital educational products that integrate web maps will appear this year.

Nextgen students will come to higher education with greater expectations of what maps can and should be. Esri's contribution to President Obama's ConnectED initiative is an offer to donate ArcGIS Online subscription accounts to any public, private, or home school in the US and provide the curriculum solutions, professional development for teachers, and geomentors needed to support meaningful usage in 25,000 schools by 2017.

Thousands of pupils every year are discovering that web maps make geography come alive. They'll expect even more when they go on to college. Esri is urging educators—and especially textbook authors and editors—to have higher expectations too. Geoenabled education is one of the transformative potentials of nextgen textbooks.

About the Author

David DiBiase leads the education team at Esri. The team promotes and supports GIS use to enrich teaching and learning at all levels, in formal and informal settings, domestically and internationally. Before joining Esri, DiBiase founded and led the Penn State Online GIS Certificate and Masters (MGIS) degree programs.

Mapping a More Playable Future

By Liz Dow, GIS Manager, KaBOOM!

KaBOOM!, a national nonprofit founded in 1996, is trying to improve access to play areas for children in America by collaborating with cities and providing them with data and mapping solutions so they can create a more playable future for all kids.

Whether it's on sidewalks, in school yards, at parks, or on playgrounds—play is a powerful thing. Play can transform a child from sedentary to physically active, from bored to mentally active, and from solitary to socially active.

Today, kids are less active than any other generation, simply because they have fewer opportunities to play. Although only one in four children gets the 60 minutes of daily active play recommended by the Centers for Disease Control and Prevention, they spend almost eight hours in front of a screen according to a 2010 Kaiser Foundation study.

Results of a 2009 Harris Interactive poll conducted for KaBOOM! found that across the United States, 69 percent of low-income parents reported there is no playground in the neighborhood where they live. In neighborhoods without parks, kids are 26 percent more likely to be obese. These findings were reported in "Neighborhood Socioeconomic Conditions, Built Environments, and Childhood Obesity" by Gopal K. Singh, Mohammad Siahpush, and Michael D. Kogan, an article published in the March 2010 issue of *Health Affairs*. Far too many of today's kids, especially the 16 million growing up in poverty in America *[US Census Bureau statistics]*, aren't getting the balanced and active play they need to thrive.

Data-Driven Solutions for Play

Because the well-being of society begins with the well-being of its children, KaBOOM! has a mission to bring balanced and active play into the daily lives of all children. KaBOOM! began partnering with city leaders to develop data-driven solutions that increase playability. *Playability* refers to the extent to which a city makes it easy for children to get balanced and active play.

Through Playful City USA, a national recognition program led by KaBOOM!, cities and towns are honored for making play a priority by creating more playable, family friendly cities. KaBOOM! provides Playful City USA cities with play desert maps, a tool that helps identify areas where low-income children do not have opportunities to play.

Mapping Child Dense, Play Scarce Communities

Play desert maps were inspired by the United States Department of Agriculture (USDA) food deserts maps. *[Food deserts are urban areas with little or no access to nutritious foods. For information on mapping food deserts, see "Mapping Nutritional Terrain: Identifying food deserts in Lansing, Michigan" in the Fall 2010 issue of* ArcUser *magazine.]* A play desert map analyzes child and low-income populations, available play spaces, and the walkable area around the play space.

Mapping play deserts begins with data collection from the KaBOOM! crowdsourced play space mapping website called the Map of Play (mapofplay.org). On this site, anyone from residents to visitors can map, rate, and comment on play spaces in a community. They can also use the site to locate places to play in neighborhoods in a community.

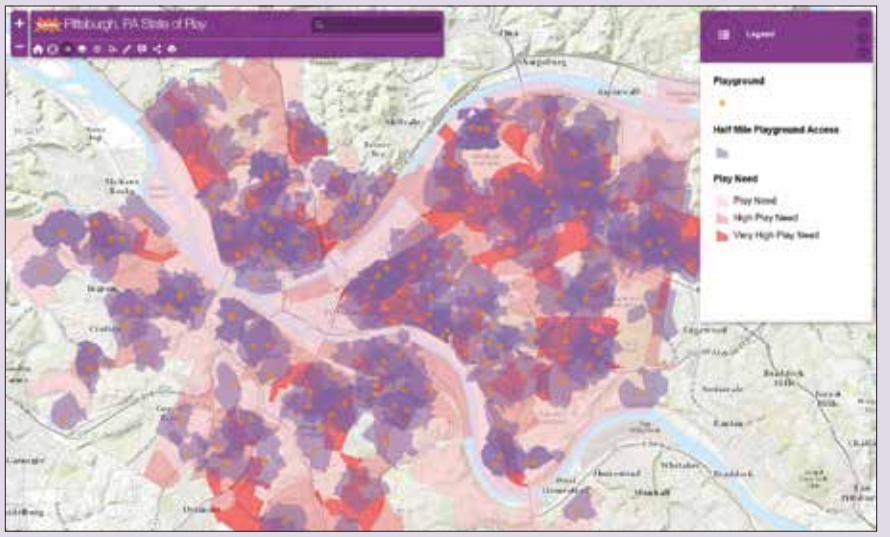
With this data, KaBOOM! uses ArcGIS for Desktop to capture play space entrance points and generate walkable service areas. The analysis creates walkable polygons that follow the road network but take barriers, like highways, that affect walkability into account. Areas where people cannot walk to a play space are prioritized by the concentration of low-income children in the area. Esri demographic data is used to identify these areas.

Progress toward Playability

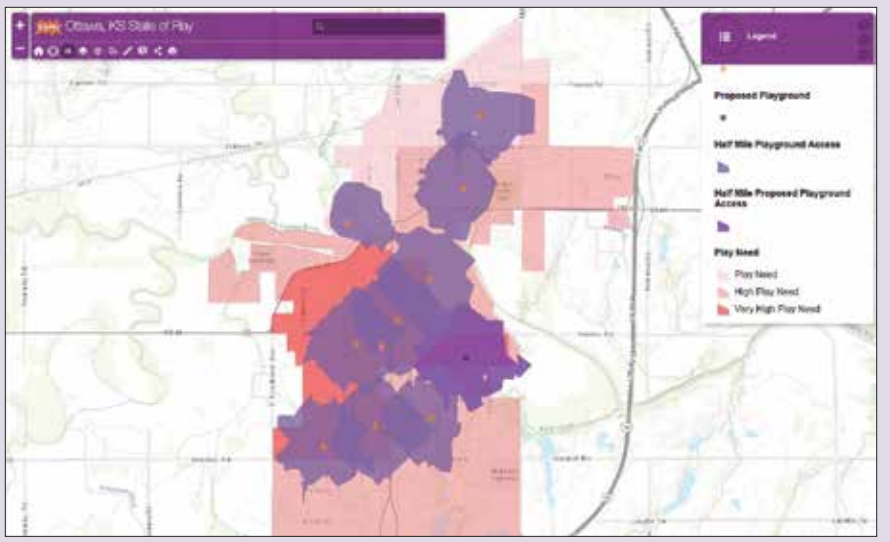
Play desert maps are a tool for benchmarking a city's progress toward increasing playability and help bring play opportunities to those neighborhoods.

In 2013, the first play desert maps were presented to Playful City USA cities that were attending the first annual Playful Leaders' Summit in Baltimore, Maryland. At this conference, experts and city leaders worked together developing actionable plans to drive change in cities using play.

KaBOOM! staff helped cities understand the data presented in the play desert maps that were shared using ArcGIS Online. KaBOOM! quickly uploaded and edited data in ArcGIS Online and transformed play desert maps from static images into interactive tools that allowed attendees to better see and interpret data. Staff demonstrated the value of these maps in supporting a city's plans to increase playability. Using these maps, several cities have begun making data-driven decisions to increase playability in their communities.



↑ Play deserts in Pittsburgh, Pennsylvania, are shown as dark red areas that represent high concentrations of low-income children who are not within walking distance to a play opportunity.



↑ A playground proposed to meet the need for play space in Ottawa, Kansas.

↑ A child care facility study in Pittsburgh, Pennsylvania, identified areas with high capacity child care facilities that were not within walking distance of a play space.

Get Your City Involved

If your city has made efforts to prioritize play and create more playful, family friendly communities, please consider applying for Playful City USA recognition in 2015 at apply.playfulcity.org.

Transforming Cities through Play

Ottawa, Kansas, has been a Playful City USA community since 2010. After receiving an online play desert map of Ottawa in 2013, the Ottawa Play Task Force used it to analyze and prioritize gaps in the city's amenities. Prior to receiving the play desert map, the task force had been focused on new and replacement projects and had not considered the locations of Ottawa's parks. The Play Task Force has since incorporated the play desert map into the park master plan and has used this data to plan for three additional play spaces. As a channel to share successes with funders and apply for grants, Ottawa's play desert map has become a useful tool for setting goals and illustrating the need for play areas to potential funders.

Pittsburgh, Pennsylvania, a Playful City USA community since 2011, also received its online play desert map in 2013. The Playful Pittsburgh Collaborative, a group of committed individuals and organizations working to prioritize play in Pittsburgh, worked with KaBOOM! to learn more about play opportunities in Pittsburgh.

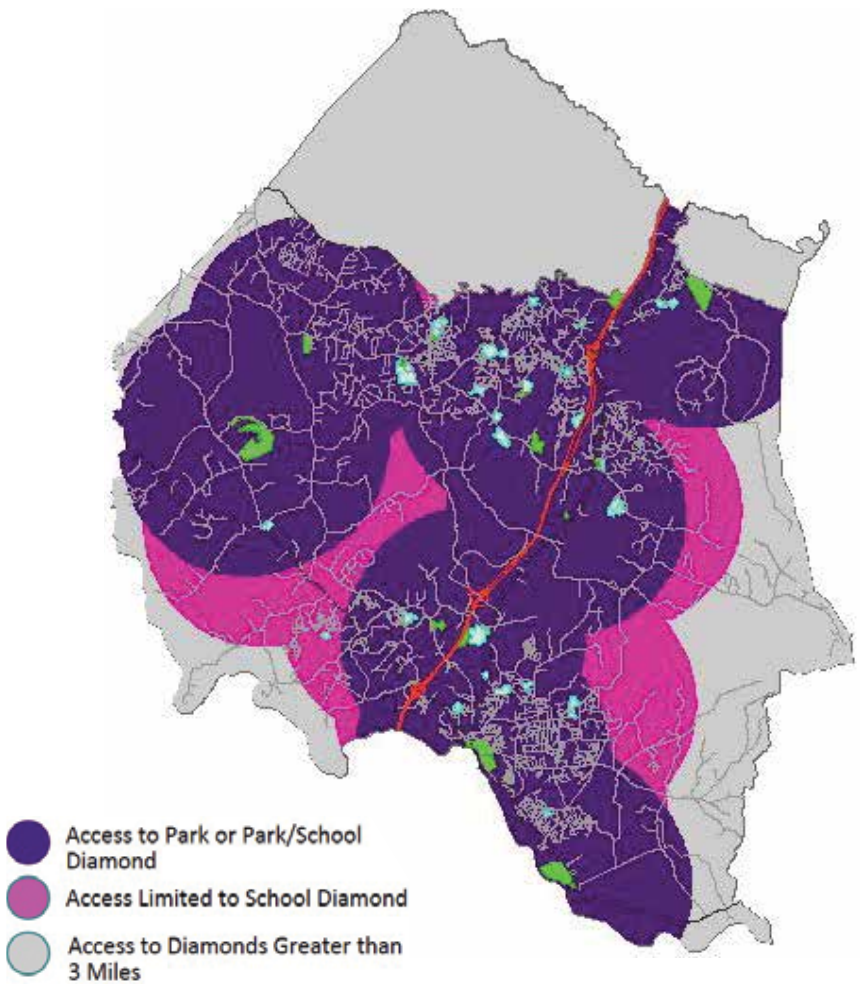
In addition to a traditional play desert map that focuses on play spaces, the collaborative also requested an analysis of child care facility locations to examine the play opportunities available to children during the day. The child care analysis examined each facility's capacity for children, its quality, and whether it was within walking distance of a play space. The collaborative used the map to start conversations with child care providers and city personnel to begin the process of bringing outdoor play spaces to downtown Pittsburgh and other areas in need.

Twelve Playful City USA communities at the vanguard of the national playability movement received play desert maps in 2014 when they attended the Second Annual Playful City USA Leaders' Summit in Chicago, Illinois. KaBOOM! continues working with cities to develop actionable solutions that enhance playability. The organization sees play desert maps as valuable tools that will help cities make data-driven decisions for building a more playable future in America.

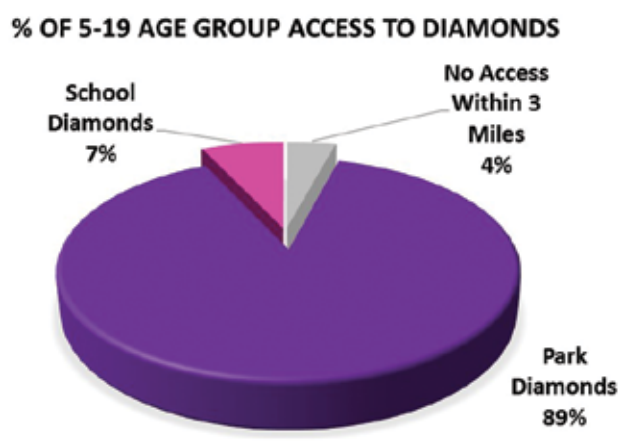
For more information on mapping play, contact KaBOOM! GIS manager Liz Dow at ldow@kaboom.org.

Ball Field Study Hits Home Run

By Dave Peterson and Carter Marshall, Design Concepts CLA, Inc.



↑ Initial analysis showed good field distribution and excellent access to at least one ball field throughout the county. Marine Corps Base Quantico, shown as a gray area in the northern part of the county, was excluded from the study.



Communities nationwide highly value active lifestyles. Athletic fields provide critical quality of life infrastructure. Despite the demand for fields, there is no nationally accepted standard for athletic field provisioning in this country. This situation leads to lots of questions. How does an agency determine the number of fields it should provide? Are sufficient fields currently available? Are these fields properly distributed? Where are the best places to add new fields within a community?

A study conducted by the authors for Stafford County, Virginia, utilized GIS analysis and public input to determine current demand and capacity for baseball and softball diamonds in Stafford County, Virginia. In this study, ArcGIS was used to map the locations of ball fields and analyze access throughout the county. All data management, mapping, and analysis were performed within ArcGIS for Desktop or ArcGIS Online without the need to export, import, or join to other applications. This analysis allowed planners to decide which ball fields should be improved or where ball fields should be added based on the density of a target population and the quality and distribution of existing fields.

The study area included most of Stafford County, a rapidly growing area of Virginia near Washington, DC, but excluded the Marine Corps Base Quantico in the northern part of the county. Jaime Porter, director of Stafford County Parks, Recreation and Community Facilities, noted that even though demand for diamonds was high and many had waiting lists, the county didn't know how many more fields were needed or where they should be sited, but "We knew we wouldn't have many opportunities to get it right," he said.

Feedback from focus groups, stakeholders, and public meeting attendees, as well as staff, was used to gauge public demand for playing fields and existing field availability in Stafford County. Any fields that were planned and had been funded for construction at the time of the analysis were considered part of the current inventory. Since school-age children were believed to be the primary users of ball fields in Stafford County, all demographic analysis was based on a 5–19 age group.

GIS was a key tool in the study. The first step was to identify all baseball and softball diamonds owned or maintained by Stafford County Parks. Though the majority of these ball fields are located in county-owned parks, some public school fields were also considered. A total of 45 ball fields were identified and located by using aerial photographs of the county available from World Imagery on ArcGIS Online. *[ArcGIS for Desktop comes with an ArcGIS Online subscription.]* Existing lists provided by project partners and the knowledge and expertise of park agency staff also provided ballpark locations.

Initial GIS analysis using ArcGIS and Esri Business Analyst demographics showed excellent distribution and location of these ball fields. Data enrichment revealed that 96 percent of the 5–19 age group has access to at least one diamond within three miles of home.

Next, each of the ball fields was evaluated. The evaluation team developed a scoring system to assess the value of each ball field by examining various aspects of field quality and desirability such as

- Overall field quality
- Turf quality
- Infield condition
- Backstop condition
- Dugout
- Field fencing
- Warm-up area/Batting cage
- Irrigation
- Field lighting
- Bleachers
- Team storage
- Scoreboard
- Utilities

Scoring and analysis for this project were based on a proprietary methodology called the Geo-Referenced Amenities Standards Program (GRASP), developed by Design Concepts CLA, Inc., and Greenplay LLC.

Additional assets, such as the availability of restrooms, parking, security lighting, maintenance storage, drinking water, concessions, and family amenities, were identified for existing fields. Even though they do not directly affect play, these amenities make a ball field more inviting and comfortable. The presence of these amenities increases the value of a field, especially if the amenities are of high quality.

Scores for every ball field were entered into a geodatabase on-site using a tablet. These scores were used to calculate numerical values for the ball fields, which were then ranked and compared based on the value they provide to the community.

A GIS-based study will help improve public access to ball fields in Stafford County by evaluating existing fields and identifying optimal locations for new fields.

Scores were assigned to a buffer around each ball field so that a heat map could be created that showed the cumulative value of all ball fields within three miles of any location in the county. Three miles was a distance chosen because it approximates a 20-minute-or-less drive.

The resultant data allowed a team of GIS analysts to paint a picture that showed ball field access for any location in the Stafford County study area. Values ranged from a low of 0 (no ball fields within three miles) to a high of nearly 700 (multiple, high-scoring facilities within three miles).

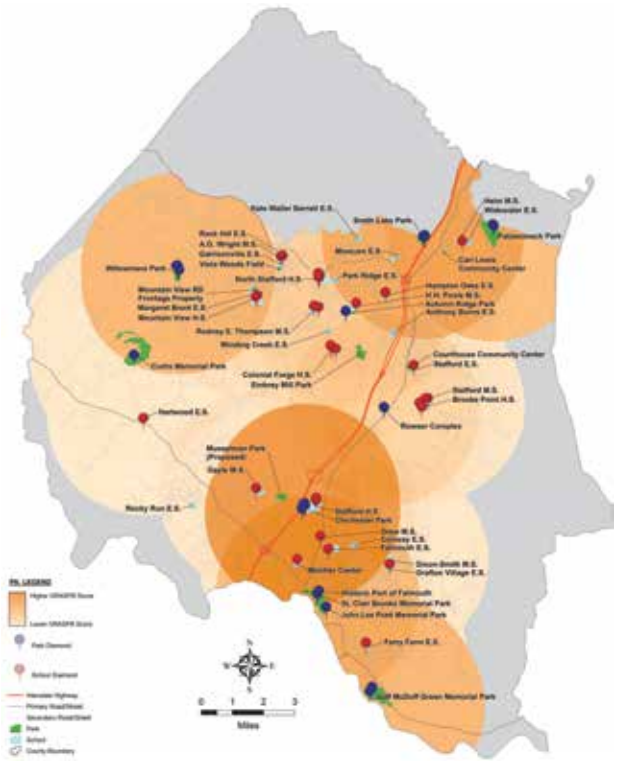
The final analysis accounted for population density by census tract and calculated an average value per acre based on the population of the 5–19 age group. This analysis highlighted two types of areas. Areas with lower field values and higher youth populations were isolated within Stafford County as target areas for improving existing ball fields or adding new ones. This analysis provided county staff with clear answers for use in their future planning efforts.

Most important, this study had a real-world impact. Despite a tight budget, GIS-based analysis was used to justify and secure additional funding needed for ball field improvements. A partnership agreement is also in the works with Stafford County Public Schools to utilize school ball fields for county programming. In addition, the final report provides peace of mind for decision makers.

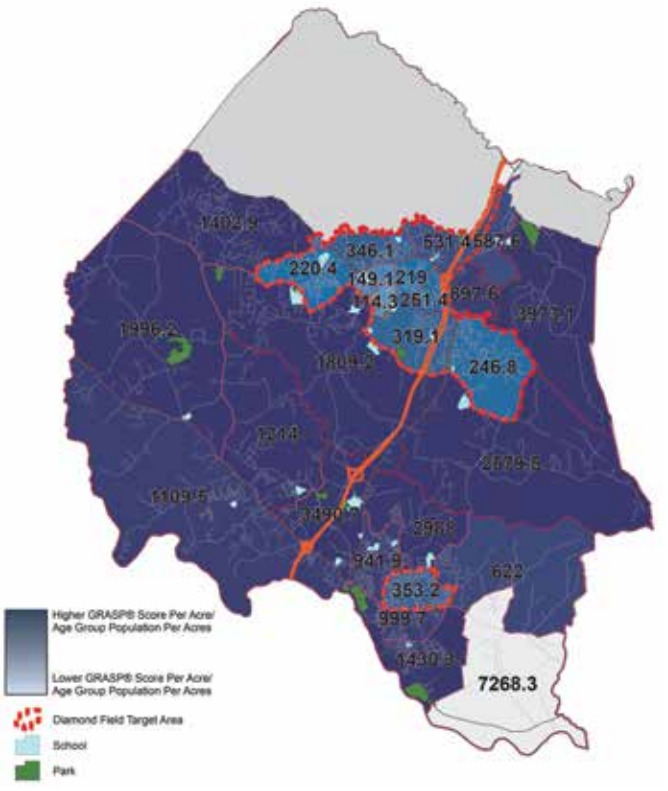
"Prioritizing projects and their locations based on the data collected and the results of the study, we are now confident in our investment choices knowing we are addressing actual needs," said Porter. "We found out that we didn't need new parks necessarily. We needed to enhance and build out current parks with the required amenities to address current and long-term capacity."

As the public sector slowly recovers from the recent recession, those choices ensure that the limited budget can be used in ways that best serve the local community. This project highlights the value of GIS analysis in affecting change not simply in infrastructure but in the quality of life for its residents so that everyone comes out a winner.

For more information, contact David Peterson at davidp@dcla.net or 303-664-5301, ext. 338, or Carter Marshall at carterm@dcla.net or 303-664-5301, ext. 309.



↑ To produce level-of-service values for any location within the county, scores were assigned to a buffer around each ball field. A heat map was created showing the cumulative value of all ball fields within three miles of any location in the study area.



↑ By combining demographic data with ball field locations and scoring data, target areas where field improvements or additional fields are most needed were isolated. These areas are indicated by dashed red outlines.

About the Authors

The authors have used Esri products for more than 10 years to perform a variety of geospatial analyses of communities related to parks, recreation, and public health. Dave Peterson, PLA, is the director of Specialized Planning at Design Concepts CLA, Inc. His work focuses on park and recreation master planning throughout the United States. Carter Marshall is a land planner and GIS specialist at Design Concepts CLA, Inc.

Crossing Borders

A column by Doug Richardson
Executive Director, Association of American Geographers

Help Put Geography and GIS in Our Schools

Congressional action is heating up on funding for K–12 geography and GIS education, and you can help. Proposals for reauthorizing the Elementary and Secondary Education Act (ESEA), also known as No Child Left Behind, have been released in both the House and Senate. US senator Lamar Alexander (R-Tennessee), the new Senate education chairman, has signaled that he has a serious interest in passing a bill in 2015. The House, meanwhile, has passed an ESEA reauthorization bill (H.R.5), which currently lacks bipartisan support. The Senate bill is considered much more likely to be signed into law by President Obama. The ESEA—the nation's primary K–12 law—has not been reauthorized since early 2002.

The Association of American Geographers (AAG) has been working for the past decade to ensure that a new ESEA includes a specific funding authorization for K–12 geography and GIS education. Geography is specified as one of nine core academic subjects in the existing law but is the only one that does not have a dedicated funding stream. As a result of the lack of federal funding and attention, only 17 states require a stand-alone geography course in middle school, and only 10 states require a stand-alone geography course in high school.

In 2010, the AAG began developing the AAG Resolution Supporting K–12 Geography Education, which calls for funding of K–12 geography in the ESEA and urges the Obama Administration to include geography and geospatial education in its STEM (science, technology, engineering, and mathematics) proposals. The AAG resolution has been endorsed by hundreds of bipartisan national organizations and prominent individuals, including eight former US secretaries of state and US secretaries of defense; 20 incumbent state governors; 25 Fortune 500 companies; and a host of leading educational, environmental, and business organizations.

The large coalition of geography education supporters that AAG has assembled has helped make a forceful case to federal policy makers.

As the 114th Congress gets under way, the AAG applauds Chairman Alexander's immediate focus on K–12 education and the reauthorization of ESEA and hopes that the final Senate bill will include a much-needed focus on the teaching and learning of geography and GIS in our schools. (See the letter sent to Senator Alexander on reauthorization at www.aag.org/esea_alexander.) Committee hearings have already begun in 2015 related to the ESEA, and the chairman has indicated that he would like to pass a reauthorization bill through his panel early this year.

Alexander's current draft bill does not yet include a listing of core academic subjects and currently does not address geography specifically. Yet geographic learning is critical so that students build the spatial skills needed for careers in the rapidly growing geospatial technologies field, designated by the US Department of Labor as one of the three most important emerging and evolving fields.

When former secretary of state James Baker (who served with Alexander in the cabinet of President George W. Bush) endorsed the AAG Resolution on Geography Education, he told AAG: "During my time as secretary of state, I witnessed firsthand how important it was that Americans understood geography and the world around them. Since then, as countries have become even more interconnected, that need has grown. As a result, I support the efforts by the AAG to promote geography education in our schools, and I encourage the White House and Congress to do the same."

Former secretary of state Madeleine Albright, upon signing the resolution, also said, "Geography played a leading role in nearly every policy decision I was involved in as secretary of state. Young Americans with an understanding of peoples, places, and cultures have a clear advantage in today's rapidly changing global economy, and I am encouraged that the AAG is working with Congress and the administration to build support for geography education at the K–12 level."

In addition to this growing support for federal funding for geography education, a transformative event has occurred that makes attention to this issue especially critical. Esri made a $1 billion donation of GIS technology available to all US elementary and secondary schools, both public and private. This initiative, which is aimed at strengthening K–12 STEM education, has the power to drastically improve the college and career readiness of US students in a critical technology field.

AAG is also doing its part to support this incredible gift by setting up an Esri authorized nationwide GeoMentoring network of specially trained educators and GIS practitioners (www.geomentors.net). Esri's efforts need the support of policy makers to leverage this donation by providing needed federal funding and support to enable states and school districts to better invest broadly and on a sustained basis in geography and geospatial education. Now is the time for Congress to provide funding support for geography and GIS in a reauthorized ESEA. Boosting proficiency in these fields will undoubtedly generate new jobs and enhance economic development across the nation.

AAG will keep you apprised of new developments on this important education legislation. For regular updates, visit www.aag.org/policy. Please also consider contacting the congressional representatives in your home district and on Capitol Hill to express your own views on the importance of funding geography and GIS education in our nation's schools. Esri has led the way with its ConnectED donation to all K–12 schools. Now is the time for Congress and the federal government to do their part to ensure strong K–12 geography and GIS education for all US students and for our nation's future.

Contact Doug Richardson at drichardson@aag.org.

By Douglas Richardson and John Wertman, AAG Senior Program Manager for Government Relations.

Tireless Proponent Continues Leading Role in GIS

GIS Hero

↑ Sam Wear

"Sam was there at GIS ground zero when the application of GIS started getting traction among scientists and decision makers." These words refer to Sam Wear, who has been an advocate for GIS for more than 30 years. The speaker is Wear's longtime friend Peter V. August, a professor at the University of Rhode Island and fellow proponent of GIS.

Wear was introduced to GIS in the early 1980s while studying for his master's degree in natural resources management at the University of Vermont (UVM) following receipt of a bachelor's degree in wildland recreation management from the University of Idaho. He was working in Gary Smith's lab, one of the first to use a new technology—GIS—to support natural resources management. The lab was such an early adopter that when Wear began his GIS career using Esri's first product, PIOS (Polygon Information Overlay System).

When Wear completed his graduate studies at UVM, he intended to pursue a doctorate at the University of Montana, but before heading there, he made a side trip to New York State that turned out to be doubly fortuitous. Hs purpose was to visit a woman who would later become his wife. While there, Wear interviewed for a job with Westchester County. He got the job—and he has never left.

In the intervening years, Wear has been a tremendous proponent of GIS and has pioneered the use of GIS for managing communities. He has worked not only at the county level but at the state and national levels. Between 2004 and 2008, Wear was loaned to the National Geospatial Program at the US Geological Survey through the Intergovernmental Personnel (IPA) Act Mobility Program. At that time, he served as a local government liaison during the development of Geospatial One Stop and early versions of *The National Map*.

Currently, Wear is the assistant CIO (GIS) at Westchester County's Department of Information Technology GIS. The county's GIS program provides interactive mapping, online data, map services, and tools. It also supports local and county agencies in implementing GIS applications for emergency response, public health and safety, infrastructure management, land-use planning, transportation, natural resource management, and green technologies. It offers GIS-related services and training to local governments, community groups, schools, and libraries.

The department has gone beyond the typical work of GIS optimizing government operations and applied GIS to improving the well-being of Westchester's residents. For example, Westchester County GIS has made interactive maps available to the Food Bank for Westchester, a nonprofit that distributes food to hungry children, seniors, and the working poor. Using these interactive maps, agency staff and volunteers can refer community members to resources. Staff members also serve on state GIS committees and support local government GIS initiatives by helping them obtain grants for projects, studies, and implementation programs.

Wear has been especially interested in developing GIS applications for government and nonprofit organizations in the health and human services sphere, an area that has traditionally been on the trailing end of the technology. One such application was developed with the Veterans Service Agency. An interactive map keeps veterans informed of events and places of special interest to them as well as businesses that offer programs for veterans.

Beyond using his greater vision of what GIS can do to enhance the county's work, Wear has always contributed to the larger GIS community.

"Sam's contribution to GIS goes far beyond the important work he does in Westchester County," said August. "Sam is all about sharing what he has learned in New York with the rest of the GIS user community. He embodies the NEARC mantra—users helping users."

Wear has been involved with the Northeast Arc User Group (NEARC) since its inception and is a two-term past president. An independent, volunteer-driven organization, NEARC was founded to help Esri software users in New England, New York, and New Jersey be more successful. Over the years, Wear has shared his expertise and insights with NEARC members through presentations, workshops, posters, and demonstrations.

In addition to his work with NEARC, Wear was also the founder and a board member of the New York State GIS Association (www.nysgis.net). This nonprofit association was founded in 2003. It is government and industry neutral and represents the interests of the state's geospatial community. It promotes professional development and continuing education for its members.

Wear continues to play an active role in the geospatial community. His wide-ranging interests are evident in his posts to his blog, *eSpatially New York* (www.espatiallynewyork.com). They are filled with information about the latest developments in the technology, industry news, and reflections on where geospatial is and should be going. In his Blue Highways of GIS series on the blog, Wear highlights GIS work done in small villages, businesses, and schools by resourceful people with limited funds who have found interesting ways to use geospatial technology to make a difference.

Most recently, he has focused on geospatial businesses—not only traditional service and consulting firms—but also geospatial start-ups and businesses in mobile, cloud, research and development, and open source.

Wear continues to live in Westchester County with his wife Daryl. They have two sons and a daughter. His outside interests include running, hiking, and golfing, and he is known as quite a dancer, according to August who said, "Sam is not all work; his Fred Astaire-like moves on the dance floor in NEARC socials are legendary!"

Although he has played a pivotal role in building traditional GIS capacity, he continues to embrace new developments in the technology and encourage the GIS community to look at new ways GIS can be implemented and applied.

"My work here is still incredibly rewarding," said Wear. "Yes, 30 years later. God willing, I have a couple more years of work in me or at least until we get our last one through college. It's been a great run."

Building Sustainable GIS Management with URISA's GIS Capability Maturity Model

By Greg Babinski and Amy Esnard

URISA is launching an innovative online GIS Assessment Service in 2015 based on the GIS Capability Maturity Model (GISCMM). Several organizations have already used the published GISCMM and performed their own internal GIS assessment process. This article describes three of these efforts that were conducted by the San Jose-Santa Clara Regional Wastewater Facility in California, Hennepin County in Minnesota, and King County in Washington.

In 2013, URISA's GIS Management Institute (GMI) published GISCMM, which is intended to allow GIS operations to assess the maturity of their organization and compare them against a standardized framework and rating mechanism for enabling capability and execution ability.

Enabling Capability is defined against 23 individual components. These components describe aspects of a GIS operation that are purchased, developed, or otherwise acquired. They are the assets of a GIS operation and include things like framework, business data layers, data maintenance, data coordination and availability, GIS design and technology, software and applications, management and staffing, governance, and financial resources. Enabling Capability components are assessed against a scale that describes how close the organization is to possessing each asset category.

Execution Ability is assessed against 22 components that focus on the process maturity of the organization in key operational areas. Execution Ability includes topics like GIS service development and delivery, end-user support and quality assurance, various aspects of operations and management, collaboration, strategic alignment, legal/policy compliance, and social responsibility. Execution Ability components are assessed against a classic five-step capability maturity model scale that describes progression from ad hoc processes to fully optimized application of best practices.

San Jose-Santa Clara Regional Wastewater Facility

Shortly after the GISCMM was published by URISA in 2013, the San Jose-Santa Clara Regional Wastewater Facility (RWF) applied the model to its GIS operations. The City of San Jose Environmental Services Department operates RWF to clean wastewater before it flows into the South San Francisco Bay. RWF is owned by the cities of San Jose and Santa Clara and also serves a number of other cities, sewer districts, and unincorporated areas. RWF is the largest tertiary wastewater facility in the western United States and is located on 2,600 acres—the size of a small city.

Tim Hayes, RWF senior geographic systems specialist, contacted the GMI Committee for guidance on applying the model against RWF's GIS operations. The GIS assessment completed by RWF was quite extensive and it was accompanied by concise comments and selected documentation to validate the self rating.

Within the Enabling Capability components of the model, RWF is rated very highly for almost every component. However, one component highlighted a challenge faced by many GIS operations: metadata. RWF has begun work on this with the resources available to complete the development of this component.

Within the Execution Ability portion of the model, most RWF GIS processes were rated at level one (ad hoc) or level two (repeatable). However, some very key process maturity components are rated at level three (defined). These included application development, quality assurance, process event management, contract management, and staff management. GIS software license management is rated at level four (measured and managed). These higher ratings validate the progress that RWF can make in other areas to leverage its existing GIS investment.

The assessment that Hayes produced for RWF helped the organization identify strengths as well as operational areas that needed to be prioritized. The completion of the assessment and feedback on the model itself helped GMI refine the model for launch of the online GIS Assessment Service.

Hennepin County, Minnesota

In 2014, as part of a strategic planning effort, Hennepin County, Minnesota, conducted a partial assessment against the GISCMM. Many strengths and opportunities were identified, among them being a strong geospatial data infrastructure. The county had collaborative data sharing and sound best practices to allow geospatial data sharing countywide. Hennepin County identified the need to continue focusing on its geospatial data governance and striving to strengthen its geospatial data stewardship countywide.

For decades, departments across the county have managed their data within their own environments. With increased focus on the county's geospatial data, including Public Safety's NextGen911 implementation and a newly adopted Open Data Initiative, the county is realizing the level of maturity that is required to maintain reliable, quality geospatial data.

A cultural shift in how the county thinks about geospatial data is provoking sharing of data publicly, enabling opportunities such as the county's first code-a-thon, which is scheduled for early 2015. All these developments were made possible by a strengthened, more mature geospatial organization. The GISCMM assessment helped to identify the very measures that the county is now taking to improve the organizations' process maturity and improve the quality of geospatial data stewardship.

The county has taken proactive measures to establish new tiers of governance including a Data Governance Board, a Data Governance Strategic Council, and an appointment of a new data officer position which support the defining of roles and responsibilities behind stewardship of services and geospatial data.

The new governance is helping improve data authority, data quality, and better define the partnerships necessary to manage and deliver reliable data and services. The county is interested in comparing its GISCMM assessment results with those of similar organizations and revisit the GISCMM assessment process to track the increasing maturity of the county program. (Thanks to GISCMM assessment contributors Gary Swensen, Hennepin County GIS coordinator, and Judy Regenscheid, Hennepin County administrator.)

King County, Washington

In mid-2014, the King County GIS (KCGIS) Center began a self-assessment against the GISCMM. This review was conducted by the entire KCGIS management team. This team effort was a way to validate individual ratings and gain new insights into issues that KCGIS must address.

Within the Enabling Capability components, the assessment spotlighted areas where ongoing business data maintenance must be improved. In many cases, problem datasets are maintained by external data stewards. The KCGIS GISCMM assessment will help engage data stewards so they can improve data quality and currency. As a fairly mature GIS, most other KCGIS ratings were quite high, except for GIS Application Portfolio Management. The assessment revealed that KCGIS has to move toward a more consistent and integrated approach to custom GIS application development and maintenance.

King County agencies are required to develop and report on a wide range of performance metrics, so many of the Execution Ability components of the model were rated at level three (managed) or level four (measured). Two areas of improvement were identified. Application development and project management methodologies need to be defined to move up to level three in these areas.

The importance of mature defined system management and process event management practices was demonstrated in late 2014 when KCGIS was hit by a crypto-virus extortion attack. Isolating the virus and getting back in operation was a challenge, but well-defined processes made the response successful.

KCGIS is taking its self-assessment one step further. It is conducting a self-assessment of its entire five-person GIS management team against the GMI Geospatial Management Competency Model (GMCM). This assessment looks at each of the 18 competency clusters within the GMCM. The team is rating itself against a management competency assessment rating scale developed by the National Institutes of Health and modified for GIS use by the URISA GMI Committee.

Making GISCMM More Valuable

GISCMM has provided value to agencies that have applied it against their own operations. However, the URISA GMI will launch a new GIS Assessment Service in 2015 that will make the GISCMM even more valuable. With this new service, organizations anywhere that use GIS will be able to complete an online GIS assessment. This is no different than the self-assessment approach used by King County, Hennepin County, and San Jose-Santa Clara Regional Wastewater Facility. However, the GIS Assessment Service will include the following valuable features:

- Agency data will populate a permanent GMI GIS Assessment Database, so that agencies can perform reevaluations in the future to validate progress developing their capability and maturity.
- Agencies will also be asked to assess their GIS management team against the GMCM. This will provide further insight into their operational resiliency.
- Agencies will also complete a GIS metric survey. This will allow GIS operations to compare

themselves against self-defined peer agencies.

- The GIS Assessment Service will include a GMI validation process and a customized report that provides suggestions for priority capability enhancements and process maturity improvements.
- The GMI will build a repository of best practices that can be shared within the GIS management community. Part of this process will include the development of formal peer-reviewed GIS management best practices.
- The GMI database will develop a body of comparable performance metrics that can be used by GIS managers and decision makers to make knowledge-based decisions about the desired level of investment in their GIS program.

A key concept of the GMI GIS Assessment Service is that process maturity improvements can result in a big increase in the effectiveness and return on investment (ROI) from any given level of investment in GIS. This will provide a valuable tool for GIS managers and decision makers to make informed investment decisions in GIS development and operations.

GIS operations will become more capable and mature by utilizing the URISA GMI GIS Assessment Service. GIS managers everywhere will have a valuable tool to help their operations maximize their potential and make progress toward a sustainable future. GIS managers themselves will be able to refine their professional competency and advance their careers using GMI products and services.

About the Authors

Greg Babinski, GISP, is the finance and marketing manager for the King County GIS Center in Seattle, Washington. He holds a master's degree in geography and is a URISA past president. He may be contacted at greg.babinski@kingcounty.gov.

Amy Esnard, GISP, is currently a business development manager for Data Transfer Solutions, LLC—Western US Region and International Territories, and a strategic GIS business consultant in Hood River, Oregon. She holds a master of science degree in GIS and currently serves as a director on the URISA Board of Directors. She can be contacted aesnard@dtsgis.com.

Managing GIS

A column from members of the Urban and Regional Information Systems Association

URISA
The Association For GIS Professionals
www.URISA.org

The Relevance of Cartography

A Cartographer's Perspective

A column by Georg Gartner
President of the International Cartographic Association

Celebrating International Map Year 2015/16

As I understand it, geoinformation disciplines—geodata, geoinformation, spatial analysis, geodata infrastructures, cartography, and maps—don't receive the acceptance, understanding, and acknowledgment by experts of other domains as well as decision makers and the public. Sometimes it is not immediately clear to someone outside our field why what we are doing is relevant and important and that it underpins so many processes of our lives, our society, our economy.

I argue that this situation can be improved. By being outspoken and proactive, we may be able to increase understanding of the relevance and importance of our work, our projects, our products, and more generally the power of geodata, geoinformation, and maps.

How can this best be done? By synchronizing our efforts at the highest level possible. This is exactly what is happening. At the fourth session of the United Nations Committee of Experts on Global Geospatial Information Management held in August 2014 at the UN Headquarters in New York, the International Cartographic Association (ICA) Initiative on an International Map Year 2015/16 was positively discussed. The resolution that resulted reads as follows:

"The committee endorses the International Map Year 2015–2016 as proposed by the International Cartographic Association as a valuable means to promote the importance of maps and Geoinformation."

Why is the United Nations interested in promoting maps and geoinformation? Efficient handling of geographic information is of vital importance in dealing with climate change, natural disasters, environmental quality, pandemics, wars, famines, population displacement, migration and economic crises, and the many other problems currently facing the world. These problems are cross-border challenges that require global, regional, and national policy responses and the efficient handling of cartography and geographic information.

The main purpose of the International Map Year (IMY) is to highlight the importance of maps and geographic information in society. Our ever more complex society would be lost without maps and the proper use of geographic information. Topographic and geological maps as well as aerial photo products are used by the public for information and orientation but also by many professional organizations in fields such as planning and defense. Socio-economic maps provide better insight into themes that range from sustainability to the spread of diseases. These maps help us to mitigate the global differences in the population's access to resources. It is, therefore, most important that everyone can easily access and retrieve maps and geographic information.

The concept of IMY is therefore to demonstrate to the general public, as well as decision makers, the importance of using and making maps in a global context. This is in line with the Rio+20 Agenda signed by the UN Secretary General.

The International Map Year will be formally launched at the International Cartographic Association's conference in Rio de Janeiro August 23, 2015, and will continue until the end of 2016. Planning for national events associated with the International Map Year started at the beginning of 2015.

IMY has four target groups: the general public, schoolchildren, professionals, and governments. Activities can include anything related to using and making maps. The objective of the United Nations resolution is to

- Provide recognition by the United Nations and its member states of the importance of maps and geospatial information for society.
- Encourage member states to further support making maps and geospatial information more accessible.
- Motivate member states to improve the general public's awareness of the availability of maps in their nation as well as improve understanding of how to use maps and geospatial information.
- Recognize the importance of the work of cartographic professionals and local governments.

IMY-related activities might include dedicated map days (maybe in conjunction with GIS Days), map exhibitions and mapping parties; demonstrations of map use and map production; local mapping activities related to planning and infrastructure; historical map exhibitions; promotion of the Barbara Petchenik Map Competition to promote mapping by children; cartographic activities for schools and children; lectures about the use of geospatial information; demonstrations of GPS, OpenStreetMap, geocaching, and mashups; map use exercises; activities in the context of entertainment with maps; storytelling with maps; and artistic activities with maps and cartography—just to name a few of the activities envisioned.

And you can help be part of the International Map Year 2015/16! Document instances that illustrate the importance of making and using maps and share that information with ICA. Highlighting the importance of maps to decision makers and others will eventually lead to a better understanding and awareness of all geodomains, which will benefit all of us. Visit internationalmapyear.org/ and www.icaci.org to learn more.

About the Author

Georg Gartner is a full professor of cartography at the Vienna University of Technology. He holds graduate qualifications in geography and cartography from the University of Vienna and received his PhD and his habilitation from the Vienna University of Technology. He was awarded a Fulbright grant to the University of Nebraska at Omaha in 1997 and a research visiting fellowship to the Royal Melbourne Institute of Technology in 2000, to South China Normal University in 2006, and to the University of Nottingham in 2009. He is a responsible organizer of the International Symposia on Location-Based Services and editor of the book series *Lecture Notes on Geoinformation and Cartography* published by Springer. He is also editor of the *Journal of Location Based Services* by Taylor & Francis. He serves as president of the International Cartographic Association.

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Start-Up Fights Urban Blight

Civic Insight

Esri technology has been the catalyst for the success of many technology start-up companies. Their applications are improving communities, businesses, and the environment. Civic Insight is an example of one of these companies.

Civic Insight is a centralized platform that helps citizens find information about their city and work together to improve neighborhoods in their city. Formerly called BlightStatus, Civic Insight was launched by Code for America as a tool for tracking vacant properties. Under the leadership of Alex Pandel and Eddie Tejeda, the service transformed into a successful start-up business called Civic Insight. Its GIS platform hosts a city's property information and shows where property is changing over time.

In the city of New Orleans, vacant and abandoned properties and other evidence of urban blight had reduced property values. This motivated citizens to get involved in solving this problem. In 2012, the city had 35,000 vacant properties. It used the BlightStatus tool to track these properties. Using the renamed tool, citizens can now go online and get information about dilapidated buildings and report run-down areas.

Civic Insight's service runs on the Esri ArcGIS Online platform, which makes data accessible, simple to map, and easy to understand. From the City of New Orleans' website (www.nola.gov/code-enforcement/find-a-blighted-property), residents and local organizations can search for a property on a map and learn about its ownership, inspection, and permitting history. They can also ask to receive real-time notifications about construction progress.

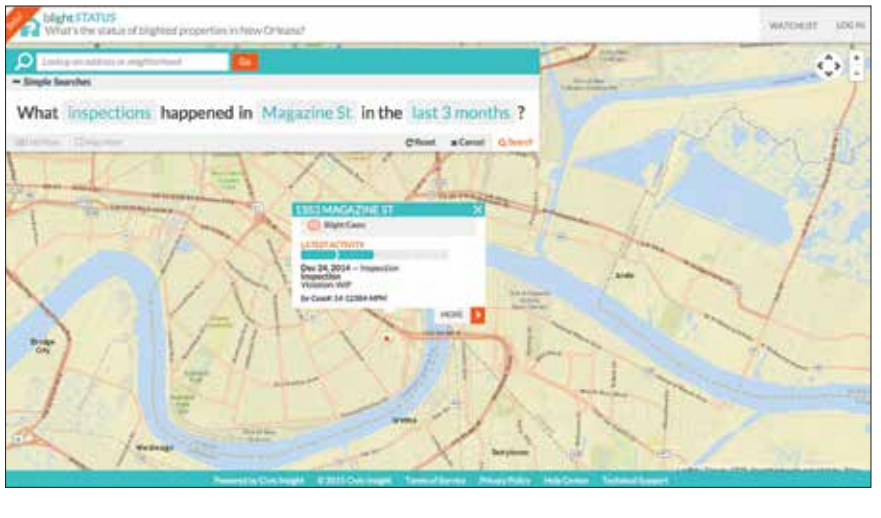
The city of New Orleans benefits from Civic Insight by keeping citizens informed and engaged, making government regulation more transparent, and improving interactions between citizens and city staff.

Civic Insight provides a community platform that lets citizens and local government officials see property activity and status. Before Civic Insight, people who lived in a neighborhood near new construction could not find out what was being built and who was building it. Now, any resident can go to the city's website and, through a map interface, get information about construction in a given area.

Civic Insight makes it easier for the average person to understand permit information. The user accesses permit information, and Civic Insight shows this data on a simple map. Civic Insight partners work directly with local governments that authorize access to the city's system for issuing permits and inspecting code violations. Civic Insight then translates the information from government-speak to citizen-speak.

Civic Insight saves time and reduces frustration when citizens interact with city government. Previously, finding out about the status of a property required tracking down a contact at city hall, calling that contact, and perhaps being put on hold or transferred to someone else before getting the right person. When the call reached the right city staff member, that person tracked down the information and called back.

Now citizens can find this information themselves, and staff are free to do other types of work. Civic Insight makes information searchable and understandable. City staff members are using the system to get a simple map that shows the status of properties.



Civic Insight improves day-to-day communications because it is integrated with the New Orleans systems and more people are able to share and combine data with other city information. Like most US cities, New Orleans already uses Esri technology to manage its data. Civic Insight builds on the existing information infrastructure, whether it is Esri technology or another system, and uses the city's existing tiles and layers.

Organizations have the information they need for renovation. The New Orleans Economic Development group uses Civic Insight for its projects. Community rehabilitation groups, such as Habitat for Humanity and Rebuilding Together, use the tool to better collaborate with the city. Agencies can see where they can best target resources to make the most difference.

For more information, visit civicinsight.com or send e-mail to Alex Pandel at alex@civicinsight.com.

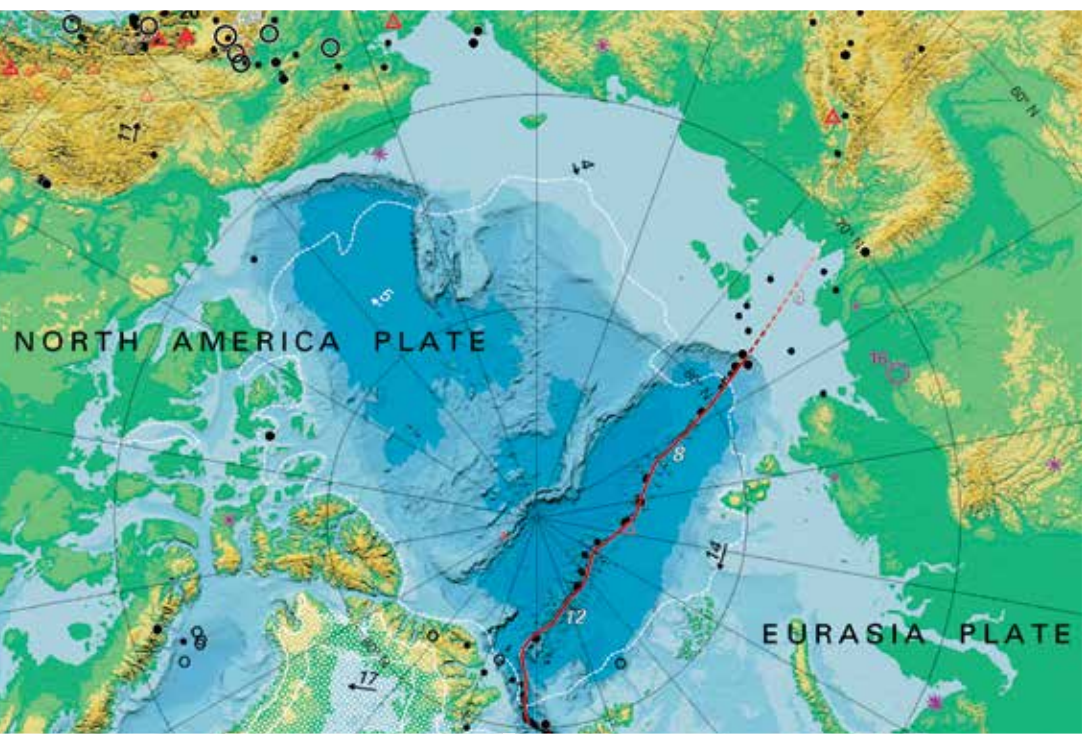
ArcGIS Open Data Sites

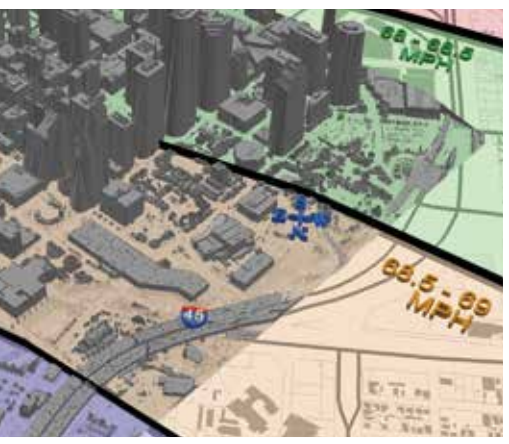
GIS technology can serve as the open data backbone for your organization, unlocking your data stores so you can share them as your organization sees fit. Governments and organizations create Open Data sites to make their authoritative data accessible, investigable, and collaborative. Visit the ArcGIS Open Data Showcase to see more and find out more about how to create your site.

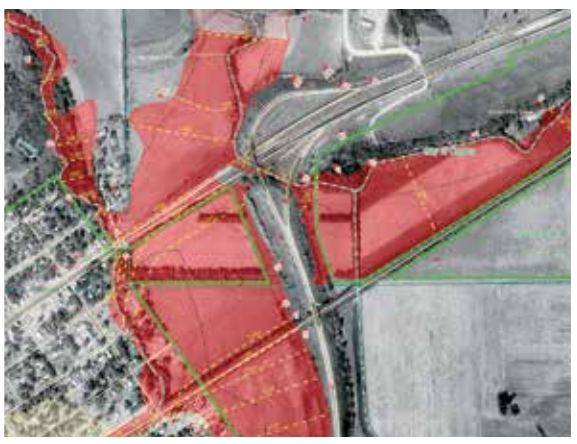
City of Tampa, Florida, Open Data Share
city.tampa.opendata.arcgis.com
Tampa's Open Data Share has become very popular in the Tampa community since its launch in the fall of 2014. The site boasts 60 datasets linked directly to Tampa's geodatabase, ensuring users have access to the most authoritative and timely data to explore and download.

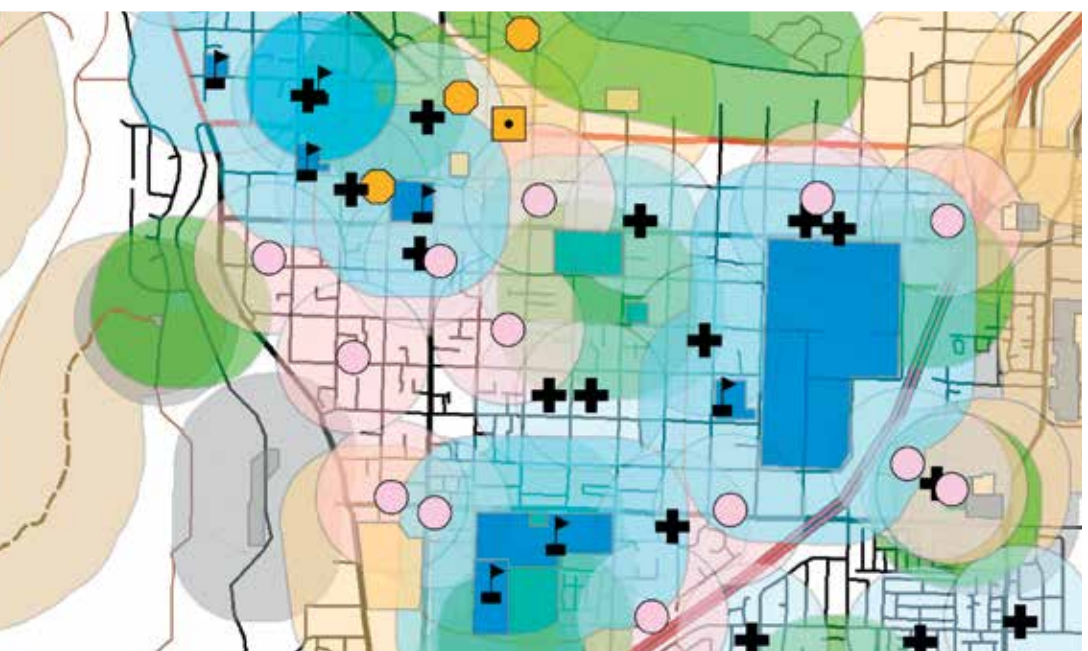
Open Raleigh GIS Data
data.ral.opendata.arcgis.com
The City of Raleigh, North Carolina, has created its Open Data site as part of the Open Raleigh Initiative. The city used a hybrid design approach that incorporates simple CSS in the header and a few widgets in the body to create an informative site with many resources.

Open Data Institute Queensland
opendata.odiqueensland.org.au
The Open Data Institute Queensland (ODIQ) is the first Australian international node of the Open Data Institute. It collected all authoritative datasets across ArcGIS Open Data sites to facilitate data discovery for geographies around the world.









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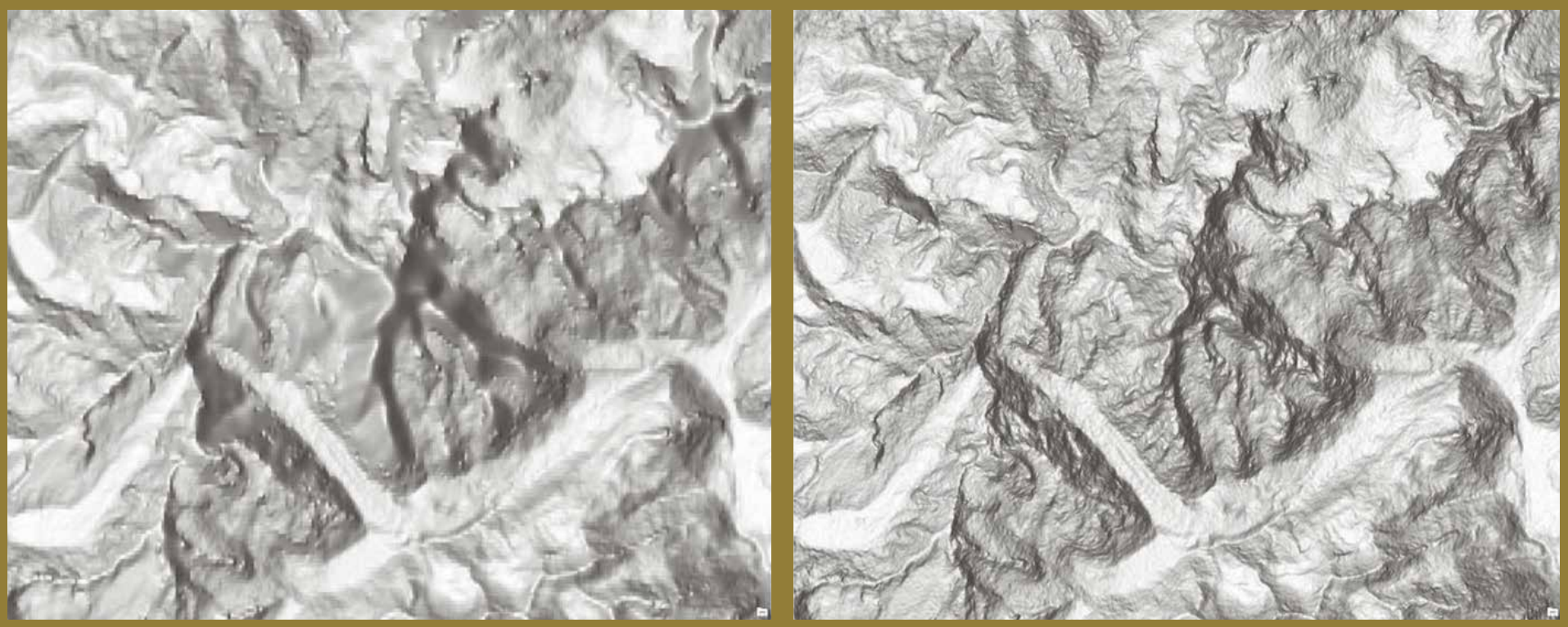
SRTM Data for South America and Western Europe Added to Esri World Elevation Services

Esri World Elevation Layers for South America, Western Europe, Central America, and the Caribbean Islands have been enhanced with detailed, void-free, 1 arc-second (~30 meters) Shuttle Radar Topography Mission (SRTM) data (Version 3.0) from the National Aeronautics and Space Administration (NASA). This update provides three times the level of detail in these areas than was previously available.

Esri's dynamic world elevation image services—Terrain and TopoBathy—can not only be used for visualizations, such as multidirectional hillshade and tinted hillshade, but also provide access to raw elevation values and derivatives, such as slope and aspect, that can be used for analysis. Access to these global layers is free and does not consume any credits. All that is required is an ArcGIS Organizational account.

Previously released SRTM data for Africa has also been refreshed with void-free SRTM 30 m (Version 3.0) data in this update. Updates for Asia and Australia are pending. For more information about the coverage of the World Elevation services, see the Elevation Coverage Map on ArcGIS Online.



↓ Compare the SRTM 90 m image on the left of Mont Blanc, the highest peak in the Alps, with the new SRTM 30 m image, on the right. This SRTM 30 m data has been added to Esri World Elevation services and is available at no cost with an ArcGIS Online organizational account.

Well-Traveled Esri T-shirts

Two-year-old Elliot Wilson is wearing his favorite GIS t-shirt. His mother Alyson Marjerrison bought it for him at the Esri User Conference in San Diego this past July. Marjerrison works as a GIS technician for the town of Golden, British Columbia, Canada.

British Columbia, Canada

This picture of Blake Weber was taken during a rare clear day at the top of Clingmans Dome in Great Smoky Mountains National Park at the beginning of a quick trip he took along the Appalachian Trail. The day before his hike, the snow had let up and it started again as he was leaving the park. Weber works as a biostatistical research analyst for BlueCross BlueShield of Tennessee.

Tennessee, USA

Partner Offerings

Esri has relationships with over 1,800 partners globally that provide customer-focused geoenabled solutions. These partners have extensive experience providing GIS solutions and services across our core industries. Partner-provided solutions and services range from custom-built applications to complete system ArcGIS implementations.

In this issue, Esri recognizes three partners that participated in the 2014 Esri User Conference (Esri UC) and have exhibited practical yet innovative application of ArcGIS's latest features, taking geographic visualization and analysis to a higher level. To learn more about the Esri partners that participated in the Esri UC, check out the #PARTofUC14 story map, 184.169.230.84/partofuc14/.

For a complete list and description of our partners and their offerings, visit the Esri website at www.esri.com/partners.

↑ Learn more about the Esri partners that participated in the Esri User Conference by viewing the #PARTofUC14 story map at 184.169.230.84/partofuc14/.

Urban Planning

SmarterBetterCities AG
www.SmarterBetterCities.ch
3D Visualization, SmartZoning Plus and CloudCities

SmarterBetterCities provides a smart zoning tool that allows users to simplify the numeric and regulatory complexities. Decision making is easy after urban scenarios are visualized in 3D. The SmartZoning Plus app and 3D Libraries are built on Esri CityEngine and ArcGIS Online. This app supports a geodesign workflow. The SmarterBetterCities CloudCities 3D platform allows users to easily share 3D content on website blogs, social media, and mobile devices. Receiving feedback has never been easier or more dynamic.

Natural Resources

Valarm
www.valarm.net
Valarm Sensor and Remote Monitoring Solutions

Valarm is an open platform that facilitates rapid deployment of geotagged, real-time, mobile sensor networks. Valarm connects industry standard sensors to our cloud systems or private networks, using readily available, standardized hardware, making extensive use of the ArcGIS platform including ArcGIS GeoEvent Extension for Server, ArcGIS Online, ArcGIS API for JavaScript, and Operations Dashboard for ArcGIS. Valarm-compatible connector hardware includes typical Android mobile devices and other open hardware platforms from multiple vendors.

Emergency Services

FireWhat Inc.
www.firewhat.com

FireWhat Inc. is an emergency services GIS technology company that maps emergency incidents and tracks assets in and out of the field. Its near real-time detailed fire information data feeds have up-to-the-minute intel and can be migrated into any data management system or information product. FireWhat fire applications speed emergency response through the use of ArcGIS Online, Collector for ArcGIS, and custom applications.

Mobile

AmigoCloud
www.amigocloud.com
AmigoCloud Mobile GIS

AmigoCloud, a mobile GIS solution provider, enables Esri users to collect, edit, visualize, and share geodatasets online and offline. Its solutions, which integrate seamlessly with ArcGIS Online, ArcGIS for Desktop, and ArcGIS for Server, support more than 60 geospatial file formats. These solutions can be used from any smartphone or tablet for collecting all types of geodata (points, lines, polygons) and sharing it in real time with members of an organization using the AmigoCloud Mobile GIS full permission setting.

New Training and Certification Offerings from Esri

Training

Esri instructor-led courses are suitable for ArcGIS 10.2 and 10.3 users. The concepts and workflows taught in these courses apply to both versions. Students work with ArcGIS 10.3 in class to complete course exercises, and the take-home course data DVD includes the ArcGIS 10.3 and ArcGIS 10.2 files needed to repeat the exercises back at the office. View all instructor-led courses at esri.com/coursecatalog.

These new courses are designed to help developers, database administrators, and GIS professionals be highly productive and take advantage of the latest ArcGIS capabilities.

Instructor-Led Courses

- *Developing Web Apps with ArcGIS API for JavaScript*
- *Deploying and Maintaining a Multiuser Geodatabase*
- *Introduction to ArcGIS Pro for GIS Professionals*

E-learning

- *Configuring Apps Using Templates and Web AppBuilder for ArcGIS—Web Course*
- *Get Started with Web AppBuilder for ArcGIS—Free Training Seminar*
- *Streamline GIS Workflows with ArcGIS Pro—Free Training Seminar*

Esri creates instructor-led training designed especially for geospatial professionals working at military, intelligence, and national security organizations. Courses emphasize realistic, scenario-driven examples and hands-on practice with ArcGIS technology. Learners acquire a solid foundation in geospatial concepts; best practices; and workflows that support the production of timely, actionable intelligence. Learn more about Esri training for these communities at esri.com/geospatial-skills. These instructor-led courses are available for military, intelligence, and national security organizations.

- *Introduction to Geospatial Concepts for Intelligence Operations*
- *Using ArcGIS for Geospatial Intelligence*

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esri.com/products

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Contact your local Esri partner:
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Certification

New desktop, developer, and enterprise exams that measure proficiency with ArcGIS 10.3 are in development. The 10.3 versions of the ArcGIS Desktop Associate and ArcGIS Desktop Professional exams will be released in May, with other exams following soon after. View complete information for all Esri technical certification exams at esri.com/certification.

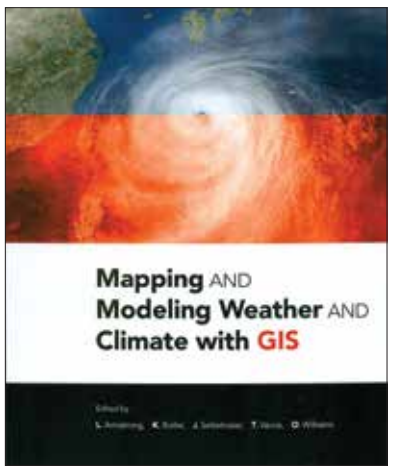
Esri Press

Esri Press e-books are available through the Esri Books app at esri.com/landing-pages/esri-press/e-books or from online retailers.
For information on all Esri Press publications, visit esri.com/esripress.

Mapping and Modeling Weather and Climate with GIS

Edited by Lori Armstrong, Kevin Butler, John Settelmaier, Tiffany Vance, and Olga Wilhelmi

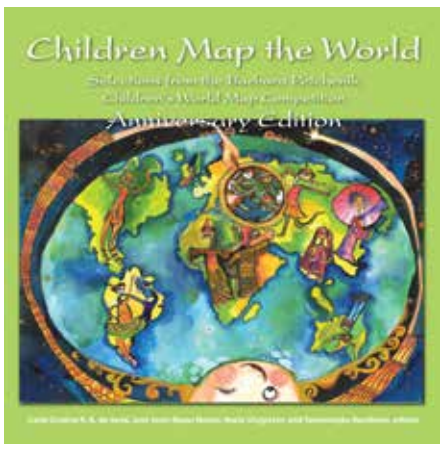
Weather mapping goes beyond what is broadcast on the evening news. *Mapping and Modeling Weather and Climate with GIS* describes how GIS technology can be coupled with atmospheric and climate sciences data to do research. The book is aimed at meteorologists, climatologists, and GIS practitioners interested in integrating weather and climate data into their GIS workflows. Early chapters cover how modeled atmospheric data and weather radar can be used in ArcGIS. A chapter describes on how weather- or climate-related social media feeds and posts can be integrated into a GIS and used in research. There is also a five-chapter section on tools and resources such as Python scripts and the Weather and Climate Toolkit, free software from the National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center. Esri Press, 2015, 370 pp., ISBN: 9781589483767



Children Map the World: Selections from the Barbara Petchenik Children's World Map Competition

by Carla Cristina R. G. de Sena, José Jesús Reyes Nuñez, Necla Uluğtekin, and Temenoujka Bandrova, editors

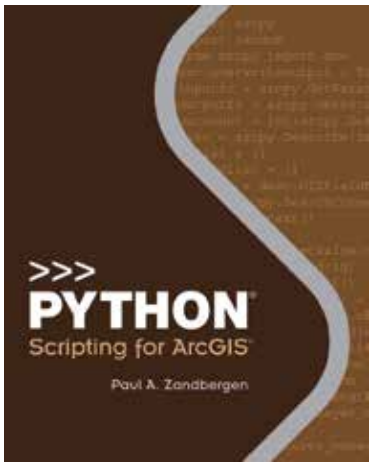
Children Map the World: Selections from the Barbara Petchenik Children's World Map Competition presents 70 maps created for the 2013 International Cartographic Association map design competition by children ranging in age from 3 to 15. These hand-drawn, sewn, or assembled maps convey powerful messages of optimism, anxiety, tolerance, and hope that reflect the competition's most recent theme "My Place in Today's World." This anniversary edition also showcases maps from past competitions that were held from 1993 through 2014. Children, parents, teachers, and map enthusiasts will delight in the work of these imaginative young cartographers. Their representations of the world and their lives demonstrate perspectives that vary from optimistic to pessimistic. April 7, 2015. 108 pp., Paperback ISBN: 9781589484221



Python Scripting for ArcGIS

by Paul A. Zandbergen

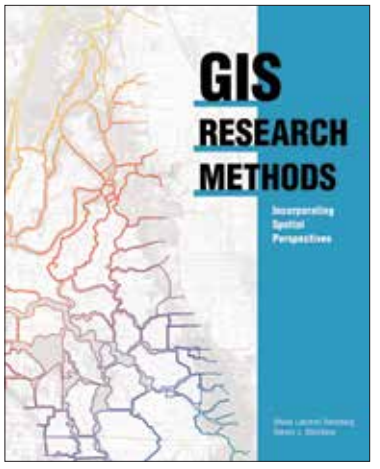
Python Scripting for ArcGIS is a guide for experienced ArcGIS for Desktop users that will get them started using Python scripting without requiring that they have previous programming experience. Experience with other scripting or programming languages, such as Perl, Visual Basic for Applications, VBScript, Java, or C++, is helpful but not required. Readers should have basic ArcGIS skills and an understanding of geoprocessing procedures. This book replaces the previous edition and moves the resources for the exercises online. The book's 14 chapters have corresponding online data and exercises that are available from the Esri Press book resource page at esripress.esri.com/bookresources. 2015. 358 pp., Paperback ISBN: 9781589483712



GIS Research Methods: Incorporating Spatial Perspectives

by Sheila Lakshmi Steinberg and Steven J. Steinberg

GIS Research Methods: Incorporating Spatial Perspectives shows researchers how to incorporate spatial thinking and GIS technology into research design and analysis. Topics include research design, digital data sources, volunteered geographic information, analysis using GIS, and how to link research results to policy and action. The concepts presented in this book can be applied to projects in a range of social and physical sciences by researchers, whether they are using GIS for the first time or are experienced practitioners looking for new and innovative research techniques. Scheduled for publication on May 1, 2015. 540 pp., Paperback ISBN: 9781589483781 and e-book ISBN: 9781589484047



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