ArcNews

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White House Climate Data Initiative

Coastal flooding. Sea level rise. Drought. The Obama administration says it wants to help communities better prepare for climate change effects like these by using scientific data, technology, and technical know-how from the public and private sectors.

Esri is joining Microsoft and several other tech companies to provide technology and expertise for the White House's Climate Data Initiative.

"The notion is to create and share knowledge to make communities more resilient," said Esri president Jack Dangermond.

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ArcGIS Already Supports GeoPackage

Esri Leads in Supporting OGC Standards

"Esri continues to add support for many open and interoperable data sources," says Keith Ryden, Esri software development team member, who led Esri's work on GeoPackage and worked on the Open Geospatial Consortium, Inc. (OGC), standard. "Adding GeoPackage support was a natural progression to our previous support of OGC WMS, WMTS, WFS, WCS, and OGC KML. We are committed to making our users successful, and we had users interested in Esri's early support of GeoPackage, so we ended up supporting even the draft specification prior to its becoming an OGC standard," continues Ryden. "We will be interested to see how popular the use of GeoPackage becomes."

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Esri to Offer Spatial Analysis MOOC

Massive Open Online Courses (MOOCs) have been an educational phenomenon in recent years. One thing that's remarkable about MOOCs is that they enable millions of people to explore new interests and strengthen skills without enrolling in formal degree or certificate programs. Now, to contribute to the growing body of MOOCs focused on geospatial technologies and methods, Esri is delighted to announce its first MOOC—Going Places with Spatial Analysis.

Spatial analysis is what makes GIS most valuable to decision makers. Spatial analysis is the set of skills and techniques that professionals use to make sense of all kinds of data that can be displayed on maps—from business data to health data to environmental data to data that analysts use to respond to emergencies. Students in the free Going Places MOOC will get access to the full analytical capabilities of ArcGIS Online, Esri's cloud-based GIS platform. Weekly lessons will familiarize students with spatial analysis following five broad topics: understanding and comparing places, determining how places are related, finding the best locations and paths, detecting and quantifying patterns, and making predictions.

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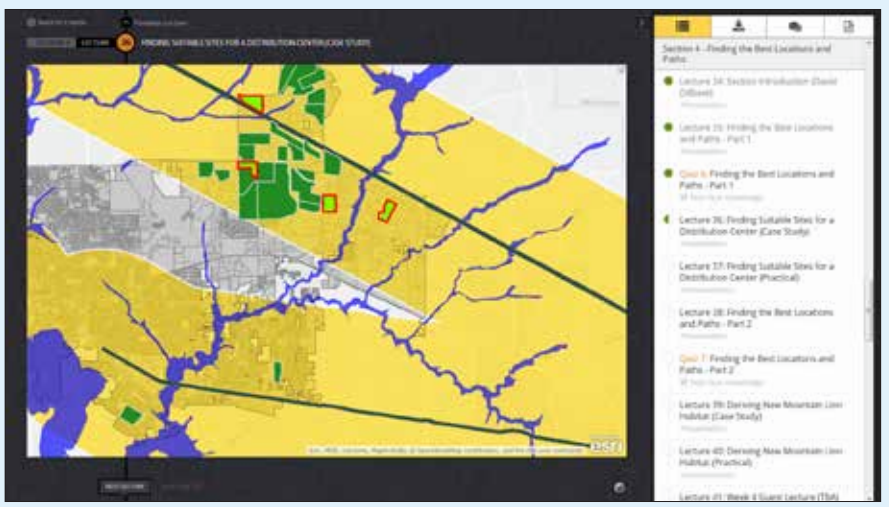
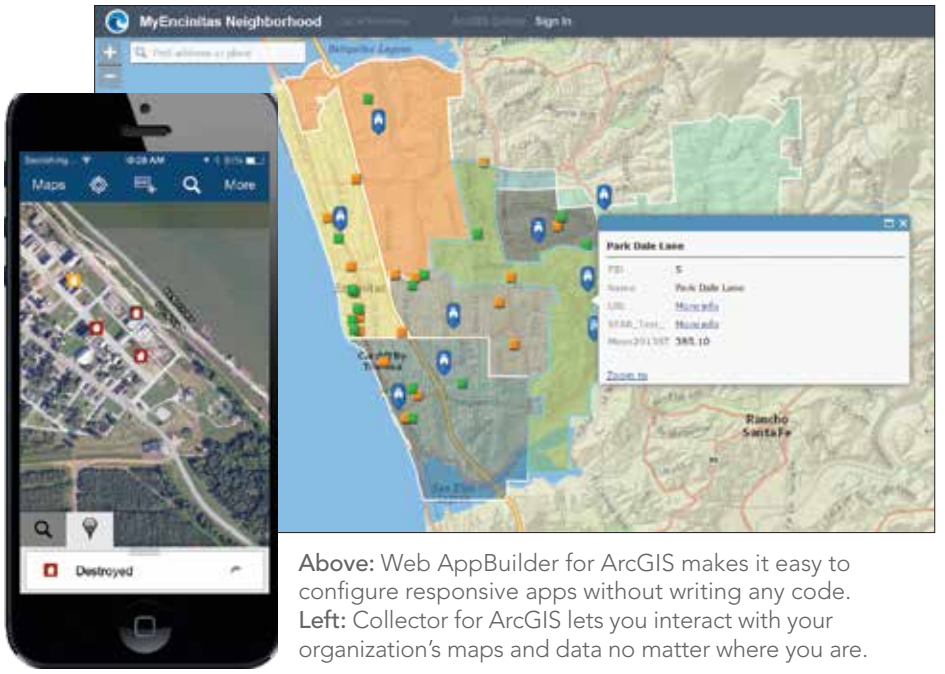


Case studies help students learn spatial analysis in ArcGIS Online.

Advances on Many Fronts

The ArcGIS Platform in 2014

People today expect to access the information they need, collaborate with others, and produce results at any time, on any device, from wherever they are. The line between the work people do inside and outside their offices is blurring; analysis and decision making are taking place whenever and wherever they need to occur. In anticipation of these growing trends, Esri has evolved ArcGIS into a location platform that gives people in any organization the ability to discover, use, make, and share maps from any device, anywhere, at any time.



Above: Web AppBuilder for ArcGIS makes it easy to configure responsive apps without writing any code. **Left:** Collector for ArcGIS lets you interact with your organization's maps and data no matter where you are.

A Platform for Understanding Your World

ArcGIS is more than technology for GIS experts. It is a location platform for empowering the entire enterprise—from line-of-business managers to the mobile work force to top-level executives—with timely, accurate information and a means of collaboration. ArcGIS channels location data stored in multiple systems across the organization into one system for mapping and spatial analysis.

This means that people working outside the GIS department can use ArcGIS to pull together information from many authoritative sources to gain new insights. They can use maps and spatial analysis to illustrate how circumstances have changed over time and spot important trends that impact their business, customers, and assets. Today, ArcGIS is used by organizations in every

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Web GIS, a key aspect of the ArcGIS platform, includes apps, a portal, web services, and data.

Taking London by 3D

By Rae DeVito

Highlights

- The London 3D city model lends itself neatly to geodesign.
- CityEngine turns London data into smart 3D city models.
- Feature attributes in building models enhance a large variety of projects.

London flood mapping analysis and visualization in CityEngine.

Cumbria, England, a rural northwestern county, is home to Garsdale Design, Ltd., an architectural, planning, and urban design firm housed in a converted countryside barn. Garsdale Design's address may be remote, but the business boasts a global reach, with projects spanning from its backyard to locales as exotic as the Middle East.

With substantial experience in 3D visualization and a variety of other GIS mapping services over the years, Garsdale Design continues to look for cutting-edge technologies to set its services apart. A smart 3D city model, featuring augmented data and more accurate buildings, proved to be the answer. The company targeted London, England—an internationally prominent metropolis steeped in history, commerce, and finance—for the project. An iconic city rich in old-world style coupled with architecturally progressive modern design made it the perfect showcase for precision geometry and adaptive modeling. Garsdale Design opted to offer its London clients an advanced, enterprise-level, 3D turnkey solution.

Geodesign veteran Elliot Hartley, a Garsdale Design director, focuses on the use of 3D urban modeling technologies. When researching the London project, Hartley explored ways to speed the workflow while improving the quality of 3D buildings and the information they contained. He also wanted the flexibility to bring 2D and 3D data into the model.

Hartley ultimately turned to Esri Silver Tier Partner CyberCity 3D, Inc., of El Segundo, California, a leading geospatial modeling company specializing in precise 3D city models (up to six inches accurate) that include an array of attributes, such as roof, facade, entity, and solar roof measurements. The company's patented modeling technology utilizes stereo imagery to extract point clouds, providing the source data to produce models. These models can be converted into Esri CityEngine models, streamlining the workflow. *[CityEngine is the stand-alone software product that transforms 2D GIS data into smart 3D city models.]* This sealed the deal, as Hartley works extensively with and offers training in Esri products.

"These technologies are transformational," says Hartley. "They've enabled us to make dramatic time savings while allowing us to communicate stories and information by combining 2D and 3D data from a variety of sources. For our business, it's raised our ambitions, so we are inspired to re-evaluate processes we took for granted."

Before moving forward, a challenge confronted the project: securing the aerial imagery necessary to build London 3D. Vertex Modelling, centering on high-precision 3D models and headquartered in London, provided the stereo imagery and camera files needed for the original London 3D launch.

Upon obtaining the imagery in May 2013, CyberCity 3D got in production mode, starting with a four-square-kilometer "beta test" area south of Buckingham Palace. Since the model was being designed for England, the buildings were aligned using the British National Grid projection. Visualizing the 3D buildings in CityEngine was the next step.

The London model is optimized for integration into CityEngine. Once there, it can be modified as needed and exported as web scenes for viewing on a modern web browser without requiring an additional plug-in. In addition, the model works seamlessly, not only in CityEngine but also in ArcGIS and most other commercial formats and platforms.

As Garsdale Design worked with its new partner to build the London model, concentrating on the London City Centre, the company faced a key challenge: could the complete model of this dense, highly detailed area be surfaced in one CityEngine visualization scene? The answer? A resounding yes.

Soon Esri (UK) Ltd. joined the project. Sales in the insurance and facilities management arenas immediately resulted from that strategic partnership.

The London 3D city model lends itself to a variety of applications, especially in the arena of geodesign. Innovative solutions sit at Esri users' fingertips, and the data the model provides enhances projects involving urban planning, visualization, solar evaluations, urban analysis, line-of-sight, shadow analysis/right-to-light, floor modeling, and real estate analytics. This extensive GIS information availability leads to faster workflows, better communication of complex proposals, and ease of data distribution via web services.

The build-out of the London model continues—extending out from the City Centre—with Garsdale Design now partnering with CyberCity 3D to market it through future cloud services. To date, the model encompasses more than 13.7 square kilometers and 5,700 structures. As the model grows, the interest does too.

"London's City Centre and the city in general are undoubtedly one of the most popular areas in the world, making it a perfect place to create a 3D model," says CyberCity's CEO, Kevin DeVito. "The visualization, analytical, and planning information gleaned from this expanding model will undoubtedly influence projects defining the future of this legendary city."

For more information, contact Elliot Hartley, director of Garsdale Design Limited (e-mail: elliot.hartley@garsdaledesign.co.uk, web: **www.garsdaledesign.co.uk**), and Kevin DeVito, CEO, CyberCity 3D, Inc. (e-mail: kdevito@cybercity3d.com, web: **www.cybercity3d.com**).

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The ArcGIS Platform in 2014

continued from cover

Highlights

- ArcGIS is much more than technology for GIS experts.
- People working outside the GIS department can use ArcGIS.
- ArcGIS interconnects spatial information throughout the enterprise.

industry to perform activities that include managing asset and resource information, planning and analysis, getting information into and out of the field, providing a comprehensive view of operations, empowering stakeholders with accurate and timely spatial information, and geoenabling other business systems.

Collaboration and Empowerment with Web GIS

This interconnection of spatial information throughout the enterprise is accomplished using web GIS, a key aspect of ArcGIS. Web GIS is made up of the following components:

- ***Servers***—Web GIS is powered by GIS services. Servers transform your data into web services. ArcGIS includes GIS servers that you can use in your own infrastructure (ArcGIS for Server), as well as servers that we host on your behalf (ArcGIS Online). These servers can connect to data (file, image), tables in a database, a complete geodatabase model, or even real-time data. The point of server technology is to web enable your data and GIS tools so that people can get to the information they need using browsers and devices.
- ***Portals***—This is how you manage the geographic knowledge that people in an organization create and use. Essentially, a portal is a geocentric content management system. It sits on top of your server technology and lets you mash up various web services to create a map. You can use a portal to combine your own data with Esri data and Esri Partner data and create a map. Your map can then be used with every Esri app, as well as apps created with Esri's software developer kits (SDK).

Portals are also a way of controlling access to the ArcGIS platform. They provide access to the right people at the right time.

- ***Apps***—Apps are the means by which people experience GIS and location analytics. They make the ArcGIS platform accessible to a broad spectrum of users, regardless of whether they are GIS professionals or knowledge workers who are unfamiliar with GIS. At one end of the spectrum, GIS professionals can use ArcGIS for Desktop and its applications (including ArcMap and the new ArcGIS Pro), as well as ArcGIS solutions that align with specific business needs, to author maps, models, and tools. At the other end of the spectrum, knowledge workers, executives, and the public—people who know little or nothing about GIS—can access apps on their local machines, smartphones, or tablets to easily see the information they need on a map and make decisions based on the most current data.

The apps that are part of the ArcGIS platform are built by Esri, its distributors, and its partners. In general, Esri builds foundational apps that cut across industries, including Operations Dashboard for ArcGIS, Collector for ArcGIS, and Explorer for ArcGIS. Esri also provides apps that integrate with leading business systems, such as Microsoft Office, IBM Cognos, MicroStrategy, SAP, and Salesforce. Distributors and partners use the ArcGIS platform to build focused apps for specific industries and workflows. Many of the apps created by Esri, its distributors, and its partners are available on ArcGIS Marketplace.

Server and Portal Technology—The Infrastructure for Making Maps Available via Apps

Server and portal technology can be implemented in three ways:

- ***Software as a Service (SaaS)***—Your portal, your GIS servers, and content all come from ArcGIS Online.
- ***Software***—Your portal is Portal for ArcGIS, your GIS server is ArcGIS for Server, and your content comes from Data Appliance for ArcGIS.
- ***Hybrid***—Your portal, servers, and content come from a combination of SaaS and software.

ArcGIS Pro handles everything from fast sketching to image processing to visualizing your world in 3D.

Customizing the Platform

ArcGIS includes a variety of tools that developers can use to embed intelligence about location into other apps. They can build apps using a combination of ArcGIS Runtime SDKs and ArcGIS for Developers—a special ArcGIS Online account that has a pricing model tailored to the way developers operate. Developers can also continue to use the Esri Developer Network to develop and test on ArcGIS Engine, ArcGIS for Server, and ArcGIS for Desktop.

Administration Made Simple with Named User Licensing

Today, every employee or contractor in an organization has their own identity. That identity is important to the organization and to the individual. Identity is usually tied to roles in the organization and, with respect to computer technology, it is also tied to what a person can do, see, and edit. Named user licensing allows organizations to administrate their ArcGIS environment simply. It allows administrators to easily define who has access to data, maps, and apps. Identity is a cornerstone in nearly every collaborative endeavor. People want to know who they are collaborating with. Identity (via named users) provides this. It is also the key to organizing and sharing information. Currently, ArcGIS Online is supported with a named user licensing model. Later this year, ArcGIS for Desktop will also be supported with this model.

Conclusion

ArcGIS provides a common location platform to support geocentric, geoenabled, and geoembedded workflows. It is open, configurable, fast, and efficient. It helps organizations integrate, display, analyze, and enrich information from many sources; see important changes that impact business; and bring new insights for better decision making. A key component of the ArcGIS platform is web GIS, which combines GIS servers, portals, and apps to enable everyone in an organization to discover, use, make, and share maps from any device, anywhere, anytime. Web GIS can be implemented as SaaS, as software on-premises, or as a hybrid of these. Finally, ArcGIS is a platform for developers. Developers can use ArcGIS APIs and SDKs to create a variety of apps for organizations, businesses, and consumers.

Learn more about what's coming to the ArcGIS platform in 2014 by visiting **esri.com/whatscoming**.

Esri Leads in Supporting OGC Standards

continued from cover

Timeline

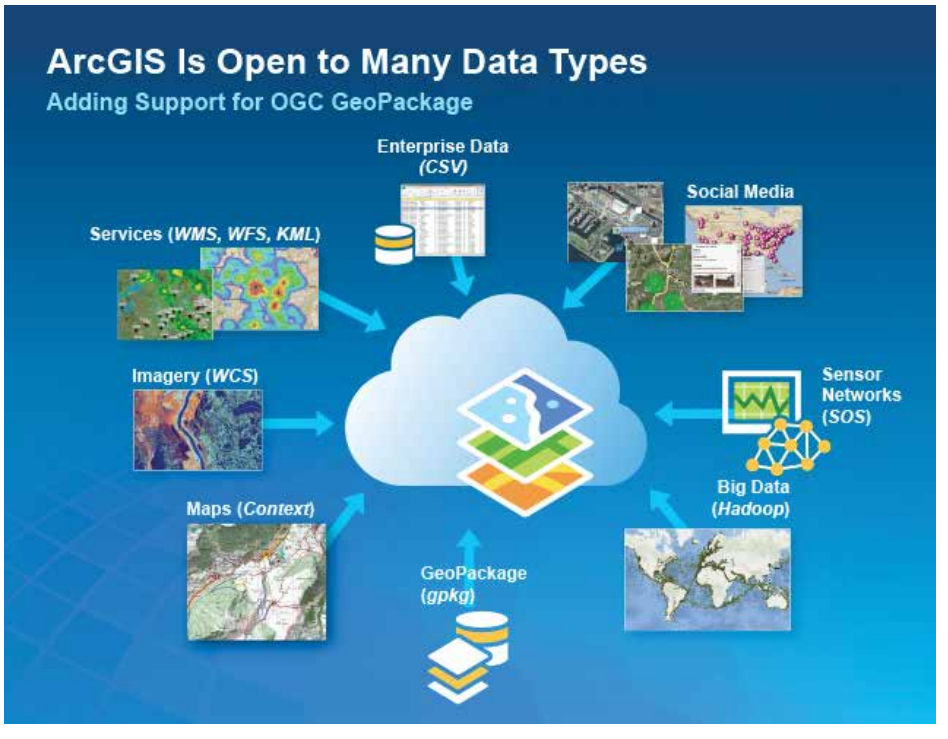
- Esri delivered draft GeoPackage support in ArcGIS 10.2.1 for Desktop that shipped at the end of 2013.
- ArcGIS 10.2.2 for Desktop and Server provide support for the 1.0 vector specification recently adopted by OGC as a new standard.
- In summer 2014, ArcGIS 10.3 for Desktop will add platforms and deployment options based on 1.0 vector and tiled raster specification for OGC GeoPackage, and ArcGIS Runtime10.2.4 for Android and Java will also support GeoPackage.

The OGC Encoding Standard defines GeoPackage for exchange and GeoPackage SQLite Extensions for direct use of vector geospatial features and/or tile matrix sets of earth images and raster maps at various scales. Direct use means the ability to access and update data in a native storage format without intermediate format translations. This guarantees data model and dataset integrity and identical access and update results in response to identical requests from different client applications. GeoPackage is interoperable across common enterprise and personal computing environments and may be particularly useful on mobile devices like cell phones and tablets in communications environments with limited connectivity and bandwidth.

koop

Esri's open-source data streaming and transformation technology koop supports exporting to GeoPackage. For more information on koop, visit **esri.github.io**.

For more information, contact Keith Ryden, Esri (e-mail: kryden@esri.com).



Esri hosts free maps and apps through its new climate-focused geocollaboration portal (resilience.maps.arcgis.com/home).

White House Climate Data Initiative

continued from cover

Esri will help on several fronts, including

- Providing geospatial technology and expertise to 12 cities to build maps and apps that the communities can use to plan for the impacts of climate change. The cities that will receive the assistance include New Orleans, Louisiana, and Tamarac, Florida.
- Hosting free maps and apps through Esri's new climate-focused geocollaboration portal (**resilience.maps.arcgis.com/home**). The government's new **Climate.Data.gov** site also includes a maps section.)
- Sponsoring the Esri Climate Resilience App Challenge, with prizes that were awarded in June for the top three applications developed with Esri technology that focus on solutions to climate-related issues.

During the launch of the Climate Data Initiative at the White House in March, Dangermond said many local government agencies and other organizations already use the company's GIS technology for planning, engineering, and disaster response.

But now with climate data from organizations such as the National Oceanic and Atmospheric Administration (NOAA) and the United States Geological Survey (USGS) available as map services, GIS will become a framework for providing climate information.

"What we are doing is engaging with different federal organizations to read climate information directly from NOAA and USGS as services that can empower all these state, local, and private sector organizations with tools that can bring climate change information to life," Dangermond said.

Jack Dangermond speaking at the Climate Data Initiative press conference at the White House, March 19, 2014.

Dangermond demonstrated a mapping application built on the ArcGIS platform that showed how many people would be displaced in New York City by a one-meter rise in sea level.

The maps section in **Climate.Data.gov** includes the Sea Level Rise Planning tool for New York City, with data from NOAA and other agencies layered on top of an Esri technology-powered web map. The map shows areas at risk for flooding in the city over the next century.

The geocollaboration portal (**resilience.maps.arcgis.com/home**) that Esri hosts in ArcGIS Online contains maps and apps organized into sections, including disaster resilience, climate resilience, economic resilience, public safety resilience, and transportation and infrastructure resilience. Data in the maps comes from NOAA, the Federal Emergency Management Agency, the US Forest Service, and many other government agencies.

The portal offers a starting point for open data and ideas and will evolve over time and grow as more scientists, government entities, and the public use it.

"We felt it was important to establish this collaborative network of individuals and organizations who use GIS to come together to combat the impacts of climate change," Dangermond said. "As governments, businesses, innovators, and citizens work toward this common goal, both a knowledge base and real-world tools will be created that people around the globe can use to build more resilient communities."

For more information about the Climate Data Initiative and president Barack Obama's Climate Action Plan, read the White House blog at **www.whitehouse.gov/blog/2014/03/19/climate-data-initiative-launches-strong-public-and-private-sector-commitments**. A fact sheet from the White House at **www.whitehouse.gov/the-press-office/2014/03/19/fact-sheet-president-s-climate-data-initiative-empowering-america-s-comm** outlines the commitments for the initiative by the government and Esri and other companies.

For more information about Esri's role, read Dangermond's blog post "Supporting the White House Climate Data Initiative" (**blogs.esri.com/esri/esri-insider/2014/03/20/supporting-the-white-house-climate-data-initiative**) on *Esri Insider*.

Esri to Offer Spatial Analysis MOOC

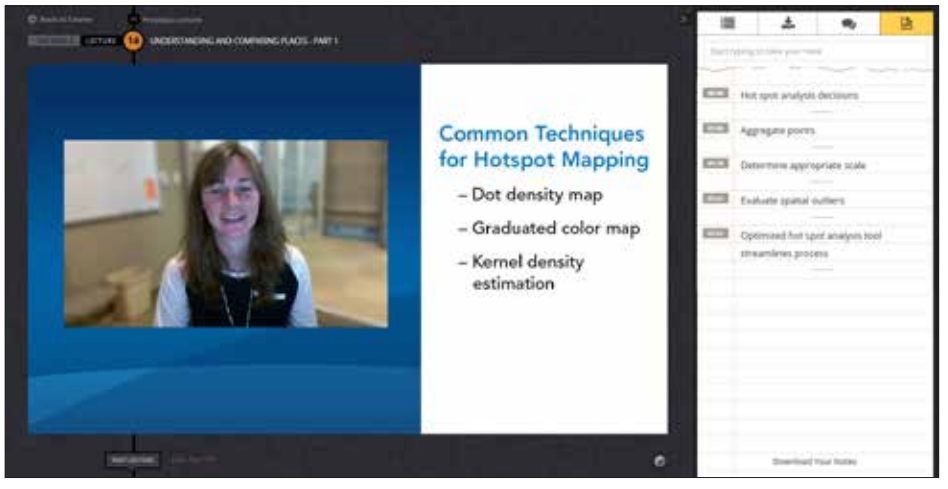
continued from cover

Students will learn to use spatial analysis to make informed decisions in a variety of contexts—from land-use assessment to crime analysis to pollution modeling and environmental justice, and more. The course provides a conceptual framework that helps students understand the nature, as well as the practice, of spatial analysis.

Going Places with Spatial Analysis is an intermediate-level online course for motivated people who know something about data analysis but want to learn more about the special capabilities of spatial data analysis. Previous experience with GIS software is helpful but not necessary for tech-savvy problem solvers. The course lasts six weeks and requires two to three hours of study per week. In addition to activities in ArcGIS Online, Going Places will consist of short video lectures, quizzes, case studies, and discussion. To provide this content, Esri has partnered with Udemy, which hosts online courses not just from universities but from all kinds of organizations, as well. To date, Udemy offers some 16,000 courses, which have enrolled about three million learners worldwide. The first offering of Going Places will launch in September 2014. It will be repeated as needed to satisfy demand.

Although the term *MOOC* was coined in 2008, the launch of three online courses at Stanford University in fall 2011 is often cited as the beginning of the MOOC movement. The first of those, Introduction Into AI, attracted 160,000 student enrollments. Two more open-access, unlimited enrollment Stanford courses soon followed. In 2012, the Stanford faculty members who offered these courses spun off private companies (Udacity and Coursera) to offer MOOCs in collaboration with select universities. As of this writing, over 7.5 million people have signed up for one or more of nearly 650 free online courses offered by more than 100 partner institutions through Coursera.

The first MOOCs related to GIS appeared in 2013. The most massive of those was Penn State's five-week Coursera course Maps and the Geospatial Revolution, which attracted nearly 50,000 students. At Penn State's invitation, Esri was proud to help, suggesting student activities in ArcGIS Online and volunteering to serve as "community teaching assistants" to answer students' questions about the platform. One of the students' most frequent requests was for a second MOOC that presents more advanced topics and techniques. Esri's Going Places with Spatial Analysis fulfills this request by complementing MOOCs offered by Penn State and other educational institutions.



Expert Esri staff explain concepts and answer questions.

Esri has been a pioneering provider of online and on-premises education and training for GIS professionals and students since 1997. Dozens of self-paced and instructor-led courses, training seminars, and workshops about various aspects of the ArcGIS platform are available at **training.esri.com**, many free of charge. Going Places is the first in a series of free online courses from Esri that are designed for the millions of learners worldwide for whom MOOCs provide a new way of expanding their horizons. Could you and your career go places with spatial analysis?

Visit esri.com/analyzemaps and sign up to be notified when the course opens for enrollment.

GIS Integrates Aid and Emergency Response

ArcGIS Online Helps World Vision

NGO Non-Governmental Organization

Highlights

- Online maps help distribute relief services to more than 700,000 people affected by Typhoon Haiyan.
- Mapping vulnerability with ArcGIS Online was key to World Vision allocating limited resources.
- A sample app using Operations Dashboard for ArcGIS mapped delivery and use of relief kits.

When Typhoon Haiyan made landfall in November 2013, it did so as the strongest storm ever recorded. The category 5 supertyphoon made its way across the central Philippines, bringing violent winds, torrential rain, and tidal surges that inundated coastal areas.

In its wake, the storm left more than 6,200 people dead. Four million people were displaced by the storm, two million of whom saw their homes completely obliterated. Roads, ports, and airports were also severely damaged by the storm, further complicating efforts to assist the millions of people impacted by the typhoon.

World Vision, an international Christian humanitarian organization dedicated to working with children, families, and their communities, immediately mobilized its response and recovery efforts after the storm. The nonprofit, established in 1950, has a long history of providing emergency assistance to people affected by natural disasters, especially in developing nations with significant vulnerable populations.

World Vision first explored the use of GIS for disaster response following the magnitude 7.0 earthquake that struck Haiti in 2010. Working in tandem with Esri, World Vision tracked the cholera outbreak that spread among refugee camps. The use of GIS left such a strong impression that the organization signed an enterprise-level license agreement with Esri soon afterward. Using the lessons learned from its efforts in Haiti, World Vision's Humanitarian & Emergency Affairs (HEA) team once again turned to GIS to guide its Typhoon Haiyan response.

World Vision used Dashboard for ArcGIS to track the distribution of kits against its overall goals.

Clarity Among the Chaos

As World Vision deployed global relief experts to assist its staff in the Philippines, GIS manager Jared Hyneman and GIS specialist Gabby Almon served as support staff from one of the organization's offices in Los Angeles. Their first task was to help Sean Ng, World Vision's information manager in the Philippines, assess locations in the country that needed immediate attention.

Using government data about the scope and intensity of damage from the storm and the preexisting vulnerability of local residents, World Vision's team created an assessment spreadsheet that assigned a weighted score to each municipality in the Philippines.

"Our response personnel in the Philippines were trying to build up their teams and understand what was going on at the same time," says Almon. "Mapping the vulnerability scores with ArcGIS Online ended up being key to helping them allocate limited resources."

Almon and Hyneman joined the vulnerability data from the spreadsheet with administrative boundaries from the United Nations in ArcGIS. They then published the information as a feature service to World Vision's ArcGIS Online for Organizations account.

Hyneman and Almon decided to use ArcGIS Online to disseminate the maps for several reasons. The interface was easier to navigate than a desktop platform, and the maps could be easily shared over the Internet to anyone with the proper credentials. ArcGIS Online also provided the ability to quickly add in data and information from other authoritative sources.

"We pulled in several services from Esri's Disaster Response Program, including the typhoon's path, initial damage assessments, and the locations of hospitals and schools," Almon says. "Using this existing, authoritative data saved us an incredible amount of time and let us focus on our response."

World Vision provided building supplies to help people rebuild after the storm.

Making a Difference

"The web map helped us define the need and really operationalized the vulnerability data," Ng says. "It just made things so much easier to understand and to create a plan."

To date, in response to the typhoon, World Vision estimates that it has helped more than 713,000 people. Among the relief operations are kits containing hygiene products, like toothbrushes and soap, as well as tarps, rope, and other construction materials.

As aid packages were distributed to more than 500 villages across 48 municipalities in the country, Almon and Hyneman used ArcGIS Online to track the progress of their efforts. They created a sample app using Operations Dashboard for ArcGIS that mapped where kits had been sent and monitored their progress against the organization's overall response goals.

A More Resilient Future

The efforts of Almon and Hyneman generated interest among some of World Vision's leadership. The nonprofit had already used GIS to support a variety of activities, including providing clean water, education, emergency food relief, and operational logistics. But the Haiyan response has prompted the organization to consider additional, more coordinated uses of GIS in the future.

For more information, contact Jared Hyneman, GIS manager, World Vision (e-mail: Jared_Hyneman@wvi.org), and Gabby Almon, GIS specialist, World Vision (e-mail: Gabriele_Almon@wvi.org).

Sterling Harris: Steward of Texas Land and Water

GIS Hero

This article is part of an ongoing series honoring individuals who have made a difference in the world by applying a GIS solution to conservation or community challenges. Since these unique individuals have been selected for their innovations or special achievements, the series is appropriately named GIS Heroes. Esri recognizes Sterling Harris as a GIS hero.

GIS Hero Sterling Harris with his hero Texas Ranger John Coffee "Jack" Hays, who was appointed US surveyor general for California in 1853.

Texas is a broad, sweeping state—the second largest behind Alaska. Its geography ranges from bayous and beaches around Houston to rolling Hill Country and the desert landscape of Big Bend National Park in the west.

It was the Texas Hill Country near Austin that ignited a passion for the land in Sterling Harris. He grew up in a ranching family, then worked in the oil and gas industry after graduating from Sul Ross State University.

"I love taking care of the environment; there's no doubt about it," Harris says. "I'm a big proponent of responsible grazing and land management practices. This is what God has given you, and you want to take care of it."

He began working in the GIS department of the Texas General Land Office (GLO) in the mid-1980s after a friend suggested it would be a good fit for him.

"He said, 'Sterling, you'd fit in perfectly here. You love history, you love the land, and you love people—you'd fit in like a glove,'" explains Harris. "And thank goodness I came here. This is a great place."

The Texas General Land Office was established in 1836 to manage the state's first land records. It still protects more than 35 million historic land records, but now its primary functions also include earning money for the state's Permanent School Fund (PSF) from sales and leases of public lands and safeguarding the state's coast.

Texas is unique in the amount of public lands it owns. When Texas entered the union, the federal government would not allow the state to pay its debt with land. Texas owns more than 13 million acres of public lands, including submerged lands up to 10.3 miles offshore.

Guarding the Coast

To protect its coastline, the Texas State Legislature passed the Oil Spill Prevention Act in 1991. Funding from the legislation allowed the GLO to acquire GIS for contingency planning and response.

Once he became the GLO's GIS manager in 1999, Harris took the leading role in managing data development for the agency's oil spill toolkit. This toolkit was developed in partnership with the Coast Guard and includes environmental sensitivity maps, local knowledge guides, and area contingency guides for the Texas, Louisiana, Mississippi, and Alabama coasts.

First responders can use the atlas in the toolkit to see critical information, including where wildlife habitats are in relation to a spill.

"The oil spill toolkit has been such a success story over the years and is a real standard for emergency response for the natural disasters that have hit the Texas coastline," Harris says.

In March, responders used the toolkit to manage the spill in Galveston Bay after a barge carrying fuel oil collided with a cargo ship and began leaking more than 160,000 gallons of oil.

"I'm pleased that the hard work our GIS team has done over the years has made a difference in preparing and responding to major spills like this one," Harris says of the incident.

Richard A. Wade, director, geographic information officer, Texas Natural Resources Information System (TNRIS), says, "Under [Harris's] leadership, the Texas General Land Office has created one of the most successful GIS programs in the country. It continues to push the limits of technology for the development of highly successful GIS systems and applications. [Harris's] innovative approaches to GIS development have been very inspiring to me personally."

Managing Lands to Support Schools

The state of Texas uses revenue generated from sales and leases of public lands to contribute to the PSF. Interest earned on the fund, approximately $800 million per year, is distributed to every school district in Texas.

Soon after becoming the GIS manager, Harris started populating the Original Texas Land Survey (OTLS) data layer with Permanent School Fund Trust Lands attribute information. He created a public-private partnership with Tobin P2 Energy Resources to acquire the OTLS layer. For two and a half years, he and his team pulled all the records from the GLO file vault to verify each record showing mineral and surface interest for each tract in the PSF inventory.

The OTLS serves as the base layer on which all other GIS layers, including oil and gas leases, grazing leases, permits, and miscellaneous easements layers, are built.

"I can't imagine not having GIS to maintain all that information, to not be able to see every active lease and well being drilled on leased land," Harris says. "It helps us ensure that we are getting paid from those leases. GIS is the centerpoint of that now; it's the front-end application for accessing all our lease information."

Under Harris's guidance, GLO also created the public-facing GISWEB Viewer, which includes OTLS boundaries, PSF lands, leases, oil and gas well locations, and imagery.

Making Life Easier

The underpinning of all Harris's work with GIS has been a desire to make life easier for people—for the staff in GLO and the citizens that do business with the agency. Staff members, including those in Professional Services, Oil Spill Response, Surveying, Coastal Resource Management and Energy Resources, use GIS in their daily work.

"GIS helps them share information," Harris says. "One person is looking up a lease on a property; the other is finding survey data. The interaction it creates among internal divisions is amazing. That's what I see as a great asset for us—we are all looking at the same map and information through a GIS enterprise system."

This is quite a change from the days Harris remembers when nobody knew what *GIS* stood for. Once he and his team began creating applications that staff could use, people were empowered with direct access to spatial information.

"Where I've seen the greatest achievement is getting people to use GIS every day in their work," he says.

Maps and Apps

Giving the public access to the vast collection of spatial data in GLO is also a key function of the agency in Harris's mind.

A wealth of downloadable GIS data is available on the GLO website, including leases, pipeline locations, and priority protection habitat areas. Oil and Gas Lease Sale Nominations data allows companies to see land that they can bid on.

In addition to the oil response toolkit and the GISWEB Viewer, Harris is behind online maps like the State of Texas Oil Spill Response Mapping Tool and Homeowner Opportunity Program (HOP) Area Locator. HOP is a disaster recovery housing program for those who live in Federal Emergency Management Agency-designated high-risk areas or areas of high minority and/or poverty concentration.

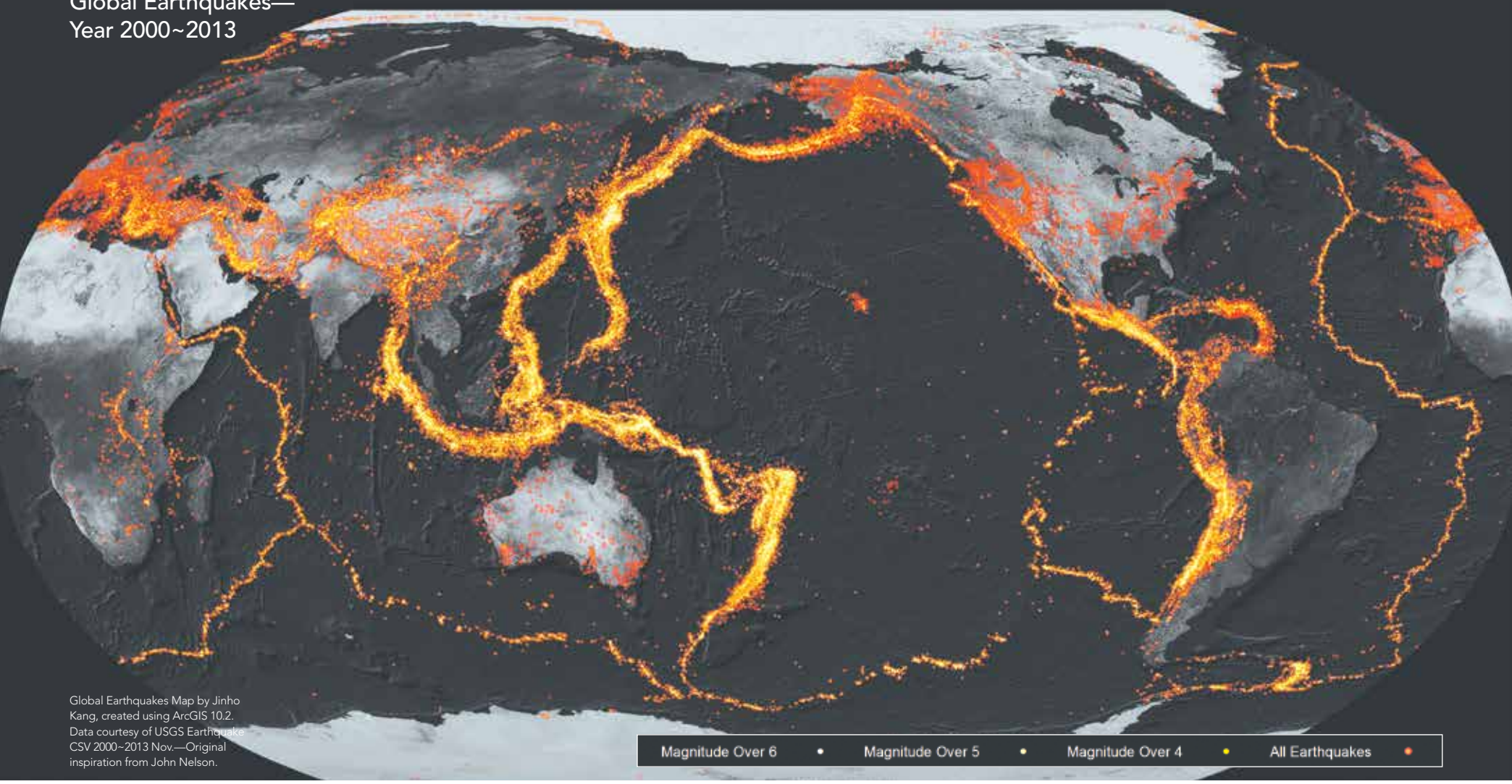
Harris's enthusiasm for GIS has made him an early adopter of new technology. He is excited about how GLO is using ArcGIS Online and Collector for ArcGIS in the agency. In the works now are geographic response plans for specific waterways.

"I've seen the evolution from old paper maps to where we are today, and I can't put a value on what it's worth to us," Harris notes. "It makes business better: people can see trends, where the hot areas are for leases, and the state of infrastructure; staff are more efficient in the field; and when people want to do business with us, they go through the GIS. It empowers people with the information and confidence they need to make decisions."

Felicia Retiz, deputy GIO, TNRIS, says, "[Harris's] passion for GIS takes him beyond the doors of the Texas General Land Office. He has been a permanent, contributing member to the Texas GIS community and is always among the first to be asked to participate on advisory committees and working groups. His opinion matters a great deal to his peers."

For more information, contact Sterling Harris, GIS manager, Texas General Land Office (e-mail: sterling.harris@glo.texas.gov).

This Texas City "Y" Spill Decontamination map depicts the ship channel impacted by the spill event. Cleanup operations are ongoing inside this area near Galveston, Texas.



Global Earthquakes Map by Jinho Kang, created using ArcGIS 10.2. Data courtesy of USGS Earthquake CSV 2000~2013 Nov.—Original inspiration from John Nelson.

Maps help humans understand big data: Earthquakes primarily occur along tectonic plate boundaries with many events happening in proximal locations. Visualizing these overlapping events is a challenge that is met using a "glow" effect obtained with multilayer symbols and varying levels of transparency, an approach developed by John Nelson of UDV Solutions. Applying this effect in ArcGIS allows the thousands of earthquakes to offer us a vivid depiction of the global pattern of these explosive events.

"The Relevance of Cartography"

A Cartographer's Perspective

A column by Georg Gartner, President of the International Cartographic Association

Why Maps Matter

This is the first of a regular column of the International Cartographic Association (ICA) in *ArcNews*, reflecting the long and outstanding cooperation between Esri and ICA. Issues related to the world of cartography and ICA and reflecting a variety of topics will be discussed and presented here. You can expect a broad range of themes, such as the history of maps; cognitive processes in cartographic communication; and the application of the newest technologies on cartography, for example, currently augmented reality, applications for location-based services, and service-oriented cartography.

Why would reading this column eventually be beneficial to you? And what is the International Cartographic Association, and why could that have something to do with your interests?

Why Will This Column Be Beneficial to You?

For this first question, I would like to refer to my contribution to the *ArcNews* Winter 2013/14 issue, where I argued that the domains dealing with spatial data are growing fast. There are more and more techniques, algorithms, sensors, and software available that can contribute to data acquisition, data modeling, and data analysis. There is huge potential in spatial data, and we are definitively not short of data. Rather, it's just the opposite. The problem is often not that we don't have enough data but too much. We need to make a greater effort to deal with all this data in an efficient sense, mining the relevant information and linking and selecting the appropriate information for a particular scenario. We are also not short of technologies. Here, too, it is the opposite. Just as we are learning to fully employ the potential of a particular new data acquisition, modeling, or dissemination technology, new technologies are developed and need to be considered. New technologies become available more quickly and need to be evaluated, addressed, and applied.

But how is the world participating in all our developments and improvements? How will a new sensor solution or new algorithms be of benefit to a decision maker? To a tourist? To a citizen? At the end of the day, maps play a key role in this context. Whenever we talk about spatial data or geoinformation, and whenever this information needs to be presented and communicated to a human user, the interface and all the intelligence behind it can very often only be "unleashed" through a map. I would go as far as arguing that investing in maps means investing in the overall success of spatial data handling.

This is because maps are most efficient in enabling human users to understand complex situations. Maps can be understood as tools to order information by their spatial context. Maps can be seen as the perfect interface between a human user and all that big data and thus enable human users to answer location-related questions, to support spatial behavior, to enable spatial problem solving, or simply to become aware of space.

In the near future, we can expect that information will be available anytime and anywhere. In its provision and delivery, it will be tailored to the user's context and needs. In this, the context is a key selector, determining which information is provided and how it is provided. Cartographic services will thus be widespread and of daily use in a truly ubiquitous manner. Persons would feel spatially blind without using their map-based services, which enable them to see who or what is near them, get support and do searches based on the current location, and collect data on-site accurately and timely. Modern cartography applications are already demonstrating their huge potential and changing how we work, live, and interact.

Investing in cartography means to make sure that the interface between a human user and the data and geoinformation—with all the efforts being done to derive, model, or analyze it—works, allowing the data and information to be used!

What Is the International Cartographic Association?

The International Cartographic Association is a forum for those who work with, produce, and use maps; are interested in map design; want to know about cartographic generalization; want to be informed about the newest mapmaking technologies; or simply love maps. Basically, the organizational structure of ICA welcomes nations as members, as well as companies and institutions as affiliate members. In addition, the ICA provides its commissions—where aficionados of a particular topic meet and discuss their area of interest—which are open to everybody who is interested and wants to participate. Check out your area of interest at **www.icaci.org/commissions**.

ICA is especially interested in linking those who deal with maps and promoting the importance and power of maps as instruments to communicate spatial information to everybody. In this sense, instruments like the Barbara Petchenik Children Map Drawing Competition are very popular, as well as cartographic exhibitions, cartographic conferences, and the planned International Map Year. This means that through ICA, any cartographic product or outcome of spatial data handling can eventually attract a more dedicated audience, while members have the benefit of having their maps evaluated and tested through connection to the global community of cartography that is ICA, leading to the development of the skills, knowledge, and competencies needed to make great maps.

Find out more at **www.icaci.org**.

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 on LBS* by Taylor & Francis. He serves as president of the International Cartographic Association.

For more information, contact Georg Gartner (e-mail: georg.gartner@tuwien.ac.at or president@icaci.org).

Building GIS Capacity Across the Globe

Train the Trainer

By John Schaeffer, GISP, and Karen Beardsley, PhD, GISP

Resource shortages, population growth, and climate change are just a few of the critical problems facing society today. The solutions will require the best that science and technology can offer, and GIS is an essential tool for those solving many of these pressing issues. Many opportunities exist for GIS training in the United States, but this is not always the case in developing countries, especially for those working in conservation-based organizations. To help address this deficiency, Esri Silver Tier Partner Juniper GIS of Bend, Oregon, and the Society for Conservation GIS (SCGIS) have joined forces to strengthen GIS capacity among conservationists around the world with their Train the Trainer (TTT) program.

The challenges in underdeveloped countries include access to the technology and expertise to implement these tools. Over the past 10 years, hardware and software pricing have come down due to economy of scale and market competition, and the Esri Conservation Program has gone a long way toward making the software easily accessible to qualified conservation groups. But the challenges of finding competent personnel to implement and take advantage of these advances in technology still remain.

John Schaeffer discusses teaching issues with Ela Šegina as Ilona Zhuravleva prepares for her lecture at the ArcGIS for Environmental Analysis class in Moscow.

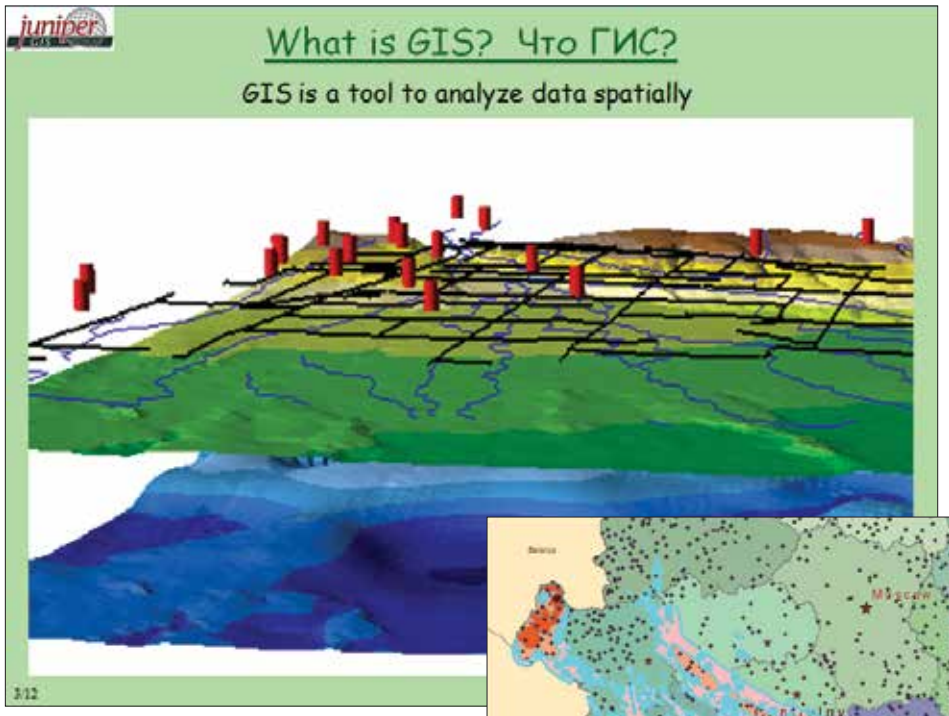
Since 1997, SCGIS has been providing intensive GIS training in the United States to 15 to 20 international participants (Scholars) from around the world each summer. While this is a very successful program, there is still a need to provide a cost-effective method to grow capacity for hands-on GIS training in environmental and conservation applications, especially in developing countries. The TTT program is one option to meet this need by helping future trainers develop skills and course materials for teaching GIS. This is intended to supplement and extend the SCGIS Scholars training program by providing previous scholars with the opportunity to become qualified trainers. At the end of this program, the Scholar/trainee possesses improved GIS skills, improved teaching skills, and a complete set of course materials for teaching a one-week core GIS class.

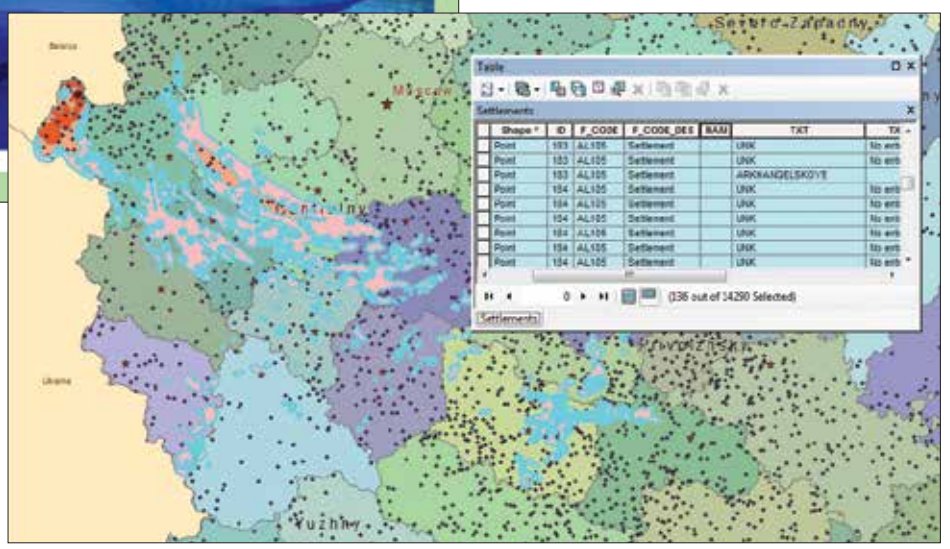
Since 2009, John Schaeffer *[one of the authors]* of Juniper GIS, who has more than 20 years of experience using and teaching GIS, has been the lead instructor for the SCGIS Scholars program. He has developed an integrated in-depth series of conservation GIS courses that are used in the SCGIS international Scholars program, as well as other trainings. In cooperation with SCGIS, he has been working to develop other trainers to use this material in their home countries. He has also been involved with several other TTT programs funded by the National Science Foundation and other organizations.

The SCGIS/Juniper GIS TTT program began in 2011. SCGIS leaders established an application process and created a formal contract with the trainee to become a Juniper GIS Authorized Instructor with full access to Juniper GIS course material. The first TTT candidate was Cecilia Cronemberger, a 2009 Scholar from Brazil. During the more than two-week Scholars training program, she assisted in the class as a helper and presented lectures, and during breaks, she and Schaeffer discussed how the class and course material work, typical problems students might have and how to solve them, and classroom management. Each evening, they worked together on class preparation, teaching skills, how to design a class and develop course material, and all the other details that make for successful teaching. Upon completing the program, she was granted her Juniper GIS Instructor certificate, along with the official Juniper GIS uniform, her own Hawaiian shirt. Since her graduation in July 2011, she has taught eight classes to approximately 100 students in Brazil, greatly helping expand GIS training.

In 2012, SCGIS selected Carlos de Angelo ("Carlitos"), a 2011 Scholar from Argentina, to be the TTT candidate. His training was the same as Cronemberger's, and in July 2012 he was awarded his Juniper GIS Instructor certificate and shirt. Since then, he has taught two classes to 29 students in Argentina, with several more classes planned for 2014.

To expand the TTT program, in 2013 a new approach was taken, which was to send Schaeffer to the SCGIS Scholars in their home regions to provide the TTT training. This program, for two to four trainees, consists of a three-day advanced GIS class for the trainees and GIS users from local conservation groups, a five-day ArcGIS for Environmental Analysis (AE) class in which the trainees served as helpers and gave some presentations, and three to four days during which Schaeffer and the trainees work together on teaching skills and issues. After reaching out to the SCGIS International Chapters, Schaeffer and the SCGIS International Committee chose SCGIS Russia from among several offers, for this





Above: A slide used in the Introduction to GIS course, with some Russian titles added. The trainees will have access to all the Juniper GIS PowerPoints to use when teaching their own classes.
Right: In the first exercise, students see how GIS can be used by doing some simple analysis. In this example, students selected areas with high radiation near Chernobyl and then found which settlements were inside these areas.

first effort.

SCGIS provided $2,500 to help pay for Schaeffer's airfare and expenses. SCGIS Russia, especially Ilona Zhuravleva and Anna Komarova, in cooperation with Greenpeace Russia, where they both work, organized training facilities and home stays for Schaeffer and another trainee in Moscow. By keeping all the activities in Moscow and having home stays, this program was affordable.

Three trainers were chosen for this program: Ela Šegina, a 2013 Scholar from Slovenia; Zhuravleva, a 2011 Scholar from Russia; and Kamarova, a 2012 Scholar also from Russia. They are all now authorized Juniper GIS instructors who have received all the Juniper GIS supplied teaching materials needed to teach the ArcGIS for Environmental Analysis course, plus a variety of introductory and intermediate-level courses. Eventually, these instructors will adapt this course to their own needs and with their own data, but a very important result of this program is they have a complete set of course materials and are familiar enough with the class to teach it right now.

The two previous TTT Scholars, de Angelo and Cronemberger, have been teaching two or more classes each per year to about 25 to 30 students. With five Scholars who have now completed the TTT training, one should easily expect to have at least 100 new students learning conservation GIS each year because of these efforts. Because this program used two classes as part of the teacher training, 23 people in various levels of conservation GIS were also trained.

The three former Scholars recently trained in Russia are now ready to teach the AE class, both in terms of their skills and having the material. As they gain experience and confidence, they will add more classes to their repertoire, with the continuing support of Juniper GIS for teaching material. Over the next five years, we would expect to have as many as 300 or more people learning how to use GIS in conservation applications from these three new instructors, which is quite a multiplier effect.

It was very important that the trainees had been through the SCGIS/Juniper GIS course for the SCGIS Scholars so they were familiar with the material in the AE class, were familiar with working with Schaeffer, and that he knew their strengths and weaknesses. This allowed him to concentrate on teaching how to be effective trainers and not worrying about their GIS skills.

The other important part of this program is that Juniper GIS is willing to share its tried and tested conservation GIS training material with these instructors so they can concentrate on training and not on having to write and update material. Anyone who has developed courses knows how time-consuming this can be.

While it might not always be possible to do a program like this for so little money, even at three to four times the cost, this program provides an incredible value and goes a long way toward increasing opportunities to learn GIS outside the United States, where this is needed most.

About the Authors

John Schaeffer is the lead instructor, consultant, and analyst for Juniper GIS Services and has more than 21 years of experience working with and teaching GIS and related technologies to a wide variety of audiences. In 1994, he started one of the first two-year GIS programs in the United States at Central Oregon Community College. He has also been the lead instructor for the Society for Conservation GIS Scholars program for several years and teaches for many conservation groups all over the world. He is also a GIS Professional (GISP) as certified by the GIS Certification Institute, an Esri Certified Instructor, an Esri Certified Desktop Associate, and a CTT+ (Certified Technical Trainer).

Karen Beardsley, PhD and GISP, serves as managing director for the Information Center for the Environment in the Department of Environmental Science and Policy at the University of California, Davis. She has more than 25 years of experience working with GIS in the management of natural resources, land use, and environmental information for the UC Davis Information Center for the Environment and international conservation organizations. Since 2010, she has coordinated the SCGIS Scholar Training in Davis, and in 2013 she became a certified Juniper GIS instructor.

For more information, contact John Schaeffer (e-mail: john@junipergis.com) and Karen Beardsley (e-mail: kbeardsley@ucdavis.edu).

Start-up Apps for the Common Good

Start-up business entrepreneurs are putting a lot of effort into building GIS applications that support the common good. While using GIS to connect causes with resources, they are designing frameworks for outreach that help people help people. Here are some examples of their altruistic applications.

Recovers

Recovers is an application that communities can use for disaster preparedness and recovery response. Recovers sets up the community's recovery hub on an online platform (recovers.org) to serve as a centralized location. Local leaders use the service to manage volunteers and donated items and organize requests for help. Individuals use it to request help and offer their own skills, services, and resources in the recovery effort. In addition, organizations serving the area can post their locations, resources, and needs to the public on a map. The Recovers platform enables people from around the country or locally to locate recovery organizations and send them the types of resources they need.

People with resources can easily connect with people in need by posting their services on a single platform that shows locations and types of service. For instance, people can find shelter for animals because the local Humane Society posted pet care services. They can also locate relief funds from the United Way, free legal advice from the American Bar Association, or a hot meal from the Salvation Army. Local volunteers can form response groups to help by removing debris, sandbagging, and salvaging. Examples of Recovers communities are Boulder County Flood Recovery Hub, Alberta Flood Recovers, and Longmeadow Emergency Management.

The Longmeadow Fire Department and Office of Emergency Management use the Recovers platform as a tool for disaster preparedness.

thrdPlace

People seeking to organize community projects can use thrdPlace (thrdplace.com) to pitch their ideas and connect with volunteers, resources, and funding needed to make it happen. Organizations can also easily use the thrdPlace online and mobile platform for community outreach or to promote charities. The US project map on the home page allows users to select, by location, a project that interests them. Clicking Take Action takes users to a project dashboard that includes a site map, information about the project, resource needs, status bar, announcements, and events calendar.

Local organizers are using the app to benefit their communities. Something to Remember is using thrdPlace to promote a portrait donation day in Culver City, California. The South Central Block Beautification project uses the app to invite the community to clean up and paint murals along an entire block of buildings in South Central, California. The Parents of Charlotte Elementary in Charlotte, North Carolina, are using the platform to get support to create three community gardens.

The Parents of Charlotte Elementary group used thrdPlace to call for volunteers and supplies to create three community gardens that will give children a place to learn about growing food.

WorkHands

WorkHands helps skilled trade workers find employment. Welders, carpenters, mechanics, and more, are using the site to connect with each other and their organizations and to find and apply for open jobs in their area. The www.workhands.us platform offers a free website and mobile app. Its GIS functionality helps workers search for and locate jobs and employers to search for and locate workers.

Companies such as Shell, Union Pacific, and SpaceX have posted their open positions on the WorkHands job board. Trade schools throughout California are encouraging their students to sign up and get connected to businesses and other workers.

The WorkHands platform provides search results for open positions in the San Francisco Bay Area in California.

Nation's Governors Recognize Esri Partnership with New Hampshire

The National Governors Association recently honored Esri with its Public-Private Partnership Award, which recognizes those companies that have partnered with a state to implement a program, project, or service that positively impacts its citizens.

Esri was nominated by New Hampshire Governor Maggie Hassan for its work with New Hampshire schools to improve science, technology, engineering, and math (STEM) education through the implementation of a statewide GIS license that provides access to geospatial technology to more than 200,000 students.

"The partnership between New Hampshire, Esri, and numerous other stakeholders has made it possible for New Hampshire students to learn and apply 21st-century geospatial concepts using Esri's ArcGIS software," Hassan writes in her nomination letter. "This partnership allows every public and private school in the state unprecedented access to Esri's state-of-the-art GIS tools for use in education and research. Recognized nonformal education groups, such as 4-H Clubs, scout groups, and Boys and Girls Clubs, also have access to the software."

Lara Bryant, geography professor at Keene State College and coordinator of the New Hampshire Geography Alliance (NHGA), said "NHGA was interested in the statewide license but knew that we would need partners to provide the professional development. The formation of NHEdGIS, whose members include the New Hampshire Department of Education, the New Hampshire Geographic Alliance, University of New Hampshire Cooperative Extension Geospatial Technologies Training Center [GTTC], and New Hampshire Fish and Game, has proved to be very successful. Each group provides different expertise, and we have been able to accomplish more together than we would have been able to separately."

The New Hampshire Department of Fish and Game supports teachers and students in their classroom use of GIS to gather, display, analyze, and share data about the state's natural resources.

Kevin Heany, social studies teacher at Monadnock Regional High School, says, "Our environmental studies students have been actively involved in collecting data from the nearby Asheulot River. Giving them the opportunity with ArcGIS to map and visualize their own data, as well as the capability to actively participate in monitoring the water quality, is exciting."

"To have our work supporting education across the country and the world recognized by the National Governors Association is truly humbling," says Jack Dangermond, president of Esri. "We thank Governor Hassan for the nomination and are proud to encourage greater participation in STEM education among students. The network of teachers in New Hampshire is a model for all. They are unquenchable in their thirst for GIS skills and passionate and tireless in sharing these with kids and other educators."

For more information, contact Charlie Fitzpatrick, Esri (e-mail: cfitzpatrick@esri.com).

ArcGIS Online What's New?

In the March 2014 update, we added new features and capabilities that improve the user experience and make it easier to manage your ArcGIS Online subscription.

ArcGIS Online Account Administration
Many organizations need the ability to create unique roles for their ArcGIS Online members. The new custom role capability gives administrators greater control and flexibility in assigning privileges to individual members. For example, some members only need access to maps and apps but don't need to create groups. Others might need to publish features but not tiles. Now you have the ability to tailor roles so that they fit your organization's workflows and needs.

A new Activity Dashboard for ArcGIS is available in ArcGIS Marketplace (**marketplace.arcgis.com**). This free web app gives administrators access to activity-based metrics, real-time reports, and other useful information in addition to the reports already available to ArcGIS Online administrators.

Analysis
With the Derive New Locations tool, you can create new features in your study area that meet a series of criteria you specify. The criteria can be based on attribute queries, for example, parcels that are vacant, or spatial queries, for example, parcels that are within one mile of a river. The new Find Similar Locations tool finds the locations that are most similar to one or more reference locations based on criteria you specify.

Overlay Layers now has an option for specifying the output feature type when using the Intersect method. When you click Perform Analysis, there is a submenu that allows you to select which feature type to analyze for Map Notes, KML, or any group layers that contain features.

More than 30 new countries have been added to the Enrich Layers tool. And you now can analyze KML layers.

Map Viewer
We've improved how you can resolve unmatched geocoded addresses. After you publish a hosted feature layer from a CSV file, you can use the map viewer to review the addresses in the layer. You can map all suggestions for unmatched addresses or edit attribute fields in a table to rematch individual addresses.

There are three new collections of symbols and map note templates for showing the location of natural disasters, infrastructure, and infrastructure damage. A new route to all features option lets you get directions for feature layers with 20 points or fewer.

App Templates
Find, Edit, and Filter is a new configurable app template that allows you to search for features, edit, set attribute values, and filter content.

Summary Viewer is a new configurable app template that summarizes the numeric attributes of features in a specified operational layer that are within the visible map area. The summaries can be configured to show the sum, average, minimum, and maximum of specified field values.

Parcel Viewer has been renamed Finder to reflect that it is useful for more than just parcel searches.

Ready-to-Use Apps
Collector for ArcGIS—You can now view maps offline and collect and edit features when you are disconnected from the Internet. Manage your map content on your smartphone or tablet device and synchronize changes when you are reconnected.

Operations Dashboard for ArcGIS—This app is now supported on iOS and Android tablets. By accessing your operations views through your device's browser, you can have the same real-time view on your tablet that you see on your desktop computer. You can use dynamic map layers as a data source and search for features by coordinates as well as places. There are also new capabilities for creating and managing selections and adjusting matched records.

Explorer for ArcGIS—Released in late April on the iOS platform, this new app allows you to discover, visualize, use, and share maps within your organization. You can view information about your assets and redline or mark up your maps, making it easy to collaborate with others.

Open Data—With this new capability, currently in beta, organizations are able to provide open data access to the public. Anyone can search by topic or location, download data in multiple formats, and view data on an interactive map and in a table. During the beta period, organizations who have a paid ArcGIS organizational subscription can create an open data site and make select data publicly available. Organizations that have an ArcGIS Online trial account can also create an open data site to evaluate and understand how the process works but will not be able to make their data publicly available as part of their trial. ArcGIS Online for Public Use subscribers and those who have an ArcGIS for Developers account can search and access open data sites. The final release of the open data capability is planned for the ArcGIS Online July update.

Other Enhancements
Single Sign-on to the ArcGIS Platform—You can now sign in to the ArcGIS platform and seamlessly access web apps registered with the platform. These web apps include apps you've purchased from ArcGIS Marketplace, custom web apps built by developers in your organization, and apps built by Esri that are included with your organizational subscription. Once you are signed in to the platform, you only need to approve that the app you are working with can access your account information.

World Geocode Service—This service has been enhanced for 10 countries, including Puerto Rico, Singapore, and Suriname.

Network Analysis Directions—Estonian and Latvian have been added to the 17 other supported languages. There is also a new Find Routes service available in ArcGIS for Desktop Ready-to-Use Services.

Elevation Analysis Services—The Watershed and Trace Downstream services for hydrology analysis are now available globally.

Above: Use this template to summarize numeric attributes of features in a specified layer that are within a visible map area. Left: With this template, you can search for features and edit them, set attribute values, and filter content.

ArcGIS Online Content Updates
Tile Resampling—Previously, basemap areas that lacked content at large scales displayed a gray box with the message "Map data not yet available." In early March, we introduced tile resampling where browsers resample the last cache level. This enables the map to display data uniformly down to the largest scale level of a particular ArcGIS Online basemap being viewed.

GeoEnrichment—Thirty new countries have been added, making the service available for more than 100 countries. There is also updated content for Canada and the United States.

Dark Canvas Basemap—This basemap, currently in beta, has been updated with content at larger scales (~1:9 k) for these four areas: Chicago, Illinois, USA; Perth, Australia; Geneva, Switzerland; and Milan, Italy.

Ocean Basemap—This basemap has been updated so that labels and features are now in separate layers, enabling users to turn off labels or display their data underneath the labels.

Imagery—A new set of Moderate-Resolution Imaging Spectroradiometer (MODIS) imagery layer maps and layers is available, referencing a collection of National Aeronautics and Space Administration (NASA) imagery. The MODIS imagery provides 250-meter, multispectral satellite imagery of the world that is updated daily. It has a near real-time (three-hour delay), deep, and fine-grained temporal archive that helps provide global and fine temporal context for making decisions and visual assessments of conditions for any day and anywhere in the world. This is a mashup of a NASA image service. The value is mostly in providing global and fine temporal context; adding in decision making; or as a quick visual assessment of conditions any day, anywhere.

The World Imagery basemap has been updated with nearly 2 TB of high-resolution imagery from DigitalGlobe. This is the first of two updates planned for this year. Areas that were updated include 30 cm imagery in the United Kingdom and Western Europe and 50 or 60 cm imagery in parts of Canada; Mexico; South America; Eastern Europe; Russia; India; Africa; Southeast Asia; and Pacific regions, including Australia and New Zealand. Contributions through the Community Maps Program include imagery for Denmark provided by Geodatastyrelsen (Danish Geodata Agency) and Informi GIS. Contributions were all received for Hamburg, Germany (30 cm imagery); Dawson Creek, British Columbia (25 cm imagery), Camrose, Alberta, Canada (15 cm imagery); and several other Canadian communities.

World Topographic Map—New and updated content received through the Community Maps Program was added to the World Topographic Map for Bermuda and Japan (~1:577 k); the Netherlands (~1:9 k to ~1:1 k); Suriname (~1:288 k to ~1:1 k); Albertov University and Masaryk University, Czech Republic; Warsaw University of Life Sciences, Poland; Galati and Oradea, Romania; several areas in the Northwest Territories, as well as a number of communities in Canada; and numerous communities in the United States, including Hermosa Beach, California; Lakewood, Colorado; Madison County, Idaho; Lake County, Illinois; Des Moines, Iowa; Anderson, South Carolina; Fairfax County, Virginia; Montclair State University, New Jersey; and Idaho State University, Idaho, all at ~1:9 k to ~1:1 k.

All core basemaps (World Street, World Topographic, Canvas, and Reference Overlays) have been updated with content for Africa at ~1:288 k to ~1:4 k continent-wide and to ~1:1 k in select urban areas. For a complete list of all contributions to each of the world maps, visit **esri.com/contributors**.

New to ArcGIS Online? Try It Today.

If your organization doesn't have an ArcGIS Online subscription yet, sign up for a free 30-day trial. You can invite up to five named users to participate in the trial, and you get 200 service credits. You also get a number of productivity apps as part of your trial, including Collector for ArcGIS, Operations Dashboard for ArcGIS, and Esri Maps for Office. Once your trial is over, purchase a subscription and continue to use all the features and services in the same ArcGIS Online subscription account. To sign up for the trial, go to esri.com/agoleval.

Manage Your Operations More Efficiently

Go Offline with Updated Collector App and Access Operations Dashboard from Tablet Devices

Highlights

- Collect and edit field data in a disconnected environment.
- Access real-time operation views from web browsers.
- Take advantage of new data sources.

The Collector for ArcGIS and Operations Dashboard for ArcGIS apps were recently updated with notable enhancements to better support users' workflows. These apps pull together and disseminate your most current geographic data while connecting the activities of your field and office staff.

Take Maps and Data Offline

Collector for ArcGIS is a native, configurable field data collection app to improve the accuracy and currency of spatial data. It is designed specifically for iOS and Android devices. The Collector app is a companion to Operations Dashboard, but it can also be used in a stand-alone environment. Field crews can download maps using Collector and then capture spatial or tabular data, attach photos and video, plan routes, and get directions. Information can be transmitted and immediately displayed in Operations Dashboard and shared throughout an organization. Collector now has the ability to work in a completely disconnected environment. Maps can be downloaded to users' smartphones and tablets and accessed anywhere, regardless of network availability. Users can take maps offline to collect and edit information in remote locations where network connections are either nonexistent or unreliable and then synchronize changes when reconnected.

View Daily Operations from iPads or Android Tablets

Operations Dashboard for ArcGIS provides a common view for monitoring, tracking, and reporting events within an organization. It integrates interactive maps and data to create operation views, including bar charts, lists, histograms, gauges, and other performance indicators based on live geographic information defined in a web map or web service. The dashboard was originally designed for Windows desktops to create and manage focused views of real-time information that can be shared across an organization. Today, Operations Dashboard supports web browsers on iOS and Android tablets. That means users can have the same real-time view of operations on their tablet that they see on their desktop computer.

Boost Data Sources

Data sources inside Operations Dashboard have been enhanced. Users can now power operation views using dynamic map services, as well as feature services, and other types of layers, including real-time weather, traffic, and social media feeds.

Use the Collector app offline to collect and edit maps and data, regardless of your network availability.

Download and Get Started

Collector for ArcGIS can be downloaded directly from the Apple App Store and Google Play. Operations Dashboard is available from ArcGIS Online. Both apps are free, but users need an ArcGIS Online paid or trial subscription to use them. Portal for ArcGIS users can access Operations Dashboard from the Esri Customer Care portal.

For more information, visit **esri.com/arcgisonline**.

Explorer for ArcGIS Brings GIS to Everyone

Highlights

- Discover, visualize, use, and share maps from your iOS device.
- Interact with your organization's maps and data no matter where you are.
- Tell stories and brief stakeholders with interactive map presentations.

Explorer for ArcGIS is Esri's latest application in a family of ready-to-use apps to access and share maps on smartphones and tablets. The app is designed for anyone who needs to explore data in a geographic context and use maps to help make better decisions. It has a modern, easy-to-use interface, so whether users are experienced GIS professionals or have no prior GIS knowledge, they can become immediately productive. The Explorer app is available on iOS, with support for additional platforms coming soon.

Access Maps and Hosted or On-Premises Data

Users can access any of their organization's maps and hosted or on-premises data authored in ArcGIS Online or Portal for ArcGIS. For example, users can search for places in their map and also search within specific layers to get information about particular assets, determine where assets are in relation to their current location, and quickly share that information with others. Maps can be shared several ways, including by e-mail; text message; and platform-specific methods, such as AirDrop (for iOS).

Use Sketching Tools

The Explorer app also includes sketching tools that enable users to "redline" their maps and highlight important aspects of their data. Map sketching provides easy identification and verification of edits and lets Explorer users communicate and collaborate with each other easily.

Create Interactive Presentations

Users can brief decision makers and other stakeholders by using map slides, each containing a title, a set of visible layers, and an extent. Users can interact with a live map during their presentation and also view pop-up windows and sketch with no disruption.

Sneak Peek: What's Ahead for Explorer for ArcGIS

The Explorer for ArcGIS app will grow in functionality and become more powerful with every release. Over time, users will be able to take advantage of new capabilities, including authoring maps, publishing and editing data, and viewing in 2D or 3D. The app will improve the way people plan and execute the work they do every day and use maps as a medium for presenting, sharing, and communicating with others inside their organization.

Download and Get Started

To download Explorer for ArcGIS, visit the Apple App Store. Anyone with an iOS device can download and try the sample maps included in the app. Support for Android and other platforms will be available in a later release. ArcGIS Online subscribers, trial users, and those with a Portal for ArcGIS account can simply download the app, sign in, and begin exploring their maps and data.

For more information, visit **esri.com/arcgisonline**.

Access maps, search and visualize data, and brief stakeholders using the new Explorer for ArcGIS app.

GeoPlanner for ArcGIS

New Premium App Uses Geodesign for Smart Planning

Highlights

- Users with all levels of GIS experience can participate in the design process.
- It pulls together different elements of the ArcGIS platform.
- The seven-step geodesign workflow forms the basis for configurable applications.

Planning professionals across a wide range of industries must frequently weigh different variables against multiple scenarios to make a decision or recommend a course of action. A new web-based premium application—GeoPlanner for ArcGIS—delivers the power of ArcGIS Online and a geodesign workflow while enabling users across an organization or a community to collaborate on design decisions.

GeoPlanner for ArcGIS, available in ArcGIS Marketplace, provides tools that support every step in a planning and design workflow: project creation, data identification and incorporation, scenario creation, site condition assessments, evaluation and comparison of alternatives, and reporting. Users are able to create, analyze, and report on alternative planning scenarios in support of better, more informed decision making.

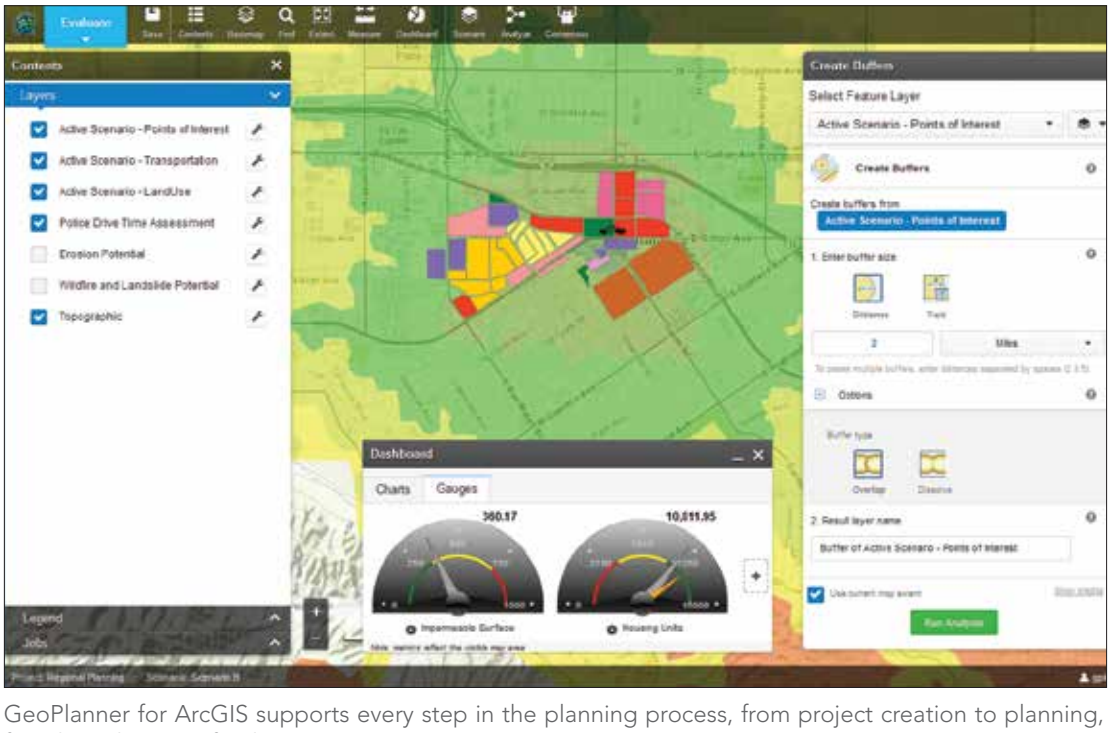
Because it is accessed by a browser, the application provides a way for stakeholders both within and outside of an organization to participate in the design process.

Planners, scientists, students, policy makers, analysts, and others, can use GeoPlanner regardless of their prior GIS experience. It is designed to be easy to learn and use by a wide range of non-GIS users and can be configured by GIS professionals in an organization.

GeoPlanner can be used for a broad range of industries, from public safety to energy to natural resources. Sample configurations are provided through ArcGIS Online. These sample configurations illustrate features commonly used for land-use, public safety, and special event planning.

Using ArcGIS for Desktop tools, these samples provide a starting point for GIS professionals to build on and create configurations that meet their specific needs.

One of the powerful capabilities of GeoPlanner is weighted raster overlay. With it, users can overlay different information layers, weight the importance of each, and generate a web map displaying the results. The application allows values to be easily adjusted as users work through the design process and quickly generate multiple scenarios.



GeoPlanner for ArcGIS supports every step in the planning process, from project creation to planning, for a broad range of industries.

As part of the ArcGIS platform, the application integrates with a range of business tools, like Esri Maps for Office. For example, once users have worked through the design process and are ready to report their findings, GeoPlanner includes a Save Presentation button that creates a web map for the current view. Those maps can quickly be inserted into a PowerPoint presentation or used to develop a Story Map.

One potential use, demonstrated at the Esri 2014 Federal GIS Conference, is locating drilling sites to minimize impact to sensitive wildlife habitat. Users can define prime habitat sites using weighted raster overlay with the landscape layers available in ArcGIS Online and then draw that into GeoPlanner to help guide and evaluate their proposed design.

From there, each well site and road needed to support it can be plotted and visualized. The application allows users to repeatedly redraw roads and move sites. Pop-up dashboards provide a quick impact analysis and can be compared from scenario to scenario to minimize the environmental impact.

For more information, contact Greg Pleiss, Esri (e-mail: gpleiss@esri.com).

Noise Impacts from Suborbital Reusable Launch Vehicles

GIS Maps Potential Noise Exposure Levels in 3D

By Lloyd Facklam and Cynthia Grizzle

Highlights

- A Commercial Spaceport Master Plan Amendment was transformed for suborbital reusable launch vehicles using GIS.
- A geodatabase feature dataset was developed to render 3D noise exposure contours.
- Noise levels were mapped to provide a spatial sense of potential impacts to the surrounding communities.

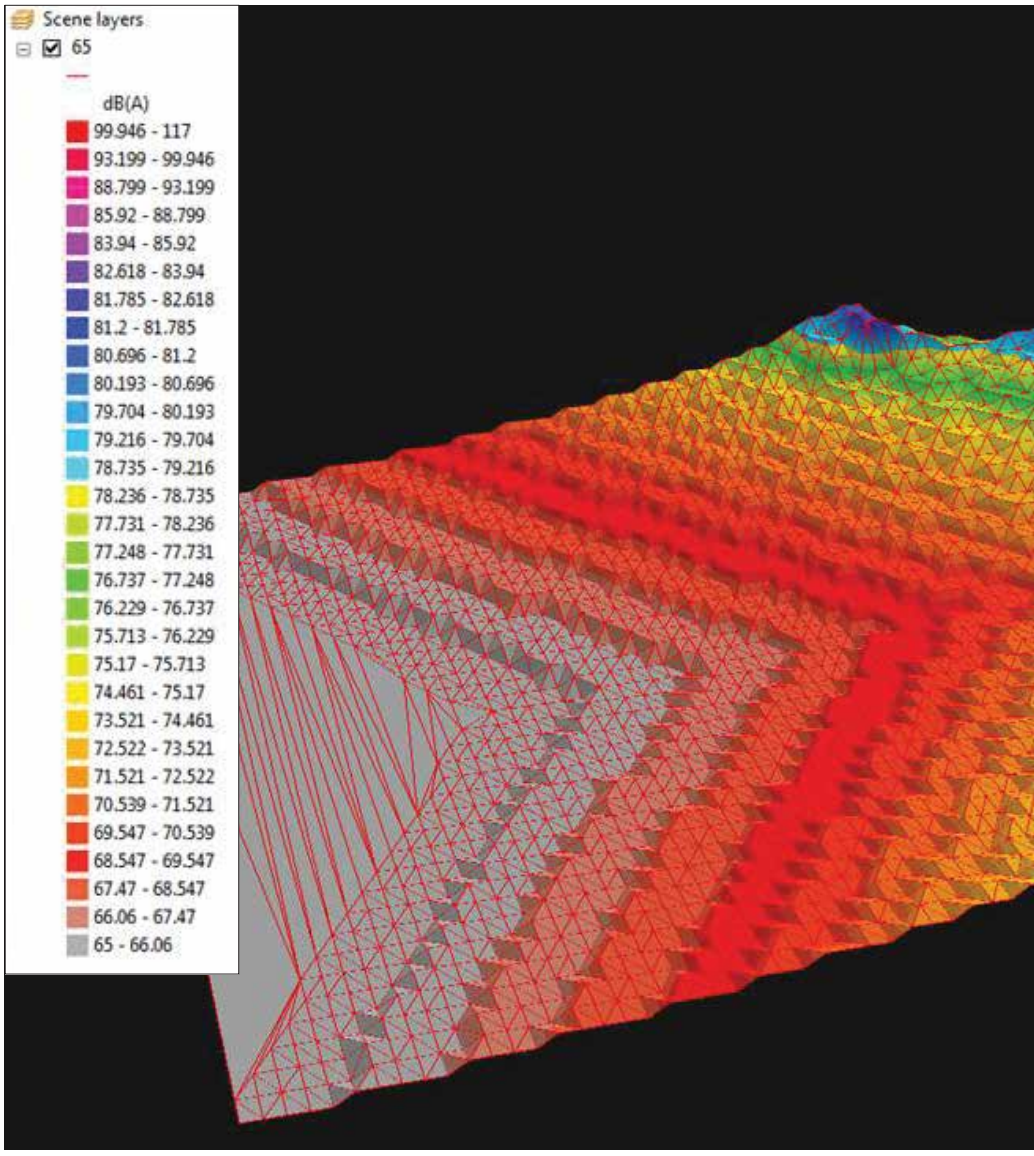
Suborbital reusable launch vehicles (RLVs) will provide the next generation's foray into space exploration. These "space planes" can provide lower-cost access for space tourism, military missions, and commercial applications. The Commercial Space Launch Amendments Act of 2004 was intended to respond to the increasing demand for lower-cost access to space through launch sites that are not associated with federal facilities or operated by the National Aeronautics and Space Administration (NASA) or the Department of Defense.

Consistent with that objective, the Jacksonville Aviation Authority (JAA) contracted with long-established aerospace company Reynolds, Smith and Hills Inc. (RS&H) of Jacksonville, Florida, as its spaceport consultant to prepare commercial launch site operator license application documentation, environmental analyses, and a commercial spaceport master plan. In 2010, JAA received a license from the Federal Aviation Administration Office of Commercial Space Transportation to operate a launch site at Cecil Airport in Jacksonville. This license allows Cecil Airport to operate as a commercial spaceport for horizontally launched RLVs as early as 2016.

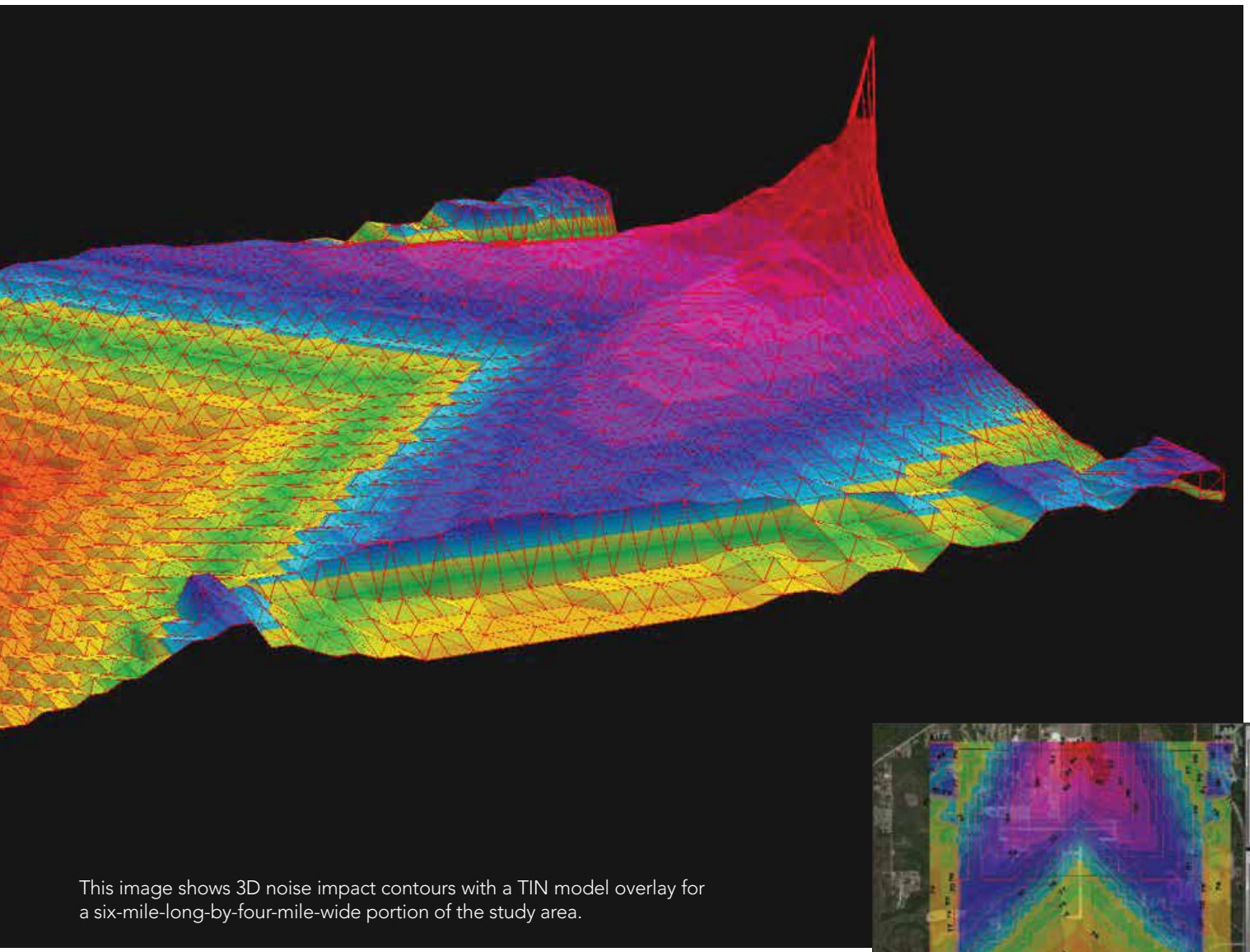
Following the spaceport master plan, RS&H was asked to prepare an amendment that initiated a potential noise impact analysis. The noise from the proposed rocket engines was identified early as a potential concern and required detailed study and analysis to understand potential impacts on the environment and surrounding community.

RS&H has been integral to NASA's missions since the 1960s. The firm's history with NASA's launch pads, the mobile launchers, and other key facilities at Kennedy Space Center have made RS&H an industry leader in aerospace and defense. RS&H also has a strong environmental team that includes in-house noise modeling experts, GIS professionals, and airport environmental process specialists. RS&H's broad range of GIS, aviation, aerospace, and environmental expertise gave the firm a comprehensive understanding of the challenges associated with quantifying and visualizing potential impacts of the developing commercial space travel industry. Esri products were the key to integrating nonspatial data with a project-specific location. The finished product "tells a great story," says Brian Gulliver, RS&H's spaceport development leader.

To understand the potential noise impacts, a site-specific noise model was needed. For this application, there were several challenges in creating the noise model: available noise data was not spatially referenced, and typical engineering software could not provide the desired 3D result. Since no RLVs are currently being launched at Cecil Airport, RS&H had to develop a method to spatially link nongeoreferenced rocket engine noise data to Cecil Airport's specific runway location. The noise data provided for the analysis included time, distance, altitude, Mach speed, and measured noise in A-weighted decibels dB(A). The A-weighted network is used most often in noise analysis because it most closely approximates the way humans hear. To identify potential impacts to noise-sensitive sites along the proposed RLV flight path, a study area 4 miles wide, 140 miles long, and 65 miles high was delineated.



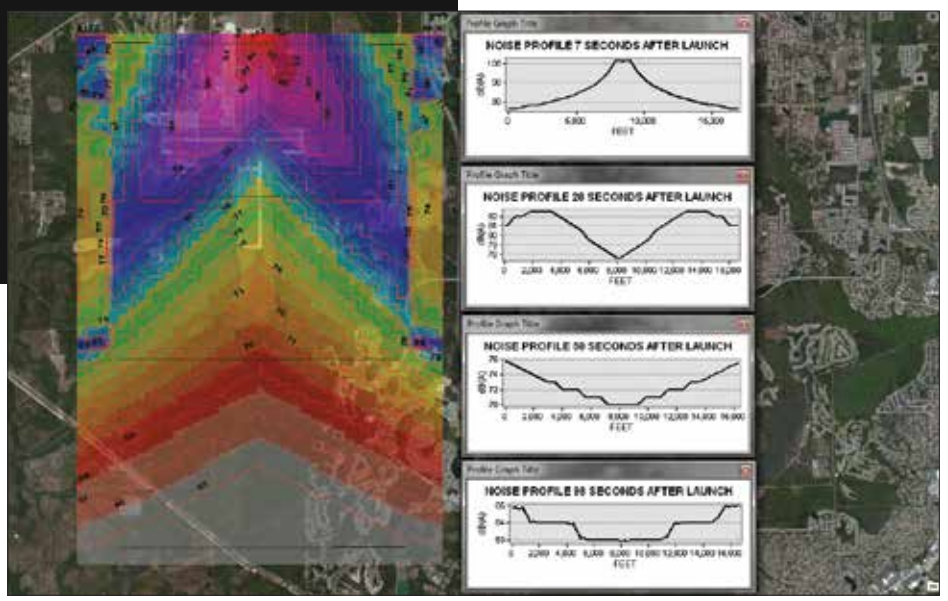
First, the RS&H team extracted the raw data from a Microsoft Excel spreadsheet and formatted it to be compatible with Esri's ArcGIS and ArcScene software. The team related the movement of the RLV to the Cartesian coordinate plane. The known x,y coordinates of the runway's start became the origin. The distance (east or west) away from the centerline of the runway was assigned to "x." The distance traveled southward down the runway was assigned to "y." The recorded noise levels in dB(A) were assigned to "z." To mirror a proposed launch event, the team created a geodatabase feature dataset to render noise contours in a 3D model



This image shows 3D noise impact contours with a TIN model overlay for a six-mile-long-by-four-mile-wide portion of the study area.

using ArcScene. To depict the noise impacts during takeoff, the z-value, which is typically associated with elevation relative to the earth's surface, was substituted as dB(A) values in the Terrain Model environment. The model was converted to a TIN (digital terrain model) and imported into ArcScene for 3D visualization.

The result was a multidimensional graphic that allowed RS&H spaceport planners to visualize the potential noise impacts. The scene provides a realistic and dramatic view that could be used to quantify potential noise impacts as a launch progresses. Jim Mykytka, one of RS&H's noise experts, says, "Besides facilitating impact assessment, these 3D maps allow the general public to visualize the anticipated noise levels and duration, as well as how the project might affect their community." By making something that is invisible visible with Esri software, the RS&H team set a new standard for the analysis of potential spaceport noise impacts.



Noise contours and profiles for the proposed flight path of a reusable launch vehicle.

About the Authors

Lloyd Facklam and Cynthia Grizzle are with RS&H, a firm that provides architecture, engineering, and consulting services. Facklam has more than 33 years of experience as a senior technician/designer with RS&H's transportation program. Grizzle is an environmental scientist with RS&H's transportation program. She has 10 years of experience assessing environmental conditions and a master's degree in environmental management.

For more information, contact Lloyd Facklam, highway designer, RS&H (e-mail: Lloyd.facklam@rsandh.com), and Cynthia Grizzle, environmental scientist, RS&H (e-mail: Cynthia.grizzle@rsandh.com).

A Room with a View

The AOC Uses 3D GIS to Help the House of Representatives Select Office Suites

Highlights

- House members can view rooms in 3D to get realistic views of the suites.
- AOC staff have built an enterprise GIS portal that gives colleagues access to needed data.
- GIS is now the hub for all the AOC's automated systems.

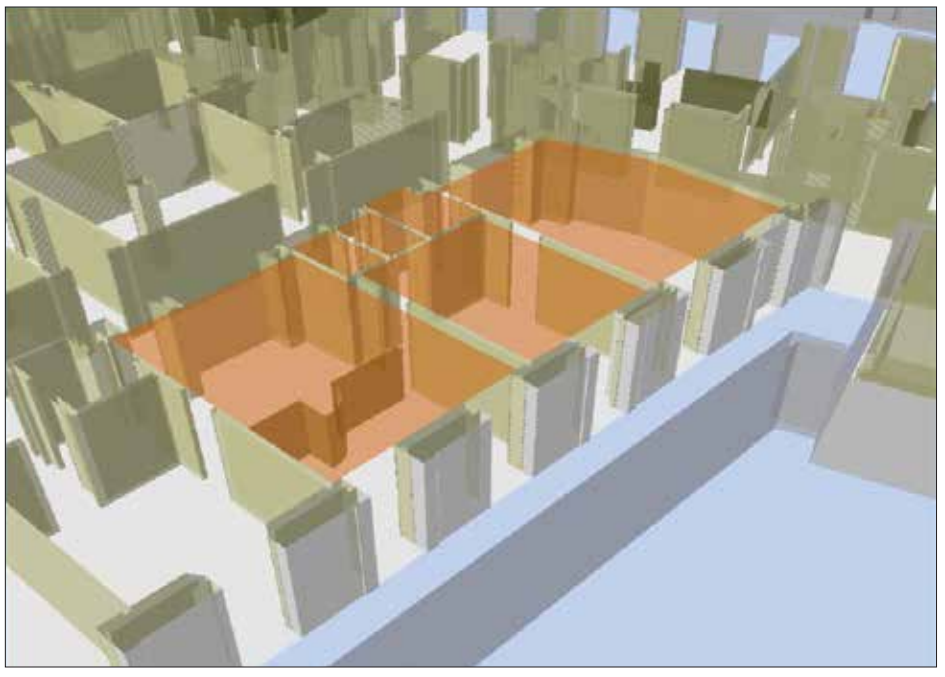
The United States Capitol and its grounds are maintained by its own architect—the Architect of the Capitol (AOC). The US Capitol and Visitor Center, Senate and House office buildings, Supreme Court, and Library of Congress—17.4 million square feet of buildings—are cared for by nearly 2,600 AOC staff. They also are responsible for keeping the more than 460 acres of Capitol grounds in impeccable condition. This isn't easy when you consider that members of congress, their staffs, and approximately two million visitors come through the US Capitol Building each year.

When it comes to providing excellent client service, one of AOC's important duties is helping members of the House of Representatives select the location of their offices after each election. Every two years, 435 members of the House go through a highly organized process to select their office suites. Based on their seniority, House members draw lottery numbers and then are ushered into a room to choose from a subset of rooms that are available to them.

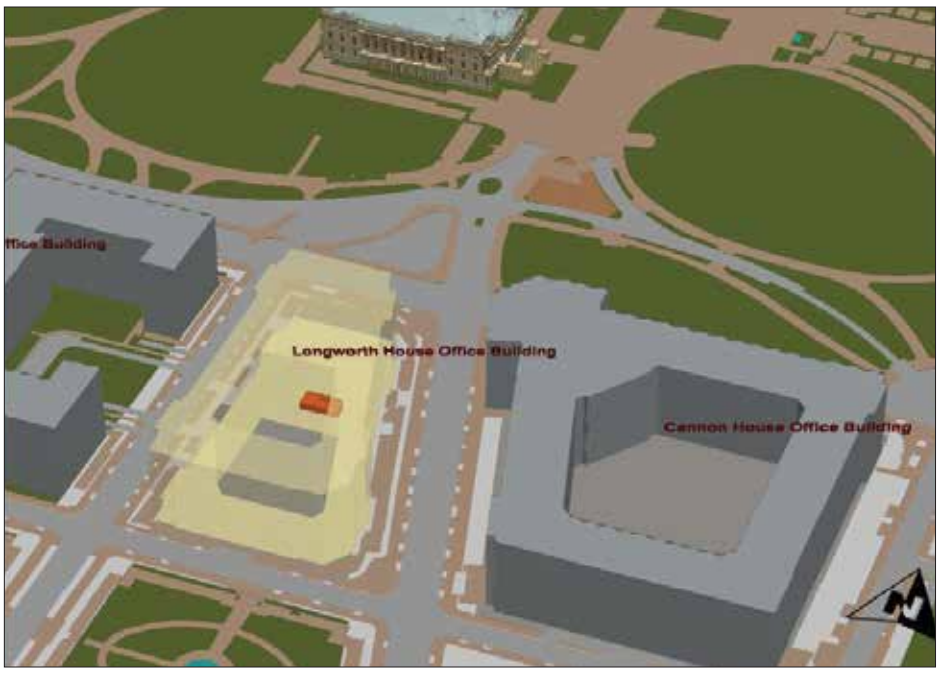
During the November 2012 transition, however—the 113th time the House has been elected into office—instead of selecting office space from paper maps and photographs, members were presented with an interactive map app that provided access to photos; complete information on the suites, such as window views, access to elevators, and committee hearing rooms; and even a 360° panoramic view of the available offices.

AOC staff had been in the midst of transferring paper architectural drawings and floor plans into digital files when an idea struck them. With the office lottery fast approaching, since the drawings were being stored in a new server so AOC staff could access the files, why not create a congressional move application at the same time?

"It was the right moment in time—we were doing a lot of data conversion," says Christopher Smith, director, Technical Support Division for the Architect of the Capitol. "We thought this would be a good tool for transparency for the House and help everyone rethink how we manage space."



The user can view a room in 3D using actual partition heights that are stored in ArcGIS to get a much more realistic view of the suite.



Suite view in government campus context.

Suite Selection Made Easy

The app was ready in time for the AOC to use during the House's postelection transition. To get started, the representatives and/or representatives-elect and their staffs sat down with an AOC professional staffer and opened the app to view the variety of office options available to them. Making things even easier, the app was designed to be used on iOS devices, which has become a standard smart device used by AOC staff. By just typing in an office number and tapping a button, a view of the suite's location pops up on a 2D map. The viewer also offers a 3D image of the building.

By navigating the screen, the member could view the various attributes, such as square footage, the window view, the condition of the existing carpeting and drapes, and other details about the suite. (Carpet and draperies are replaced after six years, not during every move cycle, as a cost-saving measure.) "All this information at one time was dispersed in many different systems," explains Smith. "Now we have it all integrated and available in one location."

The user can also hover over or touch an object on the screen to get additional information about it. For example, if an office contains a room-dividing partition, the user can tap the partition to see if it is ceiling height or not—something that was impossible to do before the app was developed. In years past, the clients would have to visit each office suite if there was a question about its configuration—which was difficult to do in the short amount of time they're allowed to select a suite. Now, the user can view the room in 3D using actual partition heights that are stored in the GIS to get a much more realistic view of the suite.

"We couldn't possibly do this on a paper map," says Smith. "GIS brought these capabilities to them, all while supporting the existing lottery system that was in place."

AOC took this new concept and embraced it—GIS is now the hub for all AOC's automated systems. When it was first introduced in 2007, it was through simple visualization of data on computer desktops. Today, AOC staff have built an enterprise GIS portal that gives all their colleagues access to the data they need.

Smith's team is also able to publish data to the web more easily, and the web apps can be used on any device. Many staff members have tablets, so the need to develop apps for tablets and smartphones was at the front of the team members' minds. To ensure the app looked great in the device environment, the developers created a simple JavaScript app that provided them with the ability to start seeing the data and get a feel for what GIS can offer. "For the first time in my career, the desktop environment was a secondary environment," says Smith.

Keeping the Old and Introducing the New

This platform allows them to support a large number of users, very large datasets, and graphic-intensive processes. The system they built to handle this is substantial, and several computer drawing staff personnel worked for three months to get the data into the system. There was a heavy investment of time in the beginning to get the drawing files into shape. The drawings had to be cleaned up, the polygons were closed, standard text blocks were created, and the drawings were all labeled in a conventional manner to make them more useful. As the fundamental data gets into better shape, the time staff spend on data conversion will decrease. A full-time GIS analyst keeps the developed apps up and running and slowly introduces new functionality.

There are master drawings of the campus that are kept on file and changed as construction happens, which is almost every day. Smith's team receives the as-built drawings, quality checks them, reflects the changes on the master drawings, and then updates the rest of the drawings on a monthly cycle. After this update, the information is updated on the map services.

You Can Use the Same System

Besides the lottery app, AOC staff members—those responsible for the upkeep and care of the buildings and grounds—can log in to the system via another app that accesses different workflows to help them keep the facilities running smoothly. This has provided a lot of efficiencies—code can be reused so developers aren't writing individual apps for each type of user. The apps can be easily expanded, as well, by adding additional themes with core map tools and functions. It's also given Smith and his core team some peace of mind: "We know the web GIS world is there, and we can make it work for all sorts of different user groups; we aren't going to try and do everything at once," says Smith. "We can plug in additional functions as they are needed by using different technologies."

For more information, contact Christopher Smith, director, Technical Support Division, Planning and Project Management, Architect of the Capitol (e-mail: cmsmith@aoc.gov, tel.: 202-226-4711).

Making Maps Accessible to the Blind and Partially Sighted

By Gido Langen and Brian Ballantyne, Surveyor General Branch, Natural Resources Canada

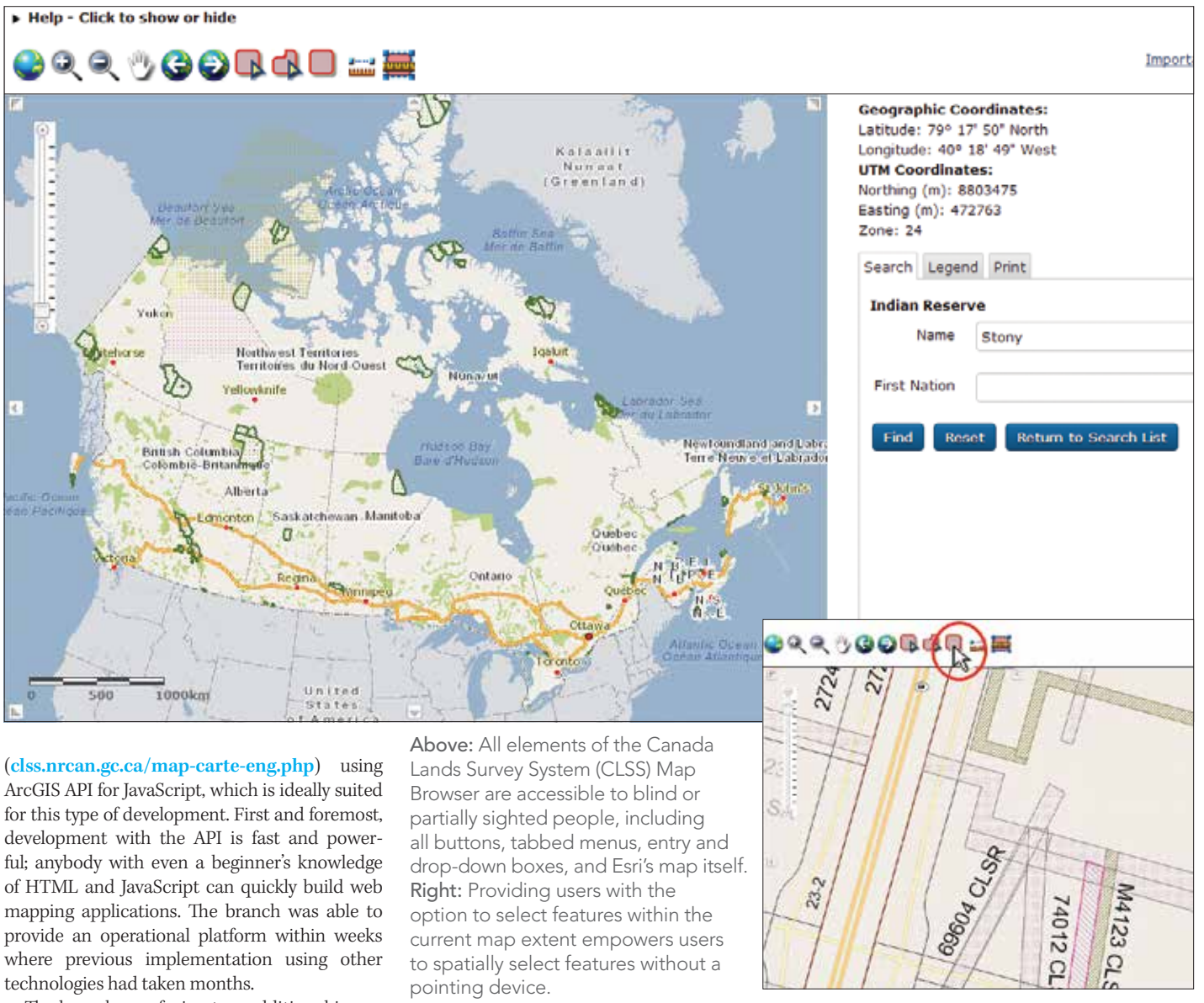
Highlights

- With ArcGIS API for JavaScript, an operational web mapping platform was built within weeks rather than months.
- ArcGIS for Server running in the background facilitated providing ArcGIS database information as publicly available web resources.
- ArcGIS API for JavaScript does not require any additional programming on the developer's side.

The Government of Canada prides itself on providing services and programs to all Canadians. To ensure that online services can be accessed by blind and partially sighted users, the federal government adopted the Common Look and Feel (CLF) Standard in May 2000. The standard was updated in January 2008. However, by 2008, many federal departments failed to meet their own standard—47 departments failed an audit, of which 22 seriously violated the CLF Standard.

Another pivotal event that spurred the strict enforcement of the CLF Standard was the accessibility challenge to federal websites filed by Donna Jodhan of Toronto. She is legally blind and is a sophisticated computer user. Despite being computer savvy, Jodhan was unable to access the federal government's informational and transactional services online. She sued and cited five examples of inaccessible online services, and in November 2010 the Federal Court agreed with her.

In compliance with the Federal Court mandate, the Surveyor General Branch of Natural Resources Canada developed a web mapping application for sighted users that is also fully accessible to blind and partially sighted people (**clss.nrcan.gc.ca/map-carte-eng.php**) using ArcGIS API for JavaScript, which is ideally suited for this type of development. First and foremost, development with the API is fast and powerful; anybody with even a beginner's knowledge of HTML and JavaScript can quickly build web mapping applications. The branch was able to provide an operational platform within weeks where previous implementation using other technologies had taken months.



Above: All elements of the Canada Lands Survey System (CLSS) Map Browser are accessible to blind or partially sighted people, including all buttons, tabbed menus, entry and drop-down boxes, and Esri's map itself. Right: Providing users with the option to select features within the current map extent empowers users to spatially select features without a pointing device.

The branch was facing two additional issues when setting out to build a web mapping application that was also supposed to provide accessibility for blind and partially sighted people:

- Replace the pointing device with keyboard input for map navigation, since use of a pointing device requires the user to see and manipulate an on-screen cursor. Blind or partially sighted people may or may not be able to use a pointing device. However, they usually have no problem using the computer keyboard.
- Allow features of interest to be selected without the use of a pointing device to trigger a spatial query of those features, and then to present the result back to the user in an intelligible fashion.

Sighted people use the computer's pointing device to accomplish both tasks—map navigation and spatial queries. To accommodate blind and partially sighted people, the branch employed graphical user interface elements in combination with screen reader software that intercepts information as it is being sent to the computer screen and then renders it into speech or Braille for blind and partially sighted people.

To enable blind and partially sighted people to navigate, the branch used drop-down menus that permit users to choose one value from a list of jurisdictions at the first level and another drop-down menu to choose one value from a list of units at the second level. With the screen-reader software, these graphical user interface elements can be readily used by blind and partially sighted people.

In addition, users can use their keyboard arrow keys to navigate the map in cardinal and ordinal directions (north, east, west, and south, as well as the directions in between). They can also use the plus (+) and minus (–) keys to zoom in and out if further zooming or panning is required. This functionality is fully integrated in ArcGIS API for JavaScript and does not require any additional programming on the development side. Those are invaluable features of the API that cannot be overemphasized, since developers can appreciate how laborious it is to implement new map navigation functions in general and accessible ones in particular.

Thus, regardless of input method—pointing device, keyboard operation, or drop-down menus—users are able to navigate to a particular unit of interest.

To provide blind and partially sighted people with the ability to select features on a map without an appropriate input method—that is, spatial queries—seemed to be a bigger hurdle. However, the branch implemented a solution that employs a button to trigger the spatial selection of all features covered by the current view extent (the area visible on screen after zooming in). The results are then posted back to the screen, where they can be reviewed by the user with the screen reader. If the resultant selection set of features is too large, then the user can refine the view area with further zoom/pan operations.

Potentially, many features of different types could be selected using this approach, which may overload the user's capacity to interpret the information. To structure the returned information, the selected features are returned by subject, where the records of each subject are listed under individual tabs in a tabbed view. The results in each tabbed view are fully navigable using the pointing device or keyboard operations and are, therefore, fully accessible to everyone. Furthermore, if a candidate record has been determined by the user, it can be activated with a keyboard stroke to navigate to its location. For example, a user can read (visually or through a screen reader) all text in the tabbed results view and can readily zoom further in to any feature by activating its hyperlinks. Of course, the application also permits feature queries based on attribute values entered in query boxes.

Development of the application was greatly facilitated by the use of REST endpoints that are generated by the branch's ArcGIS for Server running in the background. The REST endpoints provide a convenient conduit between the spatial/attribute database information and the custom-made web application. The REST endpoints provide ArcGIS database information as publicly available web resources while shielding the database itself from outside use.

Since the Canada Lands Survey System (CLSS) Map Browser was launched in 2012, the application has been reviewed and approved by accessibility experts in Canada for accommodating the needs of blind and partially sighted people. The site receives about 2,000 hits a month.

About the Authors

Gido Langen is a geomatics officer with the Surveyor General Branch of Natural Resources Canada. He received his MSc in 1990 and worked in the utility and private industries, for nongovernment organizations, and now the federal government. Along the way, he has taught GIS classes as a part-time instructor for the last 15 years. Brian Ballantyne is senior adviser for Land Tenure and Boundaries.

For more information, contact Gido Langen, Surveyor General Branch (e-mail: Gido.Langen@NRCan-RNCan.gc.ca), and visit Canada Lands Survey System's Map Browser at **clss.nrcan.gc.ca/map-carte-eng.php**.

PortMaps: A Groundbreaking Platform for Port Management

Port of Rotterdam Ensures a Resilient Future with ArcGIS

Highlights

- Three mouse clicks deliver information about any asset in the port.
- The transition to the ArcGIS platform was accomplished in five months.
- Integration will be extended to Port of Rotterdam's global port network.

The Port of Rotterdam (POR) bustles like a metropolis. The Netherlands port handles more commercial shipping than any port in Europe and more than most ports in the world. In 2013, it docked more than 130,000 vessels and processed a staggering 440 million tons of shipping cargo. Perched on the North Sea, it stretches 26 miles inland along the river Maas, the primary gateway to more than 500 million European consumers.

Industrial Processing Center

More than a large place where ships load and unload their cargo, POR forms an immense industrial center where raw material gets processed into commercial products. Oil is refined, synthetics are produced, and fruit is repacked for wholesale. Around 90,000 people work at the port in some capacity to accomplish this work.

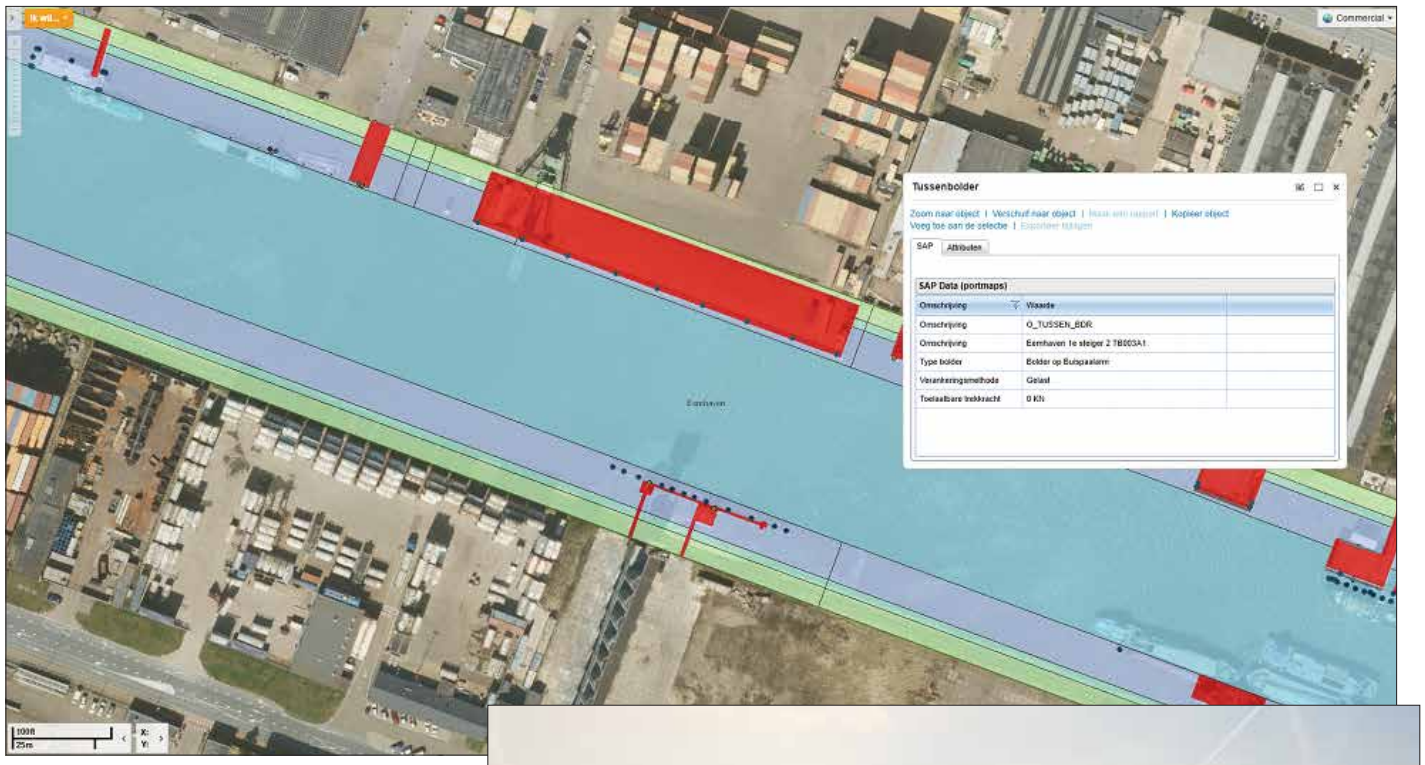
The Port of Rotterdam Authority has relied on a complicated supporting system just to maintain its enterprise operations. As a world-class port, POR can't be content with mere maintenance. Ports grow and expand. When they reach the limits of outward expansion, they still need to grow internal efficiencies as operations increase in complexity.

To ensure POR met the fiscal goals of a recent expansion, the authority needed a platform to connect all its systems, improve usability, and get all departments on the same page. Last year, after a competitive bid that tested top asset management systems in a lengthy proof-of-concept phase, POR tapped the expertise of the Esri Nederland B.V. and Esri Professional Services teams to implement an ArcGIS platform called PortMaps and unify its operations from bottom to top.

"It boiled down to uniformity of user experience and how quickly the platform could be fully operational," says Frits van der Schaaf, business development director for Esri Nederland. "Staff needed workflows to be tight and effective and the transition to be fast and seamless."

Maasvlakte 2: The Final Expansion

Last year, the port completed a massive, 1.5-billion-euro expansion into the North Sea, called Maasvlakte 2 (m2). That expansion defined the port's total land area for decades to come. Further growth meant working more efficiently to generate greater revenue from every available acre. Until last year, POR's enterprise management consisted of a legacy GIS that threatened to inhibit the authority's internal growth and profitability in the wake of m2. Its main flaw was that it couldn't easily connect to dozens of other business systems used to manage operations.



In the PortMaps Viewer, users can access live information from SAP and the document management system using a configured pop-up dialog box.

Even though Rotterdam is Europe's largest cargo port, it is much more than a shipping hub. The massive industrial complex at the port is a major economic driver for the region. (Photo by Marten Hogeweg.)

"There won't be a third Maasvlakte expansion," says Erwin Rademaker, program manager for PortMaps. "The only way to let the shipping traffic grow is to handle the available space and resources we have more efficiently and intelligently."

PortMaps

The port authority wasn't simply looking for a contractor to do the work. It needed a partner willing to work with it and its affiliate ports to transform how they manage assets. As staff learned more about what a modern GIS could do, they embraced the idea of a complete geospatial platform to manage all the port's business.

When Esri told them it could be done in five months, staff could hardly believe it. The other "best of breed" systems fell short of providing a snappy user experience, and none of them could be configured in such a quick time frame. ArcGIS was the only platform that could phase out 49 of the port's systems at once with relatively little disruption. Esri Professional Services and Esri Nederland worked with the authority to integrate the ArcGIS platform with key enterprise business systems, including SAP, AutoCAD, and Microsoft Office; develop workflows and an enterprise data model; and build a geodatabase that includes port assets and boundaries, parcels and associated land records, utilities, transportation, bathymetry, imagery, and lidar.

The authority's requirement for asset management was so specific that it mandated the workflow should only take three mouse clicks (or touch screen taps) for anyone at the port to find any asset. The implementation thus required migrating more than 1,500 layers of port data into an enterprise ArcGIS database and developing a data maintenance workflow for 10 core port objects. The idea was to work through many of the steps with port authority employees and enable them to perform the rest of those steps themselves.

"Much of the staff training involved staff actively participating in the data conversion process," says van der Schaaf. "Once data was migrated and the initial layers created, work shifted to configuring templates for information products needed by the port, such as the port basemap and dredging atlas."

The first phase of the implementation took five months to complete and was deployed in January 2014 as PortMaps. At this formative stage, PortMaps easily outperforms the port's old GIS as an asset management system. It uses a detailed map of the port as a starting point from which information can be requested by anyone at any time. Departments are also able to instantly share information on mobile devices.

In Operation

Port Authority employees currently use PortMaps to access and update a range of port information. It plays a central role in the organization's environmental management, security and safety processes (e.g., maritime traffic control), area planning, port development, and incident response. For example, an employee can click or tap on the main map in PortMaps to view a contract stored in SAP that belongs to the part of a quay (concrete platform where goods are off-loaded). Vehicles and other assets can be tracked and monitored and their associated records viewed. The map/document connection simplifies staff work, eliminating the leapfrogging from application to application that characterized the old information system.

"There are all sorts of objects on the terrain: railroads, piping, electricity cables, and so forth," says Rademaker. "ArcGIS clearly shows the intersection of these objects and opens access to their associated documentation through simple pop-up windows, giving the port a much more sensible and immediate system for port management."

Applicability and What's Next

The POR Authority considers PortMaps to be a groundbreaking approach to port management. As the GIS foundation at POR gains strength, the authority plans to implement the ArcGIS platform in its affiliate ports around the world. The next two phases will further integrate the platform with expert systems for structural degradation analysis and risk/business value assessment.

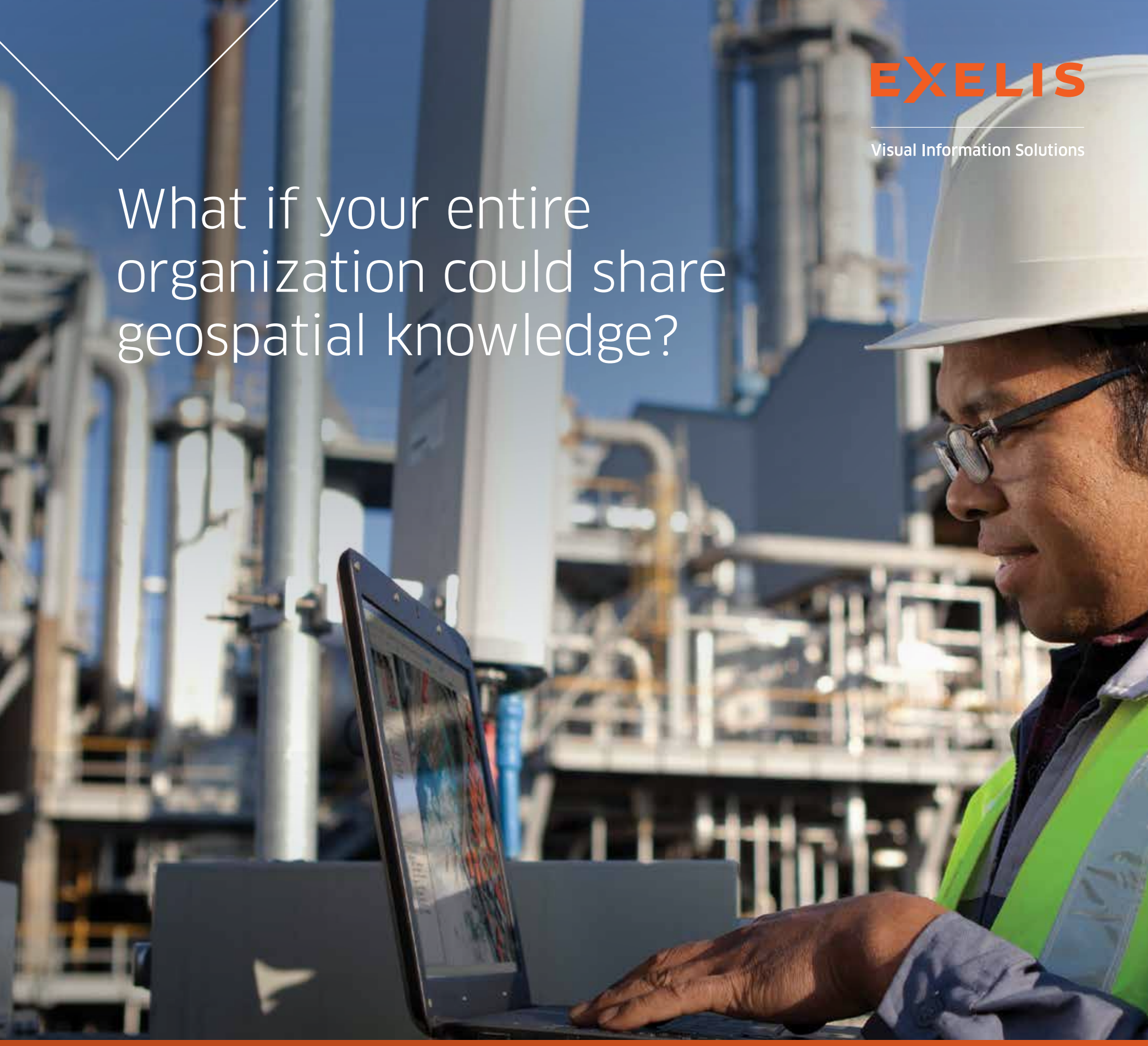
"The key factor in POR's excitement was discovering the applicability of a modern GIS," says Chris Cappelli, Esri global director of sales. "Early on, staff could see the GIS could reliably be applied to every aspect of port business."

For more information, contact Erwin Rademaker, program manager, Port of Rotterdam (e-mail: e.rademaker@portofrotterdam.com) and Guy Noll, Esri (e-mail: gnoll@esri.com).

EXELIS

Visual Information Solutions

What if your entire organization could share geospatial knowledge?



Sharing can be a challenge. Especially when your workforce is scattered across geographic locations, and they all have different methods for accessing the geospatial information they need. ENVI for ArcGIS® allows everyone from your organization to use geospatial imagery and data, such as SAR and LiDAR, to enhance their GIS applications. And, since ENVI products are fully integrated with ArcGIS, whether your team is analyzing imagery from a desktop computer, or they need to share the latest advanced image analysis tool with their colleagues via ArcGIS for Server we have the imagery software to suit your needs. Now with ENVI, sharing just got a little easier.

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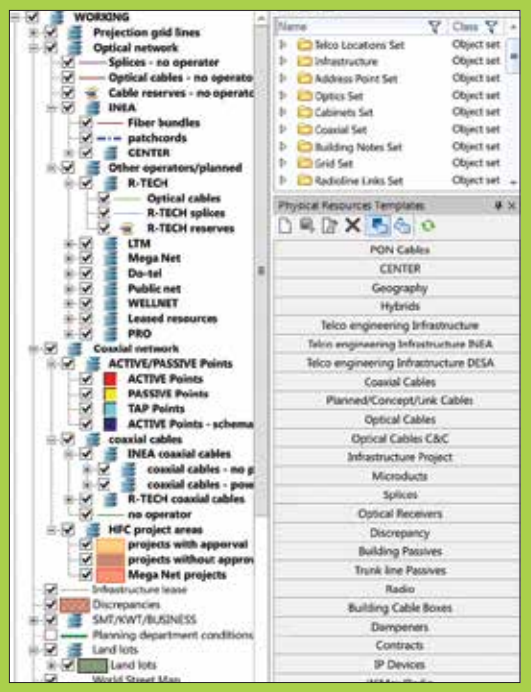
esri Partner Network Platinum



Active, passive, and tap output devices are marked on the map (in English).

Easier Management of Triple Play Telecom Network

Implementation of a Network Inventory at Poland's INEA

Highlights

- Instant information about available network resources significantly reduces the time needed for technical diagnosis and design.
- With ArcGIS, the network functions effectively and wins new customers.
- The GIS-based network inventory system is flexible, allowing INEA to grow dynamically as it undergoes continuous modernization.

Triple play telecommunications refers to networks that offer Internet, television, and telephone services over a single broadband connection. INEA S.A., one of the largest Polish triple play operators, operates a network that covers more than 360,000 households. The company is growing its network progressively and increasing its market share dynamically. Owing to a steady increase in the number of customers who have a big appetite for data services, a modern network inventory system becomes an essential tool to support the operator's key business processes.

Failure management and fast access to information about network resources are essential services provided by telecom operators. Efficient management of a telecommunications network provides customers with immediate access to a vast flow of information. Customer satisfaction largely depends on the efficiency of the system responsible for such networks' inventory control.

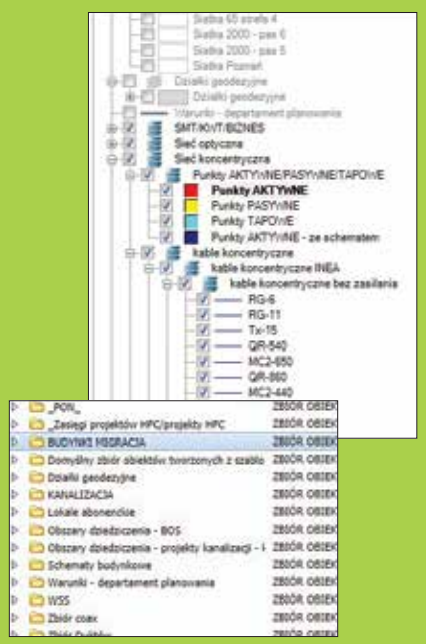
With a goal of fast-tracking and honing its systems, INEA sought just the right partner with the skills to help implement a professional network inventory system. Having analyzed a number of offers, INEA selected Esri Silver Tier Partner Suntech S.A. of Warsaw, Poland. Suntech's ArcGIS based software system SunVizion Network Inventory now supports INEA's processes in the areas of sales and management services, optimum planning of network expansion, fast failure repair, and reporting.

The system is based on ArcGIS spatial data representation. A digital network map comprises full technical data and allows users to manage information intuitively; visually; and, most importantly, simply.

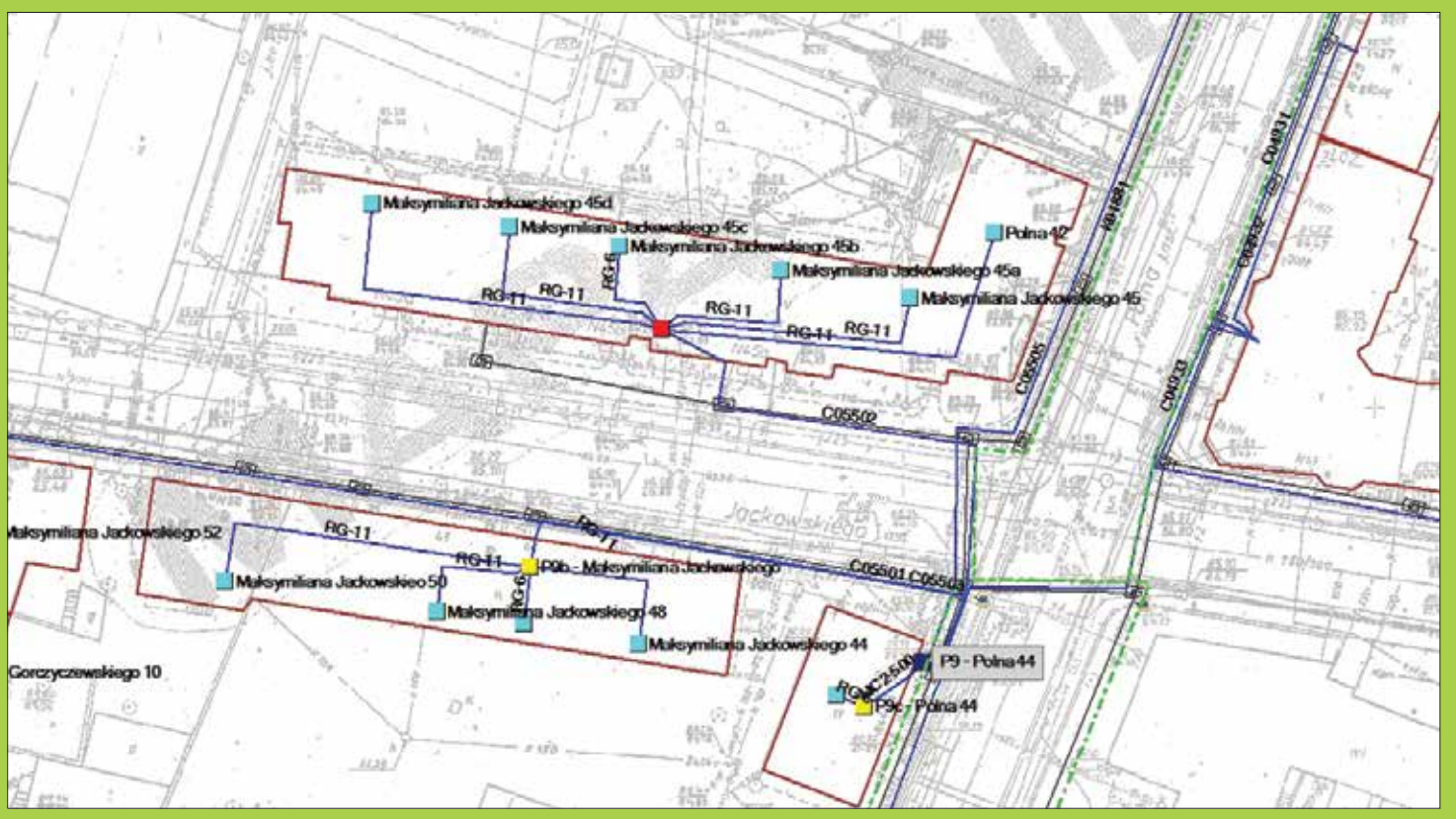
"The main business benefit we sought was the ability to reduce operating costs due to collecting and processing information in a single coherent IT environment," says Maciej Wachowiak, head of the Network Inventory Department at INEA. "Graphic representation of data based on GIS allows quick and effective management of the telecommunications network."

The central repository of information about the network resources and their use allows intelligent network management and streamlines key business processes carried out by INEA.

"The technological development of the telecommunications industry results in the growing complexity of the networks," says Piotr Saczuk, president of Suntech S.A. "We are trying to ensure that the management of such



A physical inventory of INEA's network resources (in Polish).



Another example of a physical inventory of INEA's network resources (in Polish).

networks is as easy as possible, providing our clients with an advanced IT platform that optimizes the network maintenance process and generates significant savings."

Implementation

The implementation of the SunVizion Network Inventory solution began with the geopositioning of the surveyors' maps and their placement into the system. Then, in such an environment, all elements of the local fiber-optic networks, the teletechnical infrastructure, and the coaxial distribution and subscriber network were modeled. This created a coherent database model, which allowed smooth migration of the INEA-owned optical, concentric, and radio network into the system. The next step of the implementation process was to establish procedures that would provide the system with information on any changes within the network so that the system data always corresponds with the current state. Reports were subsequently created in the system, whereby the system users receive any required information in an accessible manner.

Benefits

Instant information about available network resources that appears next to a customer address significantly reduces the time needed to perform a technical diagnosis and to design a service prior to signing a contract. Based on the reservation of the network resources, the technical teams receive coherent configuration and installation documentation required to launch a new service.

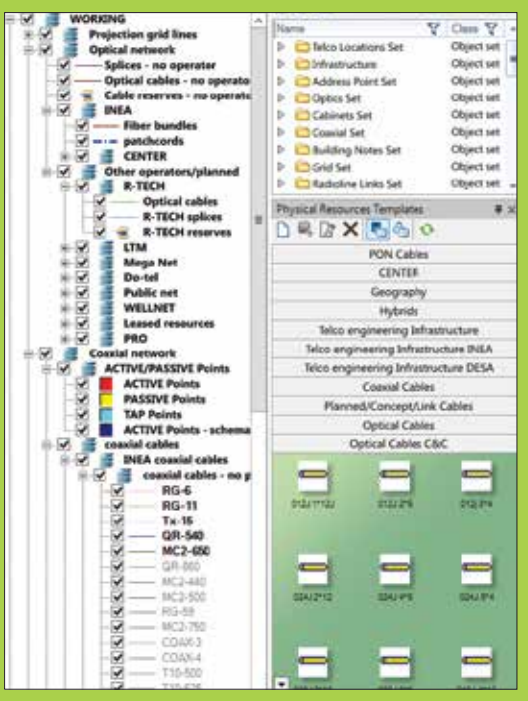
The fact that the system is based on the professional ArcGIS environment offers numerous benefits. In the event of equipment failure, the digital network map with full data makes it much easier to locate the fault and shortens recovery time. Based on the data concerning the geographic and functional correlation of equipment, the system also quickly identifies the extent of the failure, indicating which services, on which area, will be unavailable to the customers. Thus, the operator is able to provide the customers who have had their Internet or telephone cut off with exhaustive information on what has happened and when the issue will be resolved. Such an approach contributes largely to maintaining good customer relations and has a positive influence on the operator's image.

Very important functions of the SunVizion Network Inventory solution are support of the network design and expansion and the process of modernizing the existing network. This feature of the system is especially important in the case of INEA, which is growing dynamically and undergoing continuous modernization. The inventory system supports the design process, which saves time and ensures that all data is coherent and stored in one place. Additionally, it allows contextual analysis of investments and efficient preparation of documents for the execution resources. The final step of the design process is the very fast entering of postdesign data.

These qualities allow the network to function effectively and to win new customers. Thanks to the system, the scale effect that was achieved is a clear advantage. Documentation is collected in one coherent application, which makes it possible to combine many investments (which earlier seemed totally unrelated to each other). All modifications that have been made are immediately visible to other users. It is no longer necessary to engage in time-consuming data updating or to worry about data synchronization.

Thanks to the faster and more efficient services, the improvement of customer opinions about the service provider is the biggest benefit.

For more information, contact Maciej Wachowiak, Network Inventory Department, INEA (e-mail: maciej.wachowiak@inea.com.pl), and Magdalena Jablonska, Suntech (e-mail: magdalena.jablonska@suntech.pl).



Optical network has its logical picture in the system (in English).

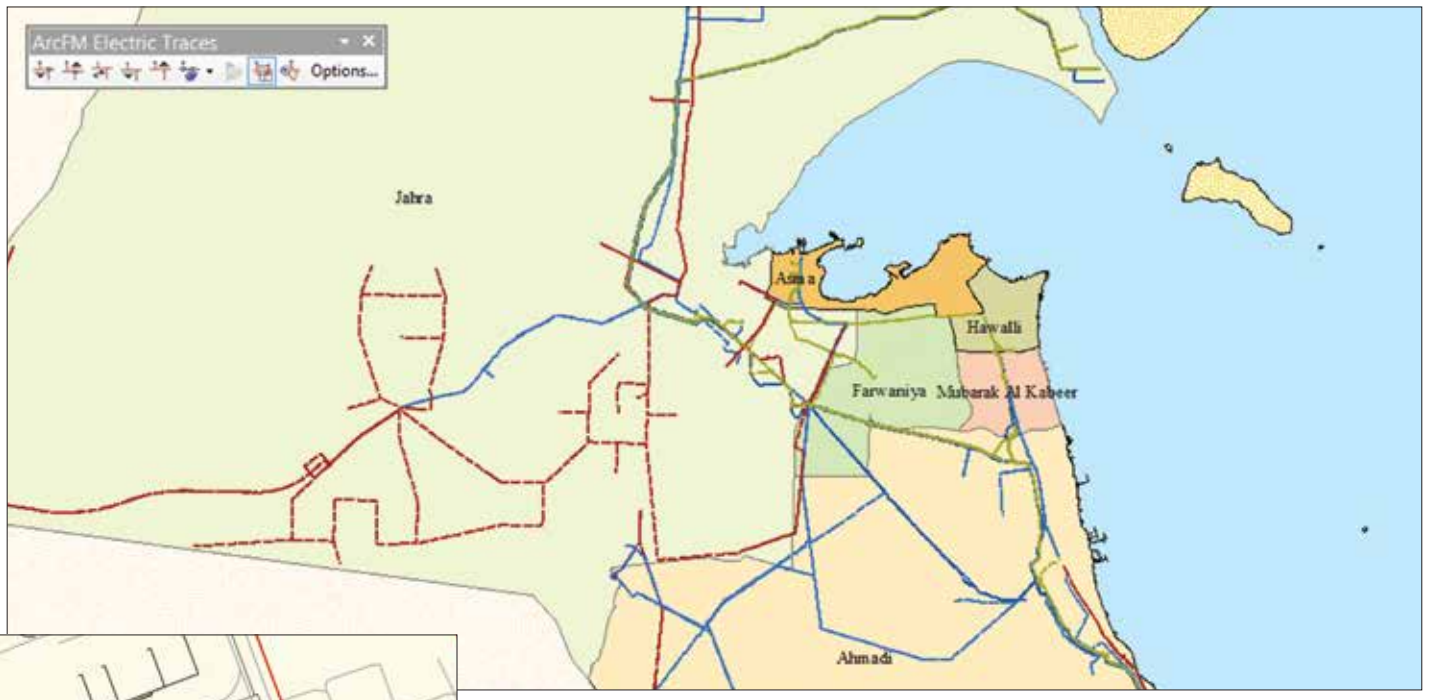
Kuwait's Ministry of Electric and Water Streamlines Utility Services

Conversion of Paper Maps into a GIS Was Central to the Solution

Highlights

- ArcGIS and ArcFM Viewer products were developed as the main platform for viewing and analyzing GIS data.
- Tracing functionality tools is essential to utility engineers' daily analysis.
- GIS-based tools support MEW's core businesses while also providing a secure GIS data repository.

The Ministry of Electricity and Water (MEW), headquartered in Kuwait City Safat, Al Assimah, Kuwait, is responsible for providing electricity and water utility services to more than three million consumers. As the demand grows annually, MEW faces many challenges in aligning its strategic and business decisions to meet increasing demands.



One of the maps for the electric transmission network sector showing the overhead line and the primaries substation on Kuwait state.

Above: Electric transmission network tracing in Kuwait.

Below: Kuwait city at night showing electricity and streetlights distributed around the city.
(Photo: Mohammed Hachem Aouad.)

The Way Things Were

To retrieve maps, drawings, and other data when needed, for years it was all maintained at the Directorate of Engineer Drawings for both archiving and updating whenever there were changes of the water and electricity networks.

The archive included pressure measurements, street lighting data, original photos, microfilm, and the as-built drawings provided by contractors after the completion of projects. In addition, the Directorate of Electric Network Design archived 16,000 paper maps in different shapes and sizes and some in bad condition, including 200 CAD maps.

By 2012, frustrated by this difficult-to-maintain-and-access, manual system of storing maps, engineer Abdulla Al Osaimi, head of the Section IT Department and GIS manager of MEW, was determined to make improvements. Following an exhaustive search, he approached Esri's Kuwait distributor OpenWare Information Systems Consulting Company (Hawalli, Kuwait), as well as Esri Platinum Tier Partner Khatib & Alami Lebanon (Beirut, Lebanon), and together, this team created the GIS Project, which focuses on carry-out services and provides an integrated GIS utility business solution based on Esri's ArcGIS software and ArcFM software from Schneider Electric (formerly Telvent Miner & Miner) of Fort Collins, Colorado. The solution included application software packages to provide an efficient and cost-effective business system to support MEW's core businesses in planning, operation, and management, while also providing a secure GIS repository for conserving electricity and water data resources.

Milestones

The first task was scanning all paper maps and CAD drawings and then converting them into a GIS format. Since not all the records of Kuwait's electric network were available, in August 2012 survey teams collected the missing data, using GPS devices to validate the data. This data was then added to MEW's enterprise GIS database.

The implementation team developed ArcGIS and ArcFM Viewer products as the main platform for viewing and analyzing GIS data. ArcFM tracing functionality tools are essential to utility engineers' daily analysis, and this tool includes options to trace source destination, trace from service point to transformer, and trace power transformer circuits.

The project implementation team also developed the electric facility siting application to assist the decision-making process and minimize the time required to execute frequent requests of supplying electricity, for example, to a new building connection or a new meter connection; to increase customer subscription rates; and to perform other customer-related transactions involving the distribution network. The application performs spatial and electrical analysis in terms of power supply, voltage drop, and alternative energy sources based on land base layers, customer information, network layout, and MEW standards and criteria.

For more information, contact Abdulla Al Osaimi, engineer, GIS project manager, head of the Section IT Department, Control Centers Sector, Ministry of Electricity and Water, Kuwait (e-mail: abalosaimi@mew.gov.kw); Mohammad Aouad, senior GIS specialist, OpenWare Information Systems Consulting Company (e-mail: m.aouad@openware.com.kw); Wael AbuGharbieh, GIS project manager, OpenWare Information Systems Consulting Company (e-mail: W.AbuGharbieh@openware.com.kw); and Anas Homaidani, business development manager, OpenWare Information Systems Consulting Company (e-mail: a.Homaidani@openware.com.kw).

Advocating Rights to Women in Rural Kenya

GIS and Support from UN Women and the EU Fosters Better Service to Women Living with HIV

NGO Non-Governmental Organization

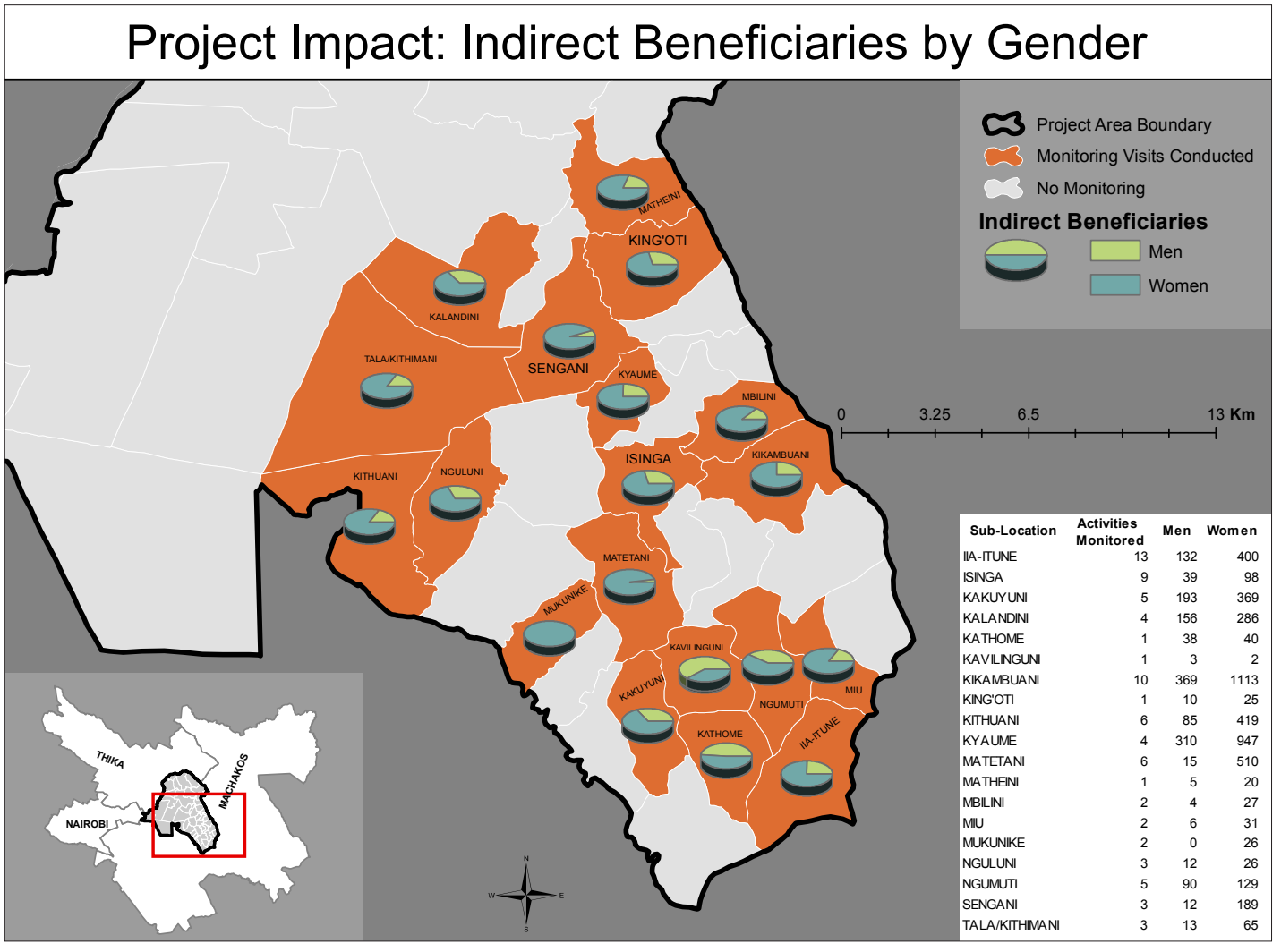
Highlights

- ArcGIS helps community-based organization support Kenyan women.
- GIS visualization and analysis support more targeted health services.
- Better reporting through maps gives sponsors information on how grant money was used.

WISUVIE—which means *take care of yourself* in Kamba, one of the languages spoken in Kenya—is a community-based organization (CBO) located in rural Kenya that works with women living with or affected by HIV, orphans and other vulnerable children, and youth in Machakos County, Eastern South Province. According to the 2012 Kenya AIDS Indicator Survey Report, the HIV prevalence rate in the Eastern South Province is 3.9 percent, while the county's prevalence rate stands at 5.1 percent.

WISUVIE was formed by a group of local women who wanted to support and help one another deal with issues posed by the disease, share personal experiences, and create preventive awareness among the general public. The organization is run and managed by volunteers who have diverse backgrounds: counselors, home-based caregivers, paralegals, nutritionists, community development workers, peer educators, and information systems specialists.

Above: Using a handheld GPS, volunteers collected coordinates marking the location for each survey form that was filled out.



Sub-Location	Activities Monitored	Men	Women
IIA-ITUNE	13	132	400
ISINGA	9	39	98
KAKUYUNI	5	193	369
KALANDINI	4	156	286
KATHOME	1	38	40
KAVILINGUNI	1	3	2
KIKAMBUANI	10	369	1113
KING'OTI	1	10	25
KITHUANI	6	85	419
KYAUME	4	310	947
MATETANI	6	15	510
MATHEINI	1	5	20
MBILINI	2	4	27
MIU	2	6	31
MUKUNIKE	2	0	26
NGULUNI	3	12	26
NGUMUTI	5	90	129
SENGANI	3	12	189
TALA/KITHIMANI	3	13	65

Right: By showing information such as what types of surveys were held and where, grant money spending and impact were visualized.

WISUVIE was the recipient of a grant from the European Union through the United Nations Entity for Gender Equality and the Empowerment of Women (UN Women), Kenya Country Program, as part of the beneficiary organizations of the global program "Supporting Gender Equality in the Context of HIV and AIDS." As part of the grant, staff members integrated GIS and GPS to monitor and evaluate the program.

Intense Training for the Best Results

The objectives of the program that CBO implemented were to build the capacity of women living with HIV with skills to demand accountability for HIV prevention, care, support, and treatment services. CBO did this through training community mobilizers, as well as conducting a number of training of trainers sessions sessions to transfer the necessary knowledge and skills on HIV prevention and educate the new trainers on human rights, including how to advocate and lobby for those rights. *[See "Building GIS Capacity Across the Globe: Train the Trainer" in this issue.]* To manage the project and understand the impact, WISUVIE needed to find a technology that would assist with data analysis, visualization, and reporting.

"The women who were going to be trained would be tasked with training other community members so they could in turn reach more members of the community in diverse locations," says GIS consultant Ruth Nakitare. "It only made sense to use GPS and GIS."

ArcGIS was chosen because it is used throughout the United Nations and by other agencies. WISUVIE licensed ArcGIS through Esri's nonprofit program. The project ran for five months, from September 2012 to January 2013. Organization staff members integrated GPS and ArcGIS in monitoring and evaluation (M&E) activities to map venues in 19 administrative units where 33 direct beneficiaries had carried out community education/sensitization activities.

By mapping this information, WISUVIE identified the best venues for reaching people and determined that 6,000 men and women were reached, of which 76 percent were women. Forty women and one man completed the ToT training and became part of the organization's Women's Rights Watch. Monitoring and evaluation of the program were carried out on 33 of the 41 trainees in the Women's Rights Watch group.

Field Data Collection with GPS

Prior to the start of M&E activities, the training beneficiaries were invited to a follow-up meeting led by WISUVIE CBO staff members who introduced them to the concepts of GIS. The members discussed the concept and value of understanding why the data was being collected. Then, the staff members asked to visit available beneficiaries; see where they had conducted training; collect GPS data; and, wherever possible, meet the community.

During the M&E visits in the selected administrative areas, the M&E and GIS officers were accompanied by the project manager, a well-known and trusted community member. Since almost everyone has a mobile phone in Kenya, the team was able to call ahead and ensure that the direct beneficiary to be visited and other available community members would meet them at the churches, schools, homes, hospitals, and clinics where community education had been carried out.

Using a handheld GPS, coordinates were collected for each paper form that the trainers had filled out during their training sessions in the community. Back at the WISUVIE CBO office, staff members used ArcGIS for Desktop to create a geodatabase of the GPS points from the field. The points were overlaid with additional data from the World Food Programme and the International Livestock Research Institute, two other organizations that also use the ArcGIS platform. Esri's World Street Map was used as the basemap.

Uncovering Facts with GIS

The teams not only plotted collection points from the field surveys, they also added more attributes from the form so they could map them, as well. This allowed them to display the various attributes that were collected, as well as the many different venues they were collected from—including churches, barazas (public meetings), health facilities, and youth and women's groups.

Says Nakitare, "We thought we would show that we trained *x* number of clients from health facility *y* and they reached *z* number of people around their home villages. What we discovered instead—when we mapped the training participant home village data—was that some of these people went to facilities that were not in their service area. This was a real breakthrough for us in delivering effective services to this community."

WISUVIE CBO staff realized that although information about HIV and AIDS has been disseminated for decades and people seek treatment and, ways to protect themselves, some still feel stigmatized and don't want others to know they are ill. Instead of seeking out treatment at the closest facility, these people travel to a distant facility.

"We found out that the traditional method of tying health care facilities to people in the area was skewed," says Nakitare. "We would have never discovered this without mapping the data."

Transparency and Accountability

Maps have also been an important tool for transparency and accountability. "Using GIS, we are able to show UN Women exactly how we spent the money, what we did with that money, and what the impact was," says Nakitare. "It is much more effective than handing over a lengthy report of the same information."

The effect of data sharing has had a great impact on the community. WISUVIE CBO staff has seen a huge domino effect through training—almost everyone is aware of HIV and AIDS. The most powerful impact has been the training to women so they understand that they have the right to stand up for themselves and their health. Two women who went through training were given medication that had been discontinued. The doctor was unaware and was still dispensing this medicine. The women insisted they didn't want the drugs and demanded new medication.

"We've never seen anything like this before," says Nakitare. "The women have become more assertive in advocating for their, as well as other community members', rights."

For more information, contact Ruth Nakitare, GIS consultant (e-mail: rnakitare@maisongeoweb.com), and WISUVIE (e-mail: wisuvieshg@yahoo.co.uk).

Keeping Track and Managing 1,400 Miles of Trails in Five States

Northeastern United States Embraces Cloud Nine for Outdoor Recreationists

By Andrew J. G. Schwartz, RLA, AICP, and Jennifer Cristobal

Highlights

- Using ArcGIS Online as a virtual workspace created a collaborative environment.
- GIS revolutionized the way the coalition finds information, communicates with each other, and engages participants.
- ArcGIS Online included tools to create, annotate, print, and share ideas with all stakeholders.

According to the Outdoor Foundation, Americans went on 12.4 billion outdoor excursions in 2012, taking advantage of the diversity and accessibility of the nation's outdoor opportunities and spending an estimated $6 billion. Nearly half of all Americans participate in some form of outdoor recreation. Most do so because getting outside is a great way to exercise.

Biking, running, fishing, and camping are the most popular outdoor activities among all Americans. A significant portion of these activities occur on trails. Trails are both a destination for people who are hiking, biking, jogging, cross-country skiing, or snowshoeing and a means of access for fishing holes, campgrounds, bird watching, and other recreation activities.

The northeastern portion of the United States has a significant network of trails that have been developed over the past 30 years, often along abandoned railroad corridors. An extensive network of trails traverses the region's valleys, mountain ridges, streams, and river corridors. The trails pass by small towns and connect in cities, only to dive back into the wilderness on paths in regional parks. Different trails accommodate varying combinations of activities such as hiking, jogging, biking, and horseback riding, as well as riding all-terrain vehicles and snowmobiles.

But the value or utility of trails goes well beyond a recreational aspect. They are a means of connecting people with employment opportunities and other destinations. They bring money into towns along the trails in the form of spending on food, gear, overnight accommodations, and supplies. The Great Allegheny Passage Trail is a 150-mile trail, that has been completed in Pennsylvania and Maryland thanks to years of hard work and tenacity. It connects to a second trail, providing a continuous link between Pittsburgh and Washington, DC. Studies have demonstrated that Great Allegheny Passage Trail users generate more than $40 million in direct annual spending in towns along the trail, with overnight visitors spending an average of $114 a day.

Trail Coalition

Generally, developing trails has been the work of local advocates who focus on building trails in their own neighborhoods. In 2011, the Progress Fund and Pennsylvania Environmental Council formed a regional coalition encompassing 32 counties called Power of 32. As the effort moved forward, project partners grew from the original 32 counties to a total of 52 counties (as of early 2014) in the states of Maryland, Pennsylvania, New York, Ohio, and West Virginia. The coalition is expected to grow through 2014. There are more than 1,400 miles of trails suitable for a wide variety of outdoor activities within the coalition's land area, although many are isolated segments that do not connect to other trails.

The coalition envisions the formation of a network of multiuse trails that will connect rural and urban communities in the five-state area to improve recreational options for locals while also positioning the region as an international trail destination. This will be accomplished by completing the most challenging but economically beneficial trail connections.

A landscape architecture and community planning firm, Environmental Planning & Design, teamed up with the Progress Fund, Pennsylvania Environmental Council, and other trail organizations and state and federal agencies to realize the vision by defining the trail corridors and mapping missing trail sections that need to be completed. Trail builders need tools to plan and prioritize—making key connections and leveraging past and future investment dollars.

Explore and Share with Online Mapping Technology

With the majority of the primary trails in the region already constructed, the key to identifying gaps in the trail system and enhancing the region as a multiuse destination had to focus on data and communication. The project mantra became "explore and share." It quickly became clear that the project would benefit from a rich platform where data could be shared, manipulated, and studied at each partner's desktop—rather than in a quarterly meeting. Paper maps were soon morphed into a cloud-based database of trail information.

The approach to creating a collaborative environment was to use ArcGIS Online as a virtual workspace. Esri software was the most common platform among the dozens of local government agencies, organizations, and groups participating as part of the coalition, so it was natural to continue on the ArcGIS platform. Furthermore, the wide array of ArcGIS Online features—including base data, aerial imagery, and topographic data—allowed the coalition's focus to turn to collecting and assembling the most current trail data available into an easily shareable web map. The base data provided by Esri was especially important because, while information like roads was important for context, the only data that needed to be manipulated was trail data. Being able to utilize Esri's base data as a background enabled the trails database to stay as slim as possible and prevent problems associated with large, cumbersome databases. This was especially useful because of the number of different coalition members who were contributing datasets. Nearly as much time was spent preparing and grooming the data for consistency as was spent analyzing it.

Above: The database was expanded beyond trails to include key features, such as scenic overlooks, and photographs. Left: The gototrails.com website provides analysis of the trail gaps provided in maps showing where trails are physically disconnected.

Powerful Tools

This database immediately revealed itself as a powerful tool to raise the profile and the use of trails in the region and to assist with advocacy, fund-raising, and collaboration focusing on how to complete and connect the system. GIS technology has revolutionized the way this coalition can find information, communicate with each other, and engage participants.

When the project began, the intended audience was a specific group of trail advocates, government officials, staff, and dedicated volunteers who needed data for prioritized decision making. Using Esri's developer tools, the initial web map was further refined into a web application, Make a Map Toolbox, to create an even more easily accessible and user-friendly planning environment. This web application included the tools necessary to create, annotate, print, and share ideas among the trail advocates and the general public.

The Make a Map Toolbox acts as a planning whiteboard—increasing understanding and collaboration, creating a consistent plane of data for the coalition members to utilize, shortening review time, solving the problem of distance across five states, and accelerating decision making. It has leveled the playing field in terms of data knowledge and acted as a guide for substantial discussions that truly address the breadth and depth of the issues facing trail connectivity in the region. Technology is allowing people to communicate in real time and reach a level of understanding never before possible when physically separated by distance.

The Three Rivers Heritage Trail provides urban recreation opportunities along the waterfront in Pittsburgh. (Photo: Jason Cohn.)

The Website

The **gototrails.com** website has been developed to be modular and, as the project moves forward, allow the data in the cloud to reach a wider audience. Trail advocates will be able to utilize data to plan maintenance, make trail connections, and track problems. A mobile trail app will expand this utility and allow the general public—from daily bike commuters to long-distance hikers and local trail enthusiasts—to access trail information in real time—mapping routes, locating amenities, and reporting problems back to trail managers.

The power of technology is harnessed to foster and enhance trail communication. It is creating better connections to large and small places through trails—between major US and Canadian cities and rural villages.

About the Authors

Andrew Schwartz is the managing principal at Environmental Planning & Design in Pittsburgh, Pennsylvania, a 75-year-old landscape architecture and planning firm focusing on attainable and implementable solutions. Jennifer Cristobal is a planner and designer at Environmental Planning & Design.

For more information, contact Amy Camp, Pennsylvania Environmental Council (e-mail: acamp@pecpa.org), or Carolyn Yagle, Environmental Planning & Design (e-mail: epd@epd-pgh.com). This project won a Presidential Award for Excellence in the Communications Category of the Professional Awards Program of the Pennsylvania–Delaware Chapter of the American Society of Landscape Architects.

Reduced Risk Building Wind and Solar Energy Plants

Irish Company Manages Projects Worldwide Using GIS

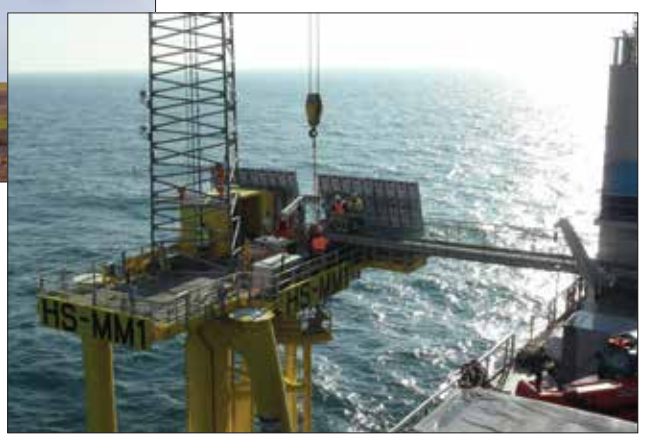
Highlights

- ArcGIS for Server integrated seamlessly with Mainstream's existing Microsoft technology, including SharePoint.
- The use of GIS has reduced risk by helping Mainstream manage its global projects more closely.
- Just 12 months after going live, ArcGIS was being used to manage 67 different projects spanning eight countries.

Mainstream Renewable Power develops large-scale wind and solar farms on behalf of, or in partnership with, large corporations, major utilities, and institutional investors. Headquartered in Dublin, Ireland, the organization operates from 11 offices in eight countries across Europe, North America, and Africa.

Designing, locating, and building wind and solar energy plants is a highly complex business fraught with risk. Hundreds of factors have to be considered in determining the best locations for new facilities, and planning applications can take years to reach a successful outcome. Construction processes are highly complicated, involving many different specialist organizations. Mainstream wanted to find a better way to manage this complexity and minimize project risk.

At the same time, Mainstream wanted to improve the efficiency of its business so that it could more quickly deliver projects for its clients. It had more than 150 employees who regularly worked with 450 partners and suppliers. To improve collaboration between these disparate teams, Mainstream needed a way to better manage all its data assets and make project information readily accessible to people working on three different continents.



Above: An Irish wind farm. **Right:** Offshore met mast, Hornsea Zone, England.

Managing Vast Datasets

Mainstream's data assets are vast. Every project it undertakes relies heavily on pools of information about everything from geology and meteorological patterns to plant species and bird migrations. In Europe, the organization primarily works in the field of offshore wind farms, and datasets associated with marine environments are particularly complex, because the seabed is a dynamic surface that is constantly evolving, governed by tides and currents. Mainstream needed to be able to better visualize large amounts of data—and then map, monitor, and predict environment changes over time.

Following a detailed investigation of its options, Mainstream made the decision to deploy ArcGIS for Server technology across its entire business. The solution was implemented with support from Esri Ireland and rolled out to its offices across Europe, North America, and Africa.

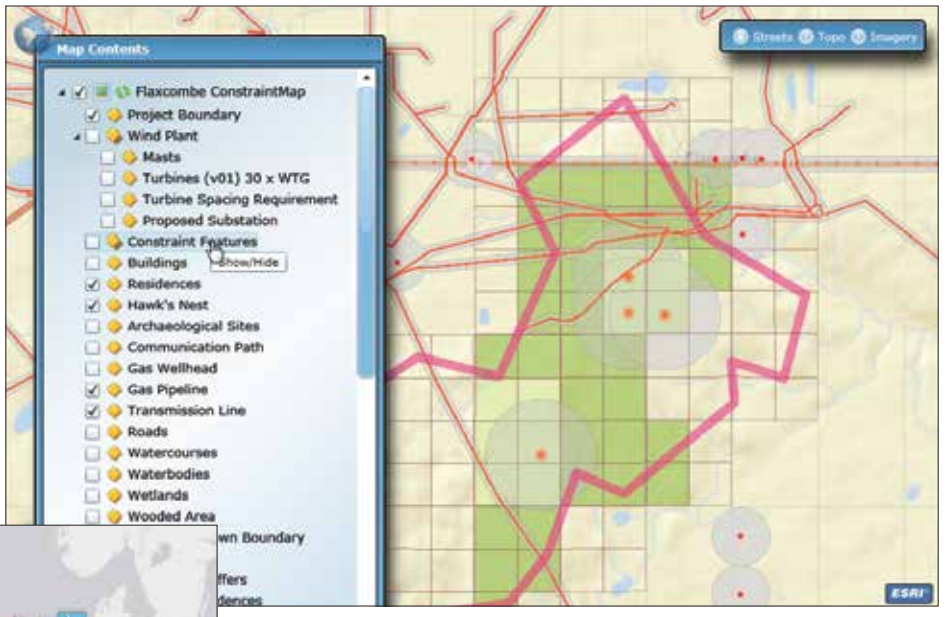
Above: SharePoint Web Parts allow Mainstream to track its assets' locations. **Right:** Many business-relevant data layers are available for all staff to browse in ArcGIS, ArcGIS Online, and other client applications. This one illustrates the average wind speed in Ireland (using public data).

ArcGIS for Server integrated seamlessly with Mainstream's existing Microsoft technology—the SharePoint platform in particular—to create a consistent enterprise solution. GIS gives the business the ability to not only manage its data centrally but also visualize it, analyze it, and make it readily accessible to employees and partners in a variety of formats. The company sees value from GIS across five core areas: visualizing projects, analyzing data, managing projects, mapping projects, and publishing maps.

Just 12 months after going live, Mainstream was using ArcGIS to manage 67 different projects in eight countries. Each project draws from up to 50 layers of pertinent, spatially referenced data.

The use of GIS has reduced risk for Mainstream by helping it manage its global projects more closely and improve collaboration between global teams. Employees in Dublin can be working with contractors in Chile, and everyone sees the same information at the same time. As a result, there is less likelihood of misunderstandings and other project management issues that might otherwise increase the risk of added costs and project delays.

Because it pulls together vast datasets and displays information in a format that is much easier to interpret, GIS also reduces the risk of a new energy plant being planned for an inappropriate location. The solution also enables Mainstream to undertake sophisticated predictive modeling to see how factors such as climate change and sea currents might affect the chosen development site in the future.



SharePoint Web Parts (v.1.1) consuming ArcGIS for Server map services allows project managers to visualize their projects using a dynamic map viewer.

Mapping the Seafloor

For example, Mainstream is currently working with Esri Ireland and other partners to create a 3D, time-sequenced map of the seabed to show how the seabed has changed over time. Once complete, Mainstream will use this unique tool to run scenarios and create models to show how the seabed will most likely change in the future. This information will be incredibly valuable in helping the company assess the best locations for new offshore wind farms.

"GIS is the anchor technology for this entire project," says Joanne McLaughlin, Esri Ireland. "It will enable Mainstream to monitor the movement of silt bars and better identify risks and reduce them."

As well as reducing risk, Mainstream is also realizing significant improvements in business efficiency, which are enabling it to accelerate its complex projects. "Processes are far more efficient now," McLaughlin says. "I estimate that Mainstream has made a 40 percent savings in time and will get payback on Mainstream's investment in GIS in less than two years. GIS is now at the heart of Mainstream's business strategy."

For more information, contact Joanne McLaughlin, Esri Ireland (e-mail: jmclaughlin@esri-ireland.ie).

GIS Helps Integrate Coastal Hazard Risk and Sea Level Rise

By Zach Ferdaña, The Nature Conservancy, and George Raber, University of Southern Mississippi

NGO Non-Governmental Organization

Highlights

- The support tool has a modular, plug-in architecture that is developed behind ArcGIS API for JavaScript.
- ArcGIS and the Spatial Analyst extension helped determine variables attributed to the complex environments of coasts.
- ArcGIS for Server provided the full package of solutions for maximum performance, usability, and design.

Local governments and decision makers often have only limited access to the critical information necessary to support choices for managing social and economic vulnerability and, specifically, to understanding the role natural habitat can play in reducing risk. As a consequence, they are unable to comprehensively integrate coastal hazard risk and sea level rise into their decision making in order to increase the resilience of human and natural communities.

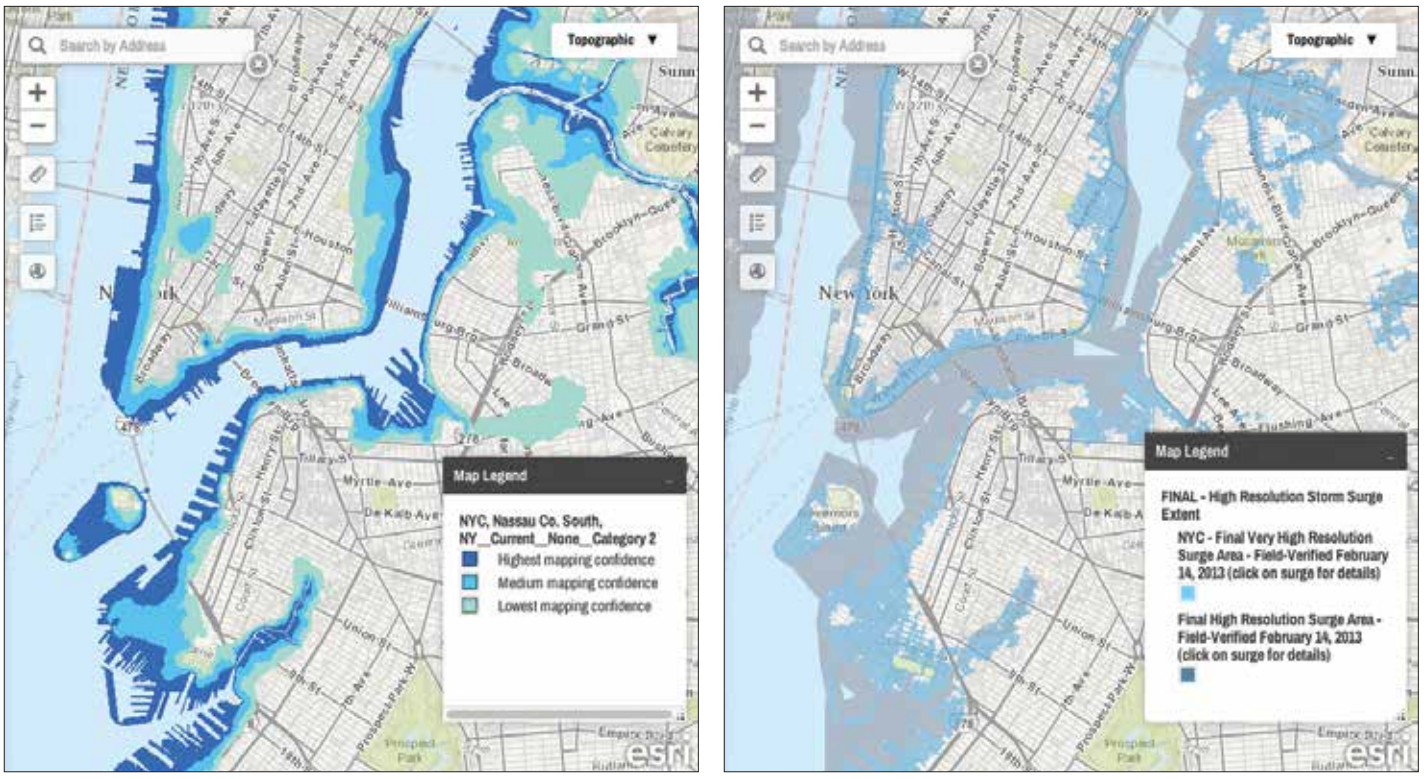
Until recently, the idea of mapping sea level rise based on emission scenarios from the Intergovernmental Panel on Climate Change was novel in the United States, and proposing to combine these with storm surge models was more novel still.

Enter Coastal Resilience, an approach to assess risk and vulnerability while identifying restoration and adaptation choices, the backbone of which is an online mapping decision support tool.

The approach and tool began in 2008 on the southern shores of Suffolk County, Long Island, in New York. The hypothesis at the time was that despite awareness of growing coastal hazards, local governments and decision makers do not have the capacity to map and plan for future climate projections, let alone identify coastal management scenarios to address these threats.

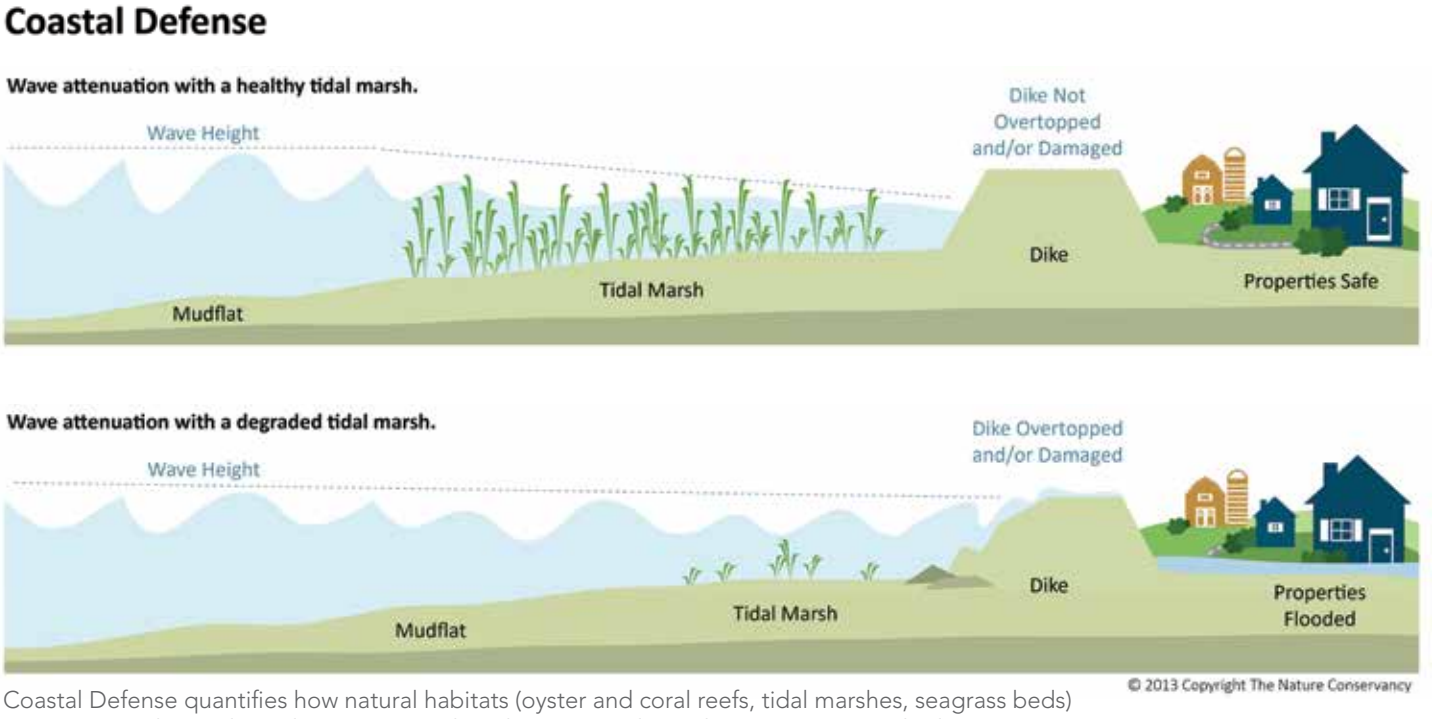
Strengthened by Esri campus-wide site licenses and Esri Conservation Program grants where appropriate, the Coastal Resilience decision support tool has evolved over this time under the aegis of The Nature Conservancy (TNC); the University of Southern Mississippi; Esri Silver Tier Partner Azavea of Philadelphia, Pennsylvania; Ebert GeoSpatial; and the University of California at Santa Cruz. Between these organizations and universities, in addition to the Association of State Floodplain Managers, the National Oceanic and Atmospheric Administration's Digital Coast partnership, the Natural Capital Project, and US Geological Survey (USGS), the Coastal Resilience decision support tool is well positioned to support a vast array of local and regional governments and institutions that are either responding to disasters or preparing and planning for current and future climate conditions.

The tool platform of Esri's ArcGIS API for JavaScript and ArcGIS Online basemaps supports applications designed to put social, economic, and coastal habitat data together alongside sea level rise and storm surge scenarios. Underpinned by ArcGIS for Server, ArcSDE technology, and a production file geodatabase, Esri provides the full package of solutions for maximum performance, usability, and design, three important objectives in establishing Coastal Resilience decision support. In performance, the team wanted both speed and responsiveness over the Internet but also the ability for a global team of data managers to access and readily update the database. Through community engagement, the developers evaluated stakeholders' ability to navigate through the interface, thereby increasing its usability for visualizing the information and readily emphasizing the role nature can play in reducing coastal hazard risk. The system has a modular plug-in architecture that is developed behind ArcGIS API for JavaScript. This allows developers to design a specific application to highlight a coastal management issue, respond to



Web map of New York and Connecticut (**maps.coastalresilience.org/nyct**), focused on the southern tip of Manhattan. This compares a modeled storm surge scenario on the left (category 2 storm with darker blue representing highest mapping confidence of inundation) with the Federal Emergency Management Agency's (FEMA) final surge area from Hurricane Sandy on the right.

Alabama oyster reef installed with booms.



Coastal Defense quantifies how natural habitats (oyster and coral reefs, tidal marshes, seagrass beds) protect coastal areas by reducing wave-induced erosion and inundation. It uses standard engineering techniques to help users estimate how and where to restore or conserve critical habitat and increase the resilience of a coastal community and its infrastructure. This and other infographics accompany the Coastal Resilience apps to illustrate their intended use.

a disaster for post-storm decision making, or emphasize nature-based alternatives.

Restoration Explorer

Just after the Deepwater Horizon oil spill in the Gulf of Mexico in April 2010, the Coastal Resilience team developed the Restoration Explorer, an application that allows stakeholders to examine ecological and socioeconomic factors for oyster reef restoration suitability. In this app, a suitability index was assembled using ArcGIS Spatial Analyst, a single raster surface of factors in every Gulf Coast state used for restoration scenario planning. The individual factors of the index can be interactively weighted for importance within the web app when identifying potential restoration sites. The oyster restoration decision support app was developed in the initial weeks after the spill to help with postdisaster planning and recovery. The application continues to be a central tool to support Restore Act legislation across the Gulf and specifically in coastal Alabama with a project called 100-1,000. This project is identifying the restoration of 100 miles of oyster reef that will protect and promote the growth of 1,000 acres of tidal wetlands in Mobile Bay. Restoration at this scale requires tools that look at the entire social-ecological system of the bay, evaluating the most suitable places that meet multiple management objectives.

Habitat Explorer

The success and deployment of the Restoration Explorer led to its replication, an essential component of the Esri technology solution stack, in another Coastal Resilience project site. The Habitat Explorer was created by replicating and modifying the Restoration Explorer in the days after Hurricane Sandy struck New York, New Jersey, and Connecticut in October 2012. In part to help New York governor Andrew Cuomo's 2100 Commission on long-term resilience of infrastructure, there was a need to know where tidal marshes may have the highest likelihood to protect coastal communities to inform where these marshes should be enhanced or conserved as part of the recovery process.

The Habitat Explorer interactively identifies tidal marshes that potentially protect people, property, and infrastructure by weighting multiple variables, such as marsh size, infrastructure, critical facilities, and demographic information. Using ArcGIS Spatial Analyst and a series of coastal watershed delineation and adjacency functions in ArcToolbox, these variables were attributed to marsh complexes throughout coastal New York and Connecticut. This has led to numerous engagements where TNC and local governments are examining tidal marshes' ability both to reduce the vulnerability of coastal communities as well as to protect their long-term economic, social, and cultural health.

Coastal Defense

At the core of Coastal Resilience is the ability to demonstrate the value of ecosystem services and the role nature plays in disaster risk reduction and adaptation. Through a collaboration between TNC, USGS, and the Natural Capital Project, the team has been able to take a complex coastal engineering model and make it accessible and simple to use as part of a web application using ArcGIS API for JavaScript.

Based on Natural Capital Project's marine Integrated Valuation of Environmental Services and Tradeoffs (InVEST) toolkit, the coastal protection model calculates an ecosystem's ability to reduce wave height and energy, thereby lowering the risk of inundation and coastal erosion. The app is called Coastal Defense, a tool for examining how natural coastal habitats, such as oyster reefs, tidal marshes, and seagrass beds, help protect coastal areas by attenuating waves. The tool uses standard engineering techniques to help users estimate how and where to restore or conserve critical habitat to reduce wave impacts and increase the resilience of the coastal community.

Deployed on tidal marshes in Puget Sound, Washington, and on oyster reefs in the Gulf of Mexico, the geoprocessing app utilizes Python when users select site-specific transects that then return the amount of attenuation provided by these habitats as waves run through them. The app supports coastal watershed planning processes in Puget Sound diking districts where "gray" (dikes) and "green" (marshes) infrastructure choices are being discussed with the goal of reducing the risk of flooding while retaining maximum ecological health. It is also being deployed in select Gulf of Mexico bays (i.e., Charlotte Harbor, Florida, and Mobile Bay, Alabama) in making the case for oyster reef restoration as a viable choice in reducing coastal erosion while increasing fishery benefits.

Coastal Resilience Launched

In October 2013, Coastal Resilience 2.0 was launched. The Coastal Resilience tool is now available in 10 coastal states (Florida, Alabama, Mississippi, Louisiana, Texas, New York, Connecticut, New Jersey, California, Washington), Latin America (Mexico, Belize, Guatemala, Honduras), and in the Caribbean (Grenada, St. Vincent and the Grenadines, US Virgin Islands). There are also global and US national web maps that together form the Coastal Resilience network (**maps.coastalresilience.org**). These and other stories can be found at **coastalresilience.org**.

For more information, contact coastalresilience@tnc.org.

The True Cost of Growth

Southern California's Mediterranean climate and varied landscape of beaches, deserts, and mountains have made it one of the most desirable places in the world to live. Topping out at more than 25 million people in 2010, the region is the second most populous in the United States, and the population explosion and housing boom have pushed many developers to build in high-hazard areas atop alluvial fans.

Alluvial fans are gently sloping, fan-shaped landforms that are created by the natural deposition of eroded materials from an upland source. Up to 40 percent of Southern California's 10 counties are covered by alluvial fans, which can be subject to dramatic changes caused by natural disasters. From 1950 to 2007, all 10 of these counties have been declared flood disaster areas at least three times, adding millions to the multibillion-dollar costs of disaster recovery in California. That number will only rise as the number of people and structures located in areas of risk continues to increase.

Flood management has been successful in protecting life and property but has resulted in the loss of riparian and wetland habitats, worsening water quality, and decreased groundwater recharge. Increasingly, alluvial fans are being recognized for the multiple benefits they provide, including groundwater recharge, critical habitat, ecological connectivity, open space, aesthetic beauty, and recreation.

The Creation of the Alluvial Fan Task Force

Current 2030 population growth projections for California indicate that an overwhelming majority of housing development will occur on alluvial fans, posing significant risks to people, property, and the environment. Most long-range financial consequences will fall on local governments, which are often hit with the double impact of disaster recovery costs coupled with declines in tax revenue that follow major disasters. To address these multiple issues, the California State Assembly established the Alluvial Fan Task Force to review alluvial fan flood history, develop a model ordinance (MO) that would reduce long-term flood damage, and create land-use guidelines for *resilient* community development on alluvial fans. The task force determined that a more balanced and integrated approach to flood management and land-use planning is needed—one that conserves the beneficial values provided by alluvial fans while minimizing risk.

Current 2030 population growth projections for California indicate that an overwhelming majority of housing development will occur on alluvial fans.

The interactive GIS map allows users to sketch various design elements directly on the map and then receive instant feedback on the potential impact of those designs on the left-hand dashboard, displayed here as risk or benefits.
(Courtesy of Boykin Witherspoon.)

After considerable review of decision support methods, the task force recommended a GIS-based decision support tool as the best means of implementing a new MO and a more holistic and multidisciplinary approach to sustainable development on alluvial fans. It was determined that the toolset should allow developers and counties to prescreen proposed designs based on a complex set of scientific factors, building codes, and floodway design recommendations early in preliminary and conceptual design stages. In essence, anyone would be able to freely sketch vetted programmatic elements onto a web-based mapping interface to create design alternatives while receiving instant feedback on possible hazards and risk while maximizing the ecological and cultural benefits of alluvial fans. This set of geodesign tools could even be used to create the safety element of a general plan or a local hazard mitigation plan. The tool would eventually be given the name the Alluvial Fan Land Planning Tool.

Geodesign techniques, Esri ArcGIS for Desktop, and ArcGIS for Server have proved to be the perfect fit for the development of prescreening tools to help both developers and local government officials weigh the true costs and benefits of development proposals over the near and long term, building resilient community design right into the planning process.

An Integrated Approach to Resilient Land-Use Planning and Development

The task force started the project with a series of fact-finding meetings in which experts from multiple disciplines met to discuss the complex nature of alluvial fan formation, structure, and function as it relates to the natural world, the built environment, human safety, and disaster and recovery costs. The collaborative effort resulted in the clarification of key issues that would ultimately define the data and criteria that would be encapsulated in a six-step decision support narrative that would help guide the development of the envisioned Alluvial Fan Land Planning Tool:

Step 1—Identify whether the proposed site is on a regulated floodplain with adequate hazard protection.

- Whether a proposed site is located within a Federal Emergency Management Agency Special Flood Hazard Area
- The presence of existing flood control structures

Step 2—Consider relative flood hazard.

- Identify areas underlain by Quaternary sediments that may include alluvial fans
- Map the relative potential for alluvial fan flooding

Step 3—Consider other hazards present on the proposed site.

- Surface fault rupture
- Seismic shaking
- Landslide potential
- Naturally occurring hazardous minerals and hazardous materials
- Wildfire
- Other hazards identified by local agencies

Step 4—Consider beneficial resources present on the proposed site.

- Groundwater recharge areas
- Ecologically valuable areas
- Mineral resources
- Culturally significant zones
- Current and future uses (projected land-use change)

Step 5—Consider capacity to address multiple objectives consistent with FloodSAFE.
- Examine the capability of a site for a proposed use.
- Examine the suitability of a site for a proposed use.

Step 6—Consider problem-solving economic strategies.
- Be smart up front.
- Take a holistic and integrated approach to assessing risks and encouraging avoidance.
- Put financing and insurance programs in place that handle the risks.
- Formulate economic strategies for sustainable development on alluvial fans that acknowledge private property rights and local cost-effectiveness.

These six steps basically show what's happening behind the scenes—essentially, a framework and set of models that describe how the natural world operates and the influence it might have on the built environment, and vice versa.

The Alluvial Fan Land Planning Tool

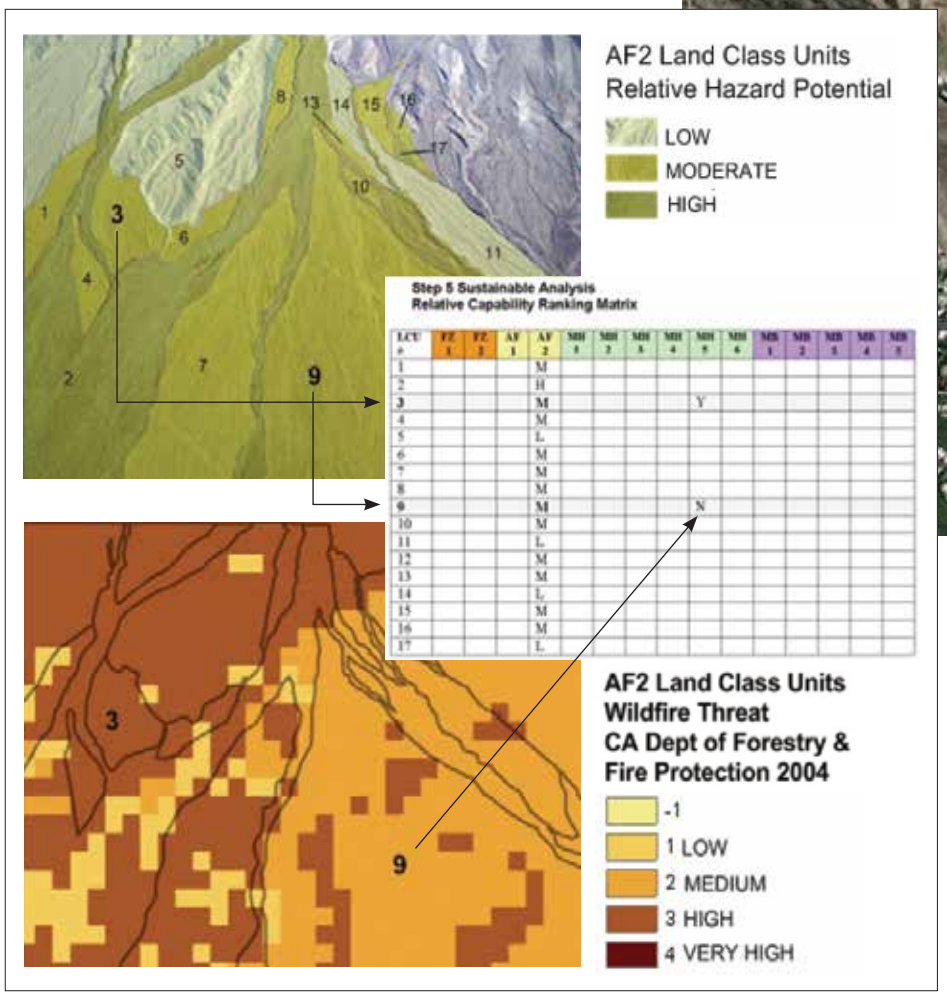
The Alluvial Fan Land Planning Tool is a web map portal that serves various map layers in a navigable, searchable map interface. The application supports a number of Internet browsers, requires no installation of special software, and runs on any mobile or desktop device that supports these browsers.

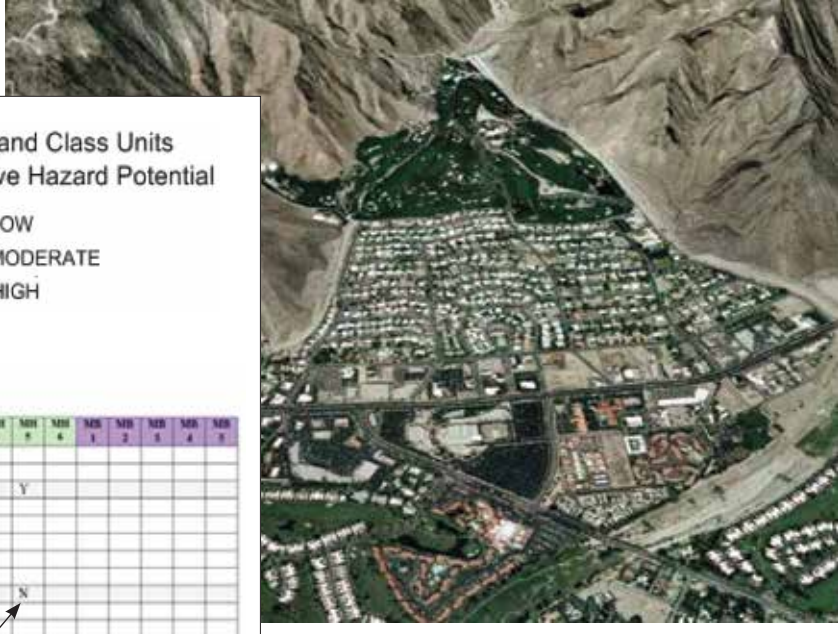
The website is secure and requires the user to log in to activate the compare and save functions. The map canvas currently covers the Southern California region and gives the user several navigation methods to choose from including pan, zoom, typing addresses, or automatically centering on a GPS location, if available.

The mapping tool has an easy-to-use interface and allows users to select a location, review the location's profile, and then compare it to other locations. Once a location has been selected, the user is presented with a location profile or summary report that includes detailed information about the site's multiple hazards and/or multiple benefits. Alternatively, the user can save and compare a number of profiles from different areas using the map comparison view.

Next, users select the program elements or development types they would like to consider for that site. Once the user has specified a development type, a drawing palette is presented specific to that type, which opens a pop-up window that allows the user to adjust and save the user-defined values. The user then selects the design element and begins to draw roads on the map canvas. The same thing can then be done with houses, and so on, until the design is complete.

As the user is drawing on the map canvas, the application periodically analyzes the potential hazards and benefits associated with design elements that have been drawn. The results of the analysis are returned to the application and displayed through dials like those found on the dashboard of a car (*see the figure on page 28*).





Above: Esri's ArcGIS Explorer was used to create a 3D View of the 2005 Development on Magnesia Spring Canyon Alluvial Fan, Rancho Mirage, California. (Source: Alluvial Fan Task Force.)
Left: The map at the top depicts land classification units. The bottom map depicts fire threat. The table in the middle is formed by the union of all maps created in steps 2 through 4 and forms one of the templates that will drive the ranking and subsequent evaluation of resilience criteria weighing risks and benefits between LCUs. (Courtesy of Boykin Witherspoon.)

Lessons Learned

The benefits of the Alluvial Fan Land Planning Tool are many. It assists developers and regulators in consistently applying a suite of local planning tools for development on alluvial fans. The pre-screening of plans helps highlight key issues for discussion and ensure completeness prior to formal submission of an Environmental Impact Report as required under the California Environmental Quality Act. These can both help save time and money through increased efficiency during the planning stage, reduce the number of unforeseen design changes, and decrease the risk of large disaster recovery expenditures in the future.

The web-based geodesign prototype demonstrates that a simple spatial decision support tool could give a large number of users with little or no GIS training the ability to select site-specific program elements or land-use options, perform analyses of alternative scenarios, and balance performance versus cost to meet their particular needs.

For more information on how to put geodesign into practice, contact Mr. Shannon McElvaney, Esri (e-mail: smcelvaney@esri.com) or visit **esri.com/geodesign**. This article has been adapted from chapter 9 of *Geodesign: Case Studies in Regional and Urban Planning* by Shannon McElvaney; ISBN: 9781589483163, Esri Press 2012.

2014 Esri Regional User Conferences

Esri's regional user conferences (UCs) soon will be upon us again.

This year's destinations include four cities—São Paulo, Brazil; Split, Croatia; Kuwait City, Kuwait; and Hong Kong, China—each on a separate continent embracing many countries, cultures, and languages. Everyone planning to attend the 2014 Esri regional UCs, however, will have one language in common—GIS.

The Esri regional UCs are recognized as the biggest GIS technology, exhibition, training, and networking events outside of the Esri International User Conference held in San Diego each year.

Conference goers will return home inspired, energized, and armed with new tools, confidence, and experience.

Here are highlights of what each regional UC will offer:

Esri Latin America User Conference

Attendees can immerse themselves in two days of workshops, seminars, and presentations September 25–26 in São Paulo.

Coming on the heels of the largest single-event sporting competition in the world, the Esri Latin America User Conference (LAUC), hosted by Esri official distributor Imagem Geosistemas e Comércio Ltda., is the biggest GIS event in Latin America, says Imagem spokesperson Izabel Cristina Costa.

Hundreds of GIS users from across Latin America will congregate at the Royal Palm Plaza in Campinas, São Paulo, to learn the latest GIS techniques and trends.

The opening Plenary Session will feature speakers including Eneas Brum, Imagem's CEO; Ismael Chivite, Esri ArcGIS for Server product manager; Leandro Rodriguez, manager, Esri in Latin America; and Deilson Silva, Esri ArcGIS platform technical engineer.

Technical teams from Esri and Imagem will present workshops on topics such as ArcGIS Online, Portal for ArcGIS, the cloud, location analytics, and ArcGIS 10.3 for Desktop. The LAUC will include a Special Achievement in GIS Awards ceremony and many user presentations.

At the first LAUC in Brazil back in 2005, one question was asked, Costa recalls: "'What will we be doing 10 years from now?' It's time to answer that question."

For further information, visit **esri.com/lauc**.

Esri European User Conference

Few cities can match the beauty and history of Split, Croatia, site of the 2014 Esri European User Conference (EUC). Hosted by GDi GISDATA LLC, Esri's official distributor in Croatia, the EUC will bring GIS innovation and discovery together October 13–15 at the seaside Hotel Le Méridien Lav, overlooking the Mediterranean.

Nearly 1,000 expected attendees will learn the latest GIS technology, network with regional colleagues, and get up-to-date on crucial industry issues.

"We're expecting participants from all over Europe and the Mediterranean, as the conference is on the coast," says Boran Loncaric, CEO of GDi GISDATA.

Preconference seminars and expert round tables will precede the opening Plenary Session at which Esri president Jack Dangermond will speak, along with other prominent regional industry figures.

The main focus will be technology platforms in the cloud or on premises and industry trends. There also will be best practices demonstrations and a Special Achievement in GIS Awards ceremony.

At the technical Plenary Session, Esri staff will demonstrate new components of the Esri platform, says Loncaric. Expert round tables will feature moderated sessions with prominent experts, and a GIS Solutions EXPO will display the latest products and services.

Paper sessions highlighting successful user GIS projects will offer a full range of topics, including solutions for regulating, tracking, and managing fisheries; navigation safety; coastal ecosystems; nature preservation versus tourism; and industry-and-port-driven coastal development.

An evening beach party, Mediterranean-style, outside the Hotel Le Méridien Lav will feature festive music, fish, and food to celebrate GDi's 25th anniversary. The official EUC dinner, held at the Croatian National Theater, will include a full cultural program.

For further information, visit **esri.com/euc**.

Esri Middle East and Africa User Conference

GIS users will be traveling to Kuwait by the hundreds this fall for the 2014 Esri Middle East and Africa User Conference (MEAUC), to be held October 20–22.

Attendees from across the Middle East, Africa, and West Asia will converge on the Regency Hotel in Kuwait City to strengthen their GIS skills while networking with Esri product specialists and GIS professionals.

"The event includes sessions by experts in the form of *Diwaniya*, the local name for social gathering," says Eyad Arab, general manager of OpenWare, Esri's official distributor in Kuwait and MEAUC's host.

Arab describes MEAUC 2014 as "the biggest GIS and Esri event in the region this year."

At the opening Plenary Session, Jack Dangermond will share the podium with other industry figures from Esri and the Middle East/Africa region.

The packed agenda features Lightning Talks on single topics, along with paper sessions that include tracks and user group meetings for the region's wide spectrum of industries using GIS.

"Governments from the region will have an opportunity to highlight their entire country's achievements in integrating GIS practice across multiple applications and industries," Arab says. The government pavilion will have interactive exhibits showing visitors how different users can apply GIS to solve the same problems region-wide.

The conference venue is located in the prestigious coastal area strip and includes a wide variety of restaurants and hotels, Arab says. For further information, visit **esri.com/meauc**.

Esri Asia Pacific User Conference

Planning has begun for the 10th Esri Asia Pacific User Conference (APUC), to be held January 27–28, 2015, at the Hong Kong Convention and Exhibition Centre.

Hosted by Esri China (Hong Kong) Limited, the APUC will offer preconference seminars on January 26.

The call for presentations will be open through September 12, 2014.

Visit **esri.com/apuc** for the latest information about the conference or to submit an abstract.

The 2013 Asia Pacific User Conference.

Esri International User Conference in San Diego Will Preview Regional UCs

You can get a preview of the upcoming regional UCs at the Esri UC in July. Just come over to the regional UC booth, where you can meet host distributors who will tell you what to expect at your event and assist you with advance registration, reservations, and other plans. Visit us in Hall D.

2014 Esri Africa User Conference Update

Due to the significance of the May 7 elections in South Africa, the 2014 Esri Africa User Conference, originally scheduled for May 6–8 in Cape Town, has been rescheduled. Please visit esri.com/auc for more information.

November 19, 2014

Discovering the World on GIS Day

2013 GIS Day in the Ukraine.

Mark your calendar for GIS Day 2014—Wednesday, November 19. On that day registered event hosts worldwide will welcome the geospatially savvy and inexperienced alike for a day—or several days—of passion for all things GIS.

This worldwide grassroots celebration provides an international forum for users to demonstrate—and learn about—real-world applications that are improving daily life everywhere. The 2013 GIS Day, one of the biggest ever, boasted more than 1,000 hosts and 105,000 people attending events in 98 countries around the world. And event planners expect this year's festivities to draw even more participants—whether attendees, hosts, or volunteers.

The first formal GIS Day took place in 1999. Esri president and cofounder Jack Dangermond credits Ralph Nader with being the person who inspired the creation of GIS Day. Nader considered GIS Day a good initiative for people to learn about geography and the uses of GIS. He wanted GIS Day to be a grassroots effort and open to everyone to participate. The event traditionally is held the third Wednesday of November each year during Geography Awareness Week, a geographic literacy initiative sponsored by the National Geographic Society.

Planning for 2014 already has begun at many venues, including government agencies, high schools, colleges, public libraries, community centers, and workplaces. As in the past, GIS Day activities will take a variety of forms: hands-on technology training and workshops, demonstrations, exhibitions, corporate or civic open houses, map gallery tours, and expos on careers in GIS. All these options are open to you as you embark on planning your GIS Day.

Perhaps the best place to find tools for developing and publicizing an educational, fun, and state-of-the-art event is the official GIS Day website, **gisday.com**. First, register your event. Then explore the site for free resources you can tailor to the GIS community and demographic you are trying to reach while drumming up maximum anticipation and excitement months ahead of the event. These include logos, flyers, posters, postcards, PowerPoint presentations, desktop backgrounds, and certificates of participation.

Introduced last year, web templates allow event hosts to create a GIS Day page on their website to provide specific information about their local event. The template has the same design as **gisday.com** to keep the same look and feel of GIS Day but leaves you with the ability to customize, including adding your own pictures and event information.

There are also giveaway items, including coloring pencils, magnets, and water bottles. In addition, there are free sets of age-appropriate activities to use during your GIS Day festivities, such as historical maps, geocaching, and e-books.

If you are attending the 2014 Esri International User Conference, stop by the GIS Day interactive booth in Hall D of the San Diego Convention Center. Meet the GIS Day team and discuss your event plans. We are happy to help you with ideas for your GIS Day event, including suggestions for activities and promotion.

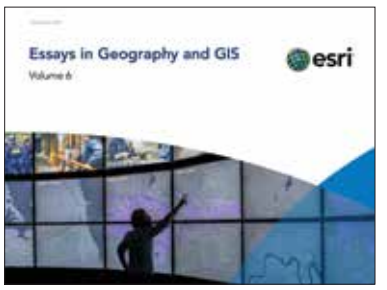
By hosting an event, you'll be giving people in your community a behind-the-scenes look into a powerful technology that has the capacity to revolutionize the world around us.

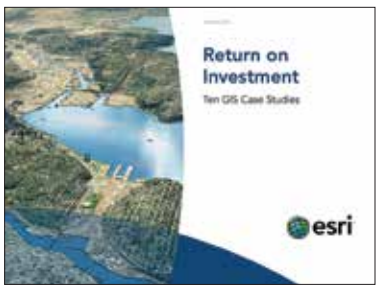
Esri E-books

Esri's library of valuable, free e-books (**esri.com/ebooks**) is extensive and covers a wide range of trends, technologies, and industries.

For example, there are the six volumes of *Essays in Geography and GIS* that collect articles written by academicians and scientists dealing with trends in geography, geospatial matters, and GIS.

There are dozens of free e-books that cover and focus on important aspects of geospatial technology, science, business, education, government, natural resources, and public safety, among others (**esri.com/ebooks**). Here are some examples:





Online-Only Articles

More *ArcNews*

The Summer 2014 issue of *ArcNews* online (**esri.com/arcnews**) presents the following special online-only articles:

- Bat Story: Using a Story Map to Track White-Nose Syndrome
- Mapping Trans-Canada Trail Adventures Online
- Not Just Plane Art: Children's Art Photomosaic at Nevada Airport

"Crossing Borders"

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

MOOCs, GIS, and Online Education: *Quo Vadis*?

Online teaching and learning is poised to radically change the institutional structures and traditions of education in the United States and worldwide. The advent of Massive Open Online Courses (MOOCs); the growing and widespread implementation of online teaching at all levels of education; and new, free and open-access publishing requirements for most scholarly research are combining to create the "perfect storm" preconditions for seismic shifts in our educational systems. These changes are already impacting geography, GIS, and geospatial education, as well.

How will the trends impact traditional educational offerings? In what ways might new online educational technologies improve access and new learning opportunities, and what might be lost in the process? What is the promise of the online transformation in education, and what unintended consequences might it entail?

Most geography departments and many other university programs currently offer an extensive array of GIS and related geospatial technology courses, ranging from introductory and applications-specific classes to advanced GIScience courses that address cutting-edge research, complex dynamic systems, spatial modeling, and cyber GIS infrastructure approaches to geographic information sciences and technologies (GIS&T). The number of online GIS and related geospatial courses within geography departments is also rapidly growing. Most of these online courses offer college credits for undergraduate or master's-level college degrees, while others provide certificates of achievement.

New Opportunities: Obviously, online education offers significant promise in terms of access, scale, and lower-cost provision of educational courses. It offers access to those who cannot afford the high tuition and living costs of many universities today. It also is a powerful way to reach students in developing regions around the world, many of whom have little access to higher education. It also will play a role in expanding adult education and for ongoing professional development. Online courses crafted specifically for specific employment requirements and for vocational and technician employment opportunities will also fill an important gap in current educational offerings. And for those who simply wish to explore a particular field, it offers a low-cost and convenient way to learn more about nearly any topic.

With continued research, it is likely that collaborative educational technologies and teaching methods will create more interactive and personalized online courses. Content will proliferate and address nearly every subject now taught in the classroom, and online pedagogy and student learning assessment procedures will be developed to function well within the online learning environment.

Potential Structural Consequences: What are some of the potential structural consequences of the online education explosion that we might want to think about, address, adjust to, or shape as these seismic shifts take place in traditional education over the next few decades?

Shift to the Private Sector: Because multiple education business models are changing simultaneously, including free, open access to research and publications of academics, as well as weakened copyright protection models for academic scholarship and curricular materials, in addition to the new Internet technology delivery systems for online education, I anticipate there will be a significant shift in the provision of educational services from existing colleges and universities to the for-profit private sector. The combination of free product (open access online courses, MOOCs, curricular materials, supplemental readings now including free academic journal articles, etc.) and free delivery systems (the Internet) will be attractive to private companies. These companies soon will be able to sell content developed by academics without having to create or purchase these open-access educational products themselves and can also avoid the brick-and-mortar facilities and other costs of universities, providing them with a competitive edge in the provision of educational services *vis*-à-*vis* many traditional colleges and universities, which must bear both of these costs.

Concentration of Higher Education: Online education approaches will also likely foster a concentration of university higher education in the United States to large, central state universities and to more prestigious universities. This shift to economics of scale or prestige recognition will entail closing many smaller colleges and regional state colleges, or their conversion to satellite tutoring centers for online courses provided from larger universities or private companies. Accompanying this trend will be the hiring of fewer senior or tenured faculty nationwide and an increase in the existing reliance on contingent faculty and, in the case of online courses, on tutors.

The Student Experience: While it is clear that online education is advancing in both technology and pedagogy and aspires to a "human" experience, many remain concerned about networking and the social and intellectual development that can be an important part of the student campus experience. While campus-based education is characterized as a luxury by some these days, it is important that online education not become the only route for students without financial means. It is often the less privileged student who may benefit most from face-to-face learning. Also, learning in the context of related courses and within a broad and diverse intellectual environment cannot easily be replicated in an online-only setting. For example, an education in GIScience may be greatly enhanced in the context of a broader education in both related and less-related fields (e.g., statistics and geographic concepts, certainly, but also the humanities or environmental science).

It is clear that the online education transformation is here to stay and that it offers tremendous potential and opportunity, particularly if we shepherd it carefully and shape it with thought given not only to all that it can achieve but also to what it may not be able to achieve.

Doug Richardson, drichardson@aag.org

What Is a GIS Data Health Check?

The data health check at the Esri International UC is free.

When an organization's reputation depends on its GIS data, errors can introduce unacceptable risk.

During the 2011 Esri International User Conference (Esri UC) in San Diego, Esri provided an opportunity for water/wastewater users to see how clean their data really was. Since then, the data health checks, as they are called, have become a staple feature at every Esri User Conference.

Eleven water/wastewater customers signed up for health checks at the 2011 Esri UC, but they gone on to become so popular that they have been expanded. Five industries and more than 70 users used the service at the 2013 Esri UC. Health checks are now offered at other conferences, such as the Electric and Gas User Group and Pacific User conference.

For users, it's as easy as bringing a sample of their data in a file or personal geodatabase. An Esri industry expert performs a diagnostic on the data using the ArcGIS Data Reviewer extension to assess its overall quality. Esri staff members explain the key data checks. Any errors detected are reviewed with the user. The error features (captured in a separate geodatabase) and a Microsoft Excel report with percent accuracy will be provided to take back to the user's organization.

At the 2011 Esri UC, the GIS team from the City of Woodland—a town in California with a population of 55,000 people—took advantage of Esri's free data health checks for water and wastewater.

"That short session really opened our eyes to the state of our data," said Daniel Hewitt, the city's GIS specialist. "We were not anywhere near where we thought we should be and wanted to fix that."

Originally, most of Woodland's GIS infrastructure data was ported over from CAD by a third-party contractor into a generic data model. The transition created issues, mainly in regard to topology, attribute population, and schema structure. For the last three years, the GIS team has been focused on customizing the schema fields and populating attribute values from historical hard-copy drawings.

Now, the City of Woodland uses ArcGIS Data Reviewer to find and fix any errors in feature classes that need more attention. In addition to monetary savings, implementing ArcGIS Data Reviewer has resulted in better data quality and confidence that the data has been fully reviewed.

"We can now perform consistent QA/QC tasks and keep our data in top shape after we have done the initial time investment," Hewitt said.

At the 2012 Esri UC, the City of Sioux Falls, South Dakota, took advantage of the free data health checks to assess its GIS data quality. City GIS professionals report that the health checks have led to increased data quality, integrity, and confidence in their data. They were introduced to ArcGIS Data Reviewer, which has allowed them to take a huge project, break it into manageable pieces, and prioritize the most urgent problems.

City GIS professionals now perform regular data checks on the datasets that are maintained within the GIS department. They perform checks when there may be a problem with a feature class. For example, if a map service is throwing data-related errors in ArcGIS for Server, they will follow up with the standard ArcGIS Data Reviewer checks, in addition to checking the geometry.

Data health checks are free, focus expressly on features and attributes, and—since only a subset of checks is performed during the session—take about 45 minutes. During production, Data Reviewer can be used to configure many more to validate all the organization's business rules. Users may choose to implement the rules by themselves, work with Esri Partners, or use Esri Database Services to review and optimize data models, configure Data Reviewer beyond the checks that were run on their data at the conference, and implement workflows for data correction and maintenance.

Watch for announcements regarding data health checks at the 2014 Esri International User Conference, to be held July 14–18.

Interesting ArcGIS Services

Esri's ArcGIS for Server adds geographic data and analysis to web applications that serve organizations and communities in a variety of ways. To submit your ArcGIS for Server site address and view other websites powered by ArcGIS for Server, visit **esri.com/serversites**.

McCarran International Airport
www.mccarran.com/Fly/MyJourneyMap.aspx
McCarran International Airport is the principal commercial airport serving Las Vegas and Clark County, Nevada. This site provides the locations of and information on the airport's services, restaurants, and shopping.

Investment Strategy Northern Ireland
www.isni.gov.uk/InteractiveMap.aspx
Investment Strategy Northern Ireland displays current and completed projects within Northern Ireland districts.

International Center for Tropical Agriculture
gismap.ciat.cgiar.org/IAViewer/v1
To monitor conditions in the world's largest rain forest, the International Center for Tropical Agriculture designed a site that calculates recent and future deforestation rates, biomass, biodiversity, land use, and opportunity costs of avoided deforestation for user-defined areas in the Amazon.

URISA Heads to New Orleans, Louisville, and Curaçao

The Urban and Regional Information Systems Association (URISA) is pleased to host three in-person educational events for the remainder of 2014:

GIS-Pro 2014: URISA's 52nd Annual Conference (New Orleans, Louisiana, USA, September 8–11, 2014)
Leveraging Spatial Technology to Support Sustainable and Resilient Communities
Take advantage of training, keynote addresses, workshops, breakout sessions, Lightning Talks, and more in New Orleans. Share GIS management strategies and technology innovations, lessons learned, and best practices with GIS professionals in all stages of their careers, from students and young professionals to the established GIS brain trust.

URISA GIS Leadership Academy (Louisville, Kentucky, USA, October 13–17, 2014)
Presented in Calgary in May of this year, the URISA Leadership Academy has successfully taught GIS leadership and management since 2007. Attend this five-day training seminar and delve deep into topics, including strategic planning, successful team development, organizational capacity building, and ethical challenges.

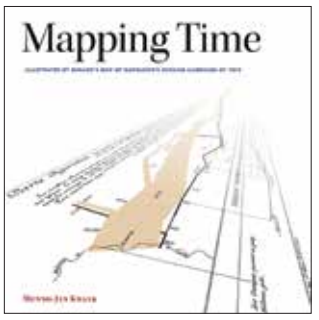
URISA's Seventh Caribbean GIS Conference (Curaçao, October 27–30, 2014)
Since 2001, URISA has presented conferences focused on the effective application and management of GIS and other information technologies within the Caribbean. Previous conferences have taken place in Jamaica (2001), Barbados (2004), the Bahamas (2006), Cayman Islands (2008), Trinidad and Tobago (2010), and Jamaica (2012). Join us as we host the 2014 conference in the Dutch Caribbean! High-level regional discussions, important keynote speeches, breakout sessions, training, and professional development opportunities abound.

In addition, throughout 2014, URISA will conduct virtual workshops and webinars (including a three-part presentation of URISA's Certified Addressing Workshop in August).

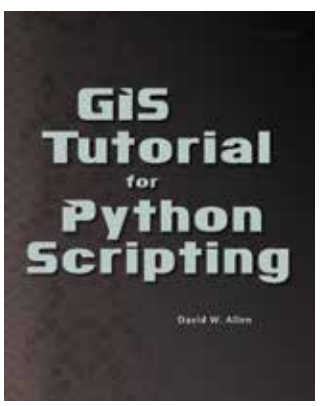
Earn AICP and GISP credits at URISA events. Learn more about these educational programs and more at **www.urisa.org**.

New from Esri Press

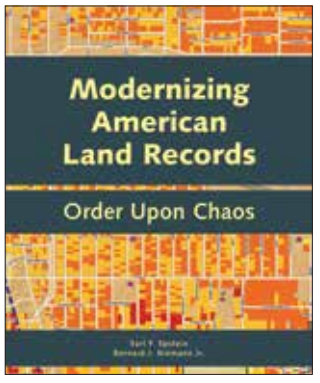
Mapping Time: Illustrated by Minard's Map of Napoleon's Russian Campaign of 1812
By Menno-Jan Kraak
This book considers the cartographic challenge of visualizing time on a map. Inspired by graphic innovator Charles Minard's classic map of France's disastrous invasion of Russia, this book combines historical and geographic analysis with cartographic visualizations of mapping change over time. It includes more than 100 full-color illustrations. May 2014. 168 pp. Hardcover (ISBN: 978-1-58948-312-5, US$49.99) and e-book (ISBN: 978-1-58948-366-8, US$49.99).



GIS Tutorial for Python Scripting
By David W. Allen
GIS Tutorial for Python Scripting is filled with practical examples, exercises, and assignments to help build proficiency using Python in ArcGIS. Knowledge of Python—a key tool for scripting geoprocessing functions and tasks in ArcGIS for Desktop—is expanded through hands-on programming. This book builds on previously acquired GIS skills and takes them to the next level with the use of Python to automate your GIS applications. Designed to be equally suitable for course instruction or independent study, data is provided for the hands-on tutorials and exercises. Instructor resources are available for course use. June 2014. 284 pp. Paperback (ISBN: 978-1-58948-356-9, US$69.99) and e-book (ISBN: 978-1-58948-370-5, US$69.99).



Modernizing American Land Records: Order Upon Chaos
By Earl F. Epstein and Bernard J. Niemann Jr.
A design for a modern American Land Records System that provides material about both the nature and extent of land interests is discussed in this text. The book includes a history of American land concepts, land governance, and land records systems and their use. These institutional aspects are considered, along with the nature and extent of location-oriented land data systems, such as geographic and land information systems (GIS/LIS). July 2014. 290 pp. Paperback (ISBN: 978-1-58948-304-0, US$24.99) and e-book (ISBN: 978-1-58948-375-0, US$24.99).



Esri Press e-books are available through the Esri Bookstore app at **esri.com/bookstoreapp** or from online retailers. For information on all Esri Press publications, visit **esri.com/esripress**.

New Training and Certification Offerings from Esri

Training

Exploring Enterprise GIS: A Workshop for Leaders
What could you achieve if you knew what was possible? Attend this half-day online workshop to get the key information you need to understand benefits and common approaches to deploying an enterprise GIS. This workshop will help you identify opportunities to expand access to GIS to better align project, department, and enterprise workflows with your organization's strategic goals. Learn more at **esri.com/coursecatalog**.

Using ArcGIS for Mining Geoscience Workflows
This new instructor-led course for geoscientists, GIS analysts, and other professionals in the mining industry teaches how to solve problems related to mineral exploration, land management, and mine operations. You will learn how to manage, analyze, and visualize mining data to create reliable information that supports decision making. Learn more at **esri.com/coursecatalog**.

Using ArcGIS for Geospatial Intelligence
Entry to midlevel professionals in the defense, intelligence, and public safety communities have a new option to learn ArcGIS workflows that support the production of timely, accurate, and actionable intelligence. Realistic scenarios and operational problems are used in demos and hands-on exercises. This new instructor-led course is the first in a planned series for geospatial intelligence professionals. Learn more at **esri.com/coursecatalog**.

Training for Organizations
People are every organization's most important asset. Making sure that the staff who execute daily operations, create mission-critical products, and engage with customers have top-notch skills is essential. Organizations can take advantage of cost-effective training options and partner with Esri training consultants to build a capable, geoenabled work force aligned with strategic goals. To learn more about training for organizations, e-mail GIStraining@esri.com.

Certification

Broadcast Your Expertise
Individuals who have earned one or more Esri technical certifications can choose to be included in the online Directory of Esri Certified Individuals. The directory displays the individual's name, country, and all certifications achieved. Employers, customers, and recruiters can easily search the directory to find individuals who have earned a certification that matches their needs. To be included in the directory, simply opt in by updating your certification record. To view the directory, visit **esri.com/certdirectory**.

Top Tips for Taking a Certification Exam
The most important strategy to prepare for an Esri technical certification exam is to closely examine the candidate qualifications and skills measured information provided on the Certification website, then invest study time accordingly. On exam day, give yourself the best chance for success by

- **Answering all questions**—All exam questions are worth one point each. Incorrect, blank, or incomplete responses earn zero points.
- **Being aware of time**—During the exam, you have the ability to flag questions for review and return to them later. If you find yourself spending too much time on a question, take advantage of this option.
- **Reading carefully**—Pay close attention to the details given for scenarios and remain within the scope of the question.

For More Information

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NATIONAL GEOGRAPHIC™

"Geo Learning"

A column by Daniel C. Edelson,
Vice President for Education, National Geographic Society

Citizen Geography with National Geographic FieldScope

Six years ago, the Center for Geo-Education at National Geographic launched a project with a simple premise: Public participation in scientific research, commonly known as "citizen science," shouldn't end with collecting data. It should include data analysis, as well.

Using the ArcGIS suite of developer tools, we began to build National Geographic FieldScope, a platform for citizen geography (citizen science projects focusing on geospatial data). FieldScope's goal is to put geospatial data visualization and analysis into the hands of ordinary people who participate in citizen geography projects.

We've developed FieldScope by working with three test bed projects, whose goals and audiences informed the software's design. The three test bed projects are

- **Project BudBurst** (National Ecological Observatory Network), a plant phenology project in which members of the general public report their observations of seasonal changes in plants.
- **FrogWatch USA** (American Zoos and Aquariums), an amphibian population study in which volunteers who are trained to identify frog and toad calls report on the distribution of different species.
- **Trash-Free Potomac** (Alice Ferguson Foundation), a regional conservation initiative in which volunteers participating in trash removal from natural areas report on the quantity and types of waste removed.

In each of these long-standing projects, the organizers had a preexisting interest in providing their participants with the opportunity to view and work with the datasets they were contributing to. However, none of them had the resources or expertise to provide that functionality to their participants. In this respect, they were typical of citizen geography projects. Most citizen geography projects are only able to provide participants and visitors with a static map or a simple interactive map of their data. Only a very few, unusually well-funded projects are able to provide maps with thematic layers, customizable symbolization, or geospatial analysis.

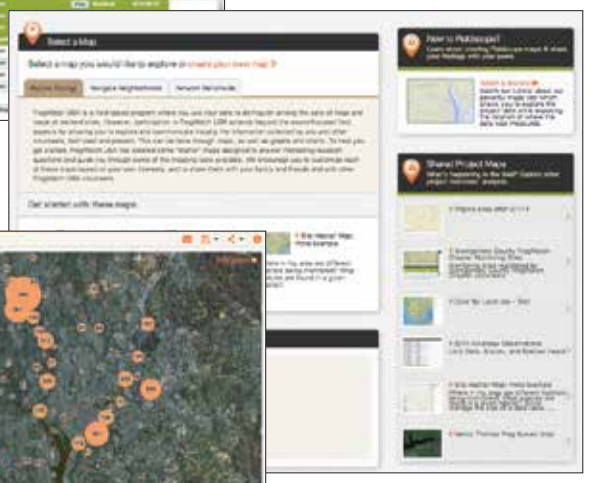
With FieldScope, we have allowed the organizers of these projects to provide their participants with access to GIS functionality for exploring their data through a novice-friendly user interface. Through our work with these test beds, we have developed an architecture for rapidly constructing and deploying citizen geography project websites. This spring, we are launching a set of FieldScope Project Builder tools that will enable nonprogrammers to set up a new FieldScope project through a forms-based interface that allows them to describe the data collection protocol and select the data and analytical functions to include in their project.

With the launch of the FieldScope Project Builder tools, we are excited to be approaching our vision of enabling any citizen science project involving geospatial data with the opportunity to provide geospatial data visualization and analysis to its participants.

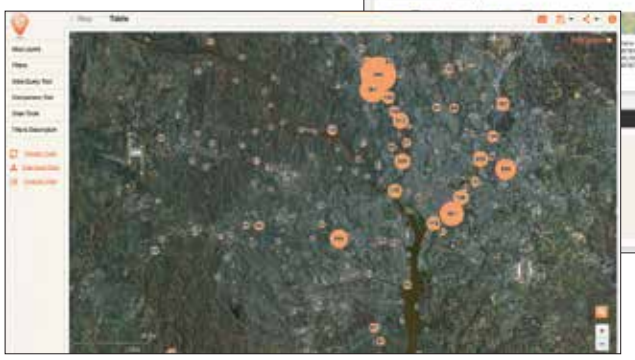
More information about FieldScope is available at **fieldscope.org**.

This material is based on work supported by the National Science Foundation under Grants No. GEO-0627923 and DRL-1010749. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of the National Science Foundation.

A histogram of observations from Project BudBurst.



The home page for the FrogWatch USA FieldScope project.



A FieldScope map showing bags of trash collected as part of the Trash-Free Potomac Project.

"Managing GIS"

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

URISA
The Association For GIS Professionals
www.URISA.org

How to Find Employment Using GIS Across All Industries

GIS and Beyond!

By Jennifer Egan, Sales and Product Manager, Wireless Applications, Corp.

Oftentimes, when young professionals coming out of college utter the words, "I'm pursuing a job in GIS," many friends and family become instantly confused. I am no different. While I was in school, my own friends and family could not understand why I was going from a secure job focus in secondary education to a focus in something no one had ever heard of.

GIS has been nothing but a blessing in my career. Having a love of maps and how the world works and making it into a creative and innovative career move has brought many great opportunities to me and continues to even now.

Many young professionals exiting college just know GIS as a geography discipline, or at least I did. They assume that for the next 30 years of their life, they will either help a municipality do city planning and zoning, collect water samples and save wetlands with a conservation group, or find their way into teaching geography in a middle school. In 2014, that could be the farthest from the truth!

GIS has become one of the largest arenas and skills in analyzing truly how the world works—from utility companies to business to government to computer software companies. If you love data and how the world is changed by it on a grand scale, GIS is a discipline that now allows you to expand this passion into many industries. With experience in the utilities, telecommunications, and gaming industries, I have been able to not only learn where GIS can be utilized but also how it can solve greater public and private sector problems without it being strictly limited to a geography or environmental focus.

The next question for young professionals coming out of college should be, "If I don't want to focus strictly in geography, how do I gain greater knowledge to get GIS jobs in other disciplines?" One route I recommend is adopting, if you haven't already, the fact that geography affects every walk of life. Having geography influencing how the world works on a grand scale allows you to think of how GIS can integrate into the many industries throughout peoples' professional careers. In the telecom world, for example, the location of a tower will affect what type of service you receive on your phone or through your Internet service. In terms of utilities, locating electric and gas lines to not be interfered with by trees and other obstacles affects the service of these resources to customers. If you are developing a game with the intention of referencing real-time landscape geography, there is no question GIS can be a major player. The list of industries goes on, but knowing that GIS and geography touch on many different categories in life helps to explain that your very niche skill set can be very exciting when it comes to paving the way for your career.

Another thing to consider is what kind of job would make you happy on a daily basis. Many would look confused wondering how this applies to just having a job in GIS. It's very valid and important not only for your career but also the longevity of GIS as a discipline in the professional world. If you are not passionate about GIS and your job, the field of GIS remains limited. The purpose of GIS in the world today is not to solve geography problems. It is there to ask questions, push possibilities, and explain something that is not necessarily GIS-centric. GIS simply is the tool to help solve the problem or get to the answer more easily.

To gain perspective of how GIS is integrated in small, medium, and large businesses/agencies throughout all industries is tough. One thing that is in your court is that you are the "specialist," even if you are just entering the work force. This means that you are in a very niche skill set that many employers both don't understand and may not be well versed in. So for those who have no idea what GIS is, this gives you the opportunity to sell yourself as an employee and possibly bring something new and innovative to that business. There is nothing limiting you from doing on-site visits to companies/agencies (using business etiquette, of course) to research companies, ask questions, and meet the personnel that already work there. One note: do your research of the company before going blindly into a visit. Employers who are familiar with GIS as a technology will find you to be a commodity because, even though you are new to the work force, you hold a unique skill set today!

As a prospective GIS analyst, engineer, or technician, congratulations on taking a risk and graduating in a focus that is still a mystery to some and a desire for others. Congratulations on graduating in something that you are passionate about! Take that passion to pave the way (much like you did in college) to find the job that you are equally passionate about. The reward will not only satisfy your career right off the bat but will also increase the longevity of a still niche but very interesting field!

About the Author

Jennifer Egan was born and raised in Washington State. She graduated from Western Washington University with the intent of going into secondary education in social studies but chose to pursue a career in GIS instead. Now she is in her eighth year of GIS, and her career has covered multiple industries. She has enjoyed working in the utilities, gaming, and wireless industries, with wireless being her overwhelming favorite. The ability that GIS has to integrate into a number of industries is what drives her most, because GIS is a universal tool (although geographic-centric in many cases) to help people understand and articulate the world in a different way, unlike any other specialty skill sets. Looking into the future, she is excited to be soon obtaining her GISP certification and continuing to add skills to her GIS resumé and contribute to the GIS community.

For more information, contact Jennifer Egan (e-mail: JEgan0883@comcast.net).

Esri Partner Solutions

Esri has relationships with more than 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, we would like to recognize those partners that won a 2014 Esri Partner Conference Award.* These organizations have exhibited practical yet innovative application of the latest ArcGIS features, taking geographic visualization and analysis to a higher level. For a complete list and description of our partners and their offerings, visit the Esri website at **esri.com/partners**.

All Industries

AWARD CATEGORY: INNOVATION APPLICATION

GISi Indoors

gisiindoors.com

GeoMetri

GeoMetri Indoor Analytics enables businesses to better understand how people are moving through their facilities. The application leverages ArcGIS Online maps and services, allowing users to compare and measure activity across different time periods or building areas, as well as understand real-time traffic patterns for any space, at any time.

Engineering, Utilities, Government, and Forestry

AWARD CATEGORY: BEST NEW PARTNER

Zerion Software, Inc.

www.iformbuilder.com

iFormBuilder

iFormBuilder is a mobile data collection platform for iOS and Android devices. The iFormBuilder platform is universal and is currently being utilized by field teams in more than 110 countries. The iFormBuilder mobile platform provides advanced form building features like skip logic, calculations, subforms (one-to-many relationships), and more than 40 powerful form building elements to assist in meeting data collection needs. It has unmatched security on mobile devices with element-level encryption and offline data collection capabilities for ultradisconnected environments. As a solution, iFormBuilder tightly integrates with both ArcGIS Online and ArcGIS for Server. The integration provides smart enterprises with the ability to leverage existing feature services as base forms or create workflows in iFormBuilder and immediately publish to the ArcGIS platform. Enhance your data and data collection workflow capabilities by allowing iFormBuilder to be the "What" to your "Where."

Public Transportation, Community Planners, and Real Estate

AWARD CATEGORY: ArcGIS for Desktop BASED APPLICATION

MobiGIS

www.mobigis.fr/en

MobiAnalyst

MobiAnalyst is an integrated modeling and analysis tool aimed at optimizing multimodal transportation for people. The software provides automatic integration of multiple networks (road, public transportation) and calculates routes, service areas, and an origin-destination cost matrix, taking into account traffic and timetables. This decision-making tool uses ArcGIS for Desktop and ArcGIS Network Analyst, as well as the full range of ArcGIS for Server. It helps communities improve the quality and coverage of public transportation services and allows organizations to better locate their services in order to offer alternatives to car-only travel.

Transportation

AWARD CATEGORY: PRIVATE WEB APPLICATION

CGI

www.cgi.com

SIGMA

SIGMA (Soll Ist Geometry Monitoring Absolute) realizes a consistent 3D geographic model of the railroad track in the Netherlands. SIGMA enables users to combine design and measurement data of the railroad track in multiple dimensions, such as x,y,z and cant, to perform in-depth analysis of the deterioration of the track. The applied data model offers a highly accurate (precision <1.5 cm) 3D representation of the track and enables the persisting of railroad-specific elements, such as transition curves, in a standard geodatabase model. For ProRail, the Dutch company responsible for railroad development, maintenance, and safety, it is an advanced high-tech tool for identifying railroad infrastructure areas for preventive maintenance. SIGMA uses the capabilities of ArcGIS for Server and FME Server to generate output in industry-wide standards, such as CAD files and geodatabases.

Environmental Conservation

AWARD CATEGORY: PUBLIC WEB APPLICATION

GeoThinking

www.geo-thinking.com

Tremarctos-Colombia 2.0

Tremarctos-Colombia 2.0 is a free, early warning geoweb application that evaluates the impacts of infrastructure projects on biodiversity and climate change. Utilizing ArcGIS for Server, Tremarctos-Colombia provides recommendations regarding the activities that need to be implemented in an affected area in order to "compensate" the environmental impact damage done as a result. Tremarctos helps governments and the private sector measure environmental impacts.

Natural Resources

AWARD CATEGORY: ORGANIZATIONAL USE OF ArcGIS Online

Oceaneering International, Inc.

www.oceaneering.com

Common Operating Picture for ArcGIS Online

The Communications Solutions division of Oceaneering has been growing fast. In addition to its long history of boots-on-the-ground support as a global oilfield provider of engineered services and products, primarily to the offshore oil and gas industry, with a focus on deepwater applications, Oceaneering has been supporting a wide adoption of ArcGIS Online as part of an extensive asset tracking support solution to clients worldwide. The partnership between Oceaneering and Esri has not only enabled managers to keep track of thousands of assets essential to the global economy, the wide adoption and incorporation of ArcGIS Online as part of Oceaneering's incident response tools have empowered first responders to large-scale incidents in harsh conditions to quickly contain and remediate the situation by providing a clear, high-level view of the incident as a whole while leveraging the power of collaboration through easily accessible web maps.

Software Publishers

AWARD CATEGORY: LOCATION ANALYTICS

KT Labs

www.ktlabs.com

KliqMap

KliqMap allows QlikView users to embed dynamic maps from ArcGIS. In addition to ArcGIS for Server integration, the native access to ArcGIS Online makes this solution appropriate for businesses of any size with simplicity and speed of deployment. With its unique, rule-driven polymorphism, KliqMap opens up to QlikView users the doors of the ArcGIS platform, allowing them to easily exploit all its richness (buffering, clustering, network services, geoenrichment, etc.). KT Labs strongly believes that there is much more to location intelligence than simply linking a map to a report. KliqMap leverages QlikView, ArcGIS, and KT Labs' Planning Suite to create a fully integrated and interactive environment where analytics and simulation can be performed in the context of business processes. With KliqMap, the GIS becomes a key element in empowering decision making through analysis, simulation, prediction, and optimization, in other words, actionable location analytics.

Utilities

AWARD CATEGORY: MOBILE APPLICATION

Clevest

www.clevest.com

WorkBook

WorkBook is a next-generation mobile app with an intuitive user interface and rich geospatial interactions for use with touch-enabled tablets. An integral component of Clevest's Mobile Workforce Management solution, WorkBook empowers utilities' mobile technicians with maps, screens, and workflows to manage their work while having real-time communication with the office. WorkBook tightly integrates with both Esri's online basemaps and GIS layers hosted on a utility's server running ArcGIS located behind the utility's firewall. This hybrid system lets workers visualize where they are in relation to their orders, create orders from GIS assets, search and filter GIS assets to view relevant information, and get optimized routes to minimize driving time with Esri's geocoding and ArcGIS Runtime.

Digging Esri T-shirts in Thailand!

Brian Hall, GIS analyst for the Washington Department of Fish and Wildlife, and Kathryn Scott of Washington State Parks volunteered at an archaeological dig near Phimai, Thailand . . . and remembered to take their matching Esri T-shirts halfway around the world!

Wear an Esri T-shirt in a unique location and send a photograph to *ArcNews*. Photos will be considered for use in *ArcNews*, the expanded T-shirt section at *ArcNews* Online, or both. Upload digital photos at *ArcNews* Online or send them via e-mail (arcnews_editor@esri.com).

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