ArcNews

Esri | Winter 2012/2013 | Vol. 34, No. 4

Esri Hosts WWW Conference—Reinventing the Art of Conversation

Artists, Entertainers, Scientists, and Thought Leaders Perform "Intellectual Jazz"

What happens when some of the world's brightest minds come together in one location to talk one-on-one about anything and everything? No script. No preparation. No podium or teleprompters.

It's more than an interesting premise or an esoteric exercise of *what if*.

This past fall, it was a reality. The result was open, honest conversation about topics ranging from climate change to video games, insects, the inner city, and even the end of the world as we know it.

September 18–20, the WWW Conference made its worldwide debut in Southern California—opening at the historic Mission Inn Hotel and Spa in Riverside and concluding with two days at the state-of-the-art theater on the campus of Esri in Redlands. Richard Saul Wurman—architect, cartographer, and founder of the now globally recognized TED conferences—created this new and wildly inventive forum as the "anti-conference." While TED talks have been elevated to near pop culture status, receiving millions of views online, they have a practiced, polished, and professional look and feel today that's different from their initial iteration in 1984.

Wurman, who also created and participated in the TEDMED Conferences 1995–2010 and many other conferences and events, sought to break new ground—and looked to do so by celebrating improvised conversation. The result was truly inspirational, instructional, and a perfect nexus of art and science.

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Richard Saul Wurman and will.i.am. (Photo by Jon Kamen.)

U-Spatial: A Consortium for the Spatial University

By Francis Harvey, Len Kne, and Steven Manson, University of Minnesota

It is increasingly apparent to many within academia and beyond that spatial thinking, technologies, systems, and services matter. Building on a rich history of research, scholarship, and teaching related to spatial topics, the University of Minnesota (UMN) has embarked on a visionary endeavor called U-Spatial to develop a collaborative consortium that supports the spatial sciences and creative activities.

U-Spatial provides support for spatial research. It helps eliminate duplication and fragmentation of scientific resources and provides a framework of data, equipment, expertise, and resources that benefits all

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Transforming ArcGIS into a Platform

By Jack Dangermond

At the foundation of Esri's work are the belief and vision that geography is a science that creates a better understanding of our world. Using GIS, geography has also become a unifying framework for integrating many forms of digital information. GIS has now become an important technology in almost every field, improving efficiency, communication, and decision making. Our users have made GIS come alive in countless applications across thousands of organizations. I would like to both acknowledge and thank our users and partners for supporting Esri's mission of evolving our GIS technology.

Our Strategy

Several years ago, we initiated an ambitious effort to both simplify the use of ArcGIS and transform it into a platform technology for use

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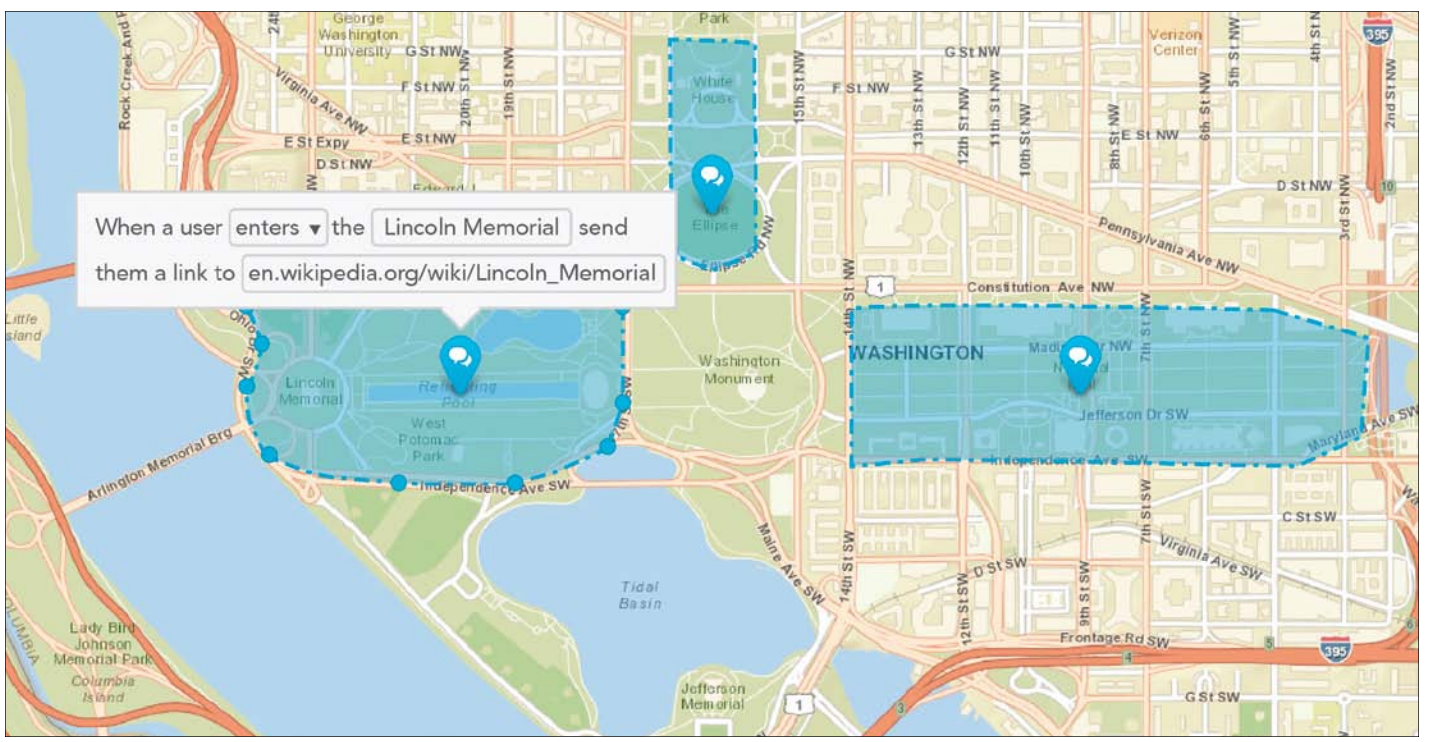

The Esri Geotrigger (see the article "Esri's Geoloqi Acquisition" on the right) feature allows an application to send messages in real time to individual users as they encounter a geofenced area. Here, a visual trigger editor allows a nontechnical staffer to modify geofence locations and Geotrigger logic on the fly, without writing any new code.

New 2013 ArcGIS Tools

Esri's Geoloqi Acquisition

By Amber Case, Director, Esri R&D Center, Portland

What could your mobile application do if it knew where it was?

Persistent location awareness has been the Holy Grail of location-based services (LBS), particularly now that GPS has become a standard feature on today's mobile phones. Yet, until now, battery life has been a common issue that has prevented a satisfactory user experience.

Geoloqi has created a patent-pending technology that cracks that nut by getting clever about how to manage the native location tracking capabilities on a smartphone and optimize those services to give the application an awareness of when its user is near a relevant point of interest. Much like Esri, Geoloqi did not choose to create its own consumer-facing LBS

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Esri's Geoloqi Acquisition

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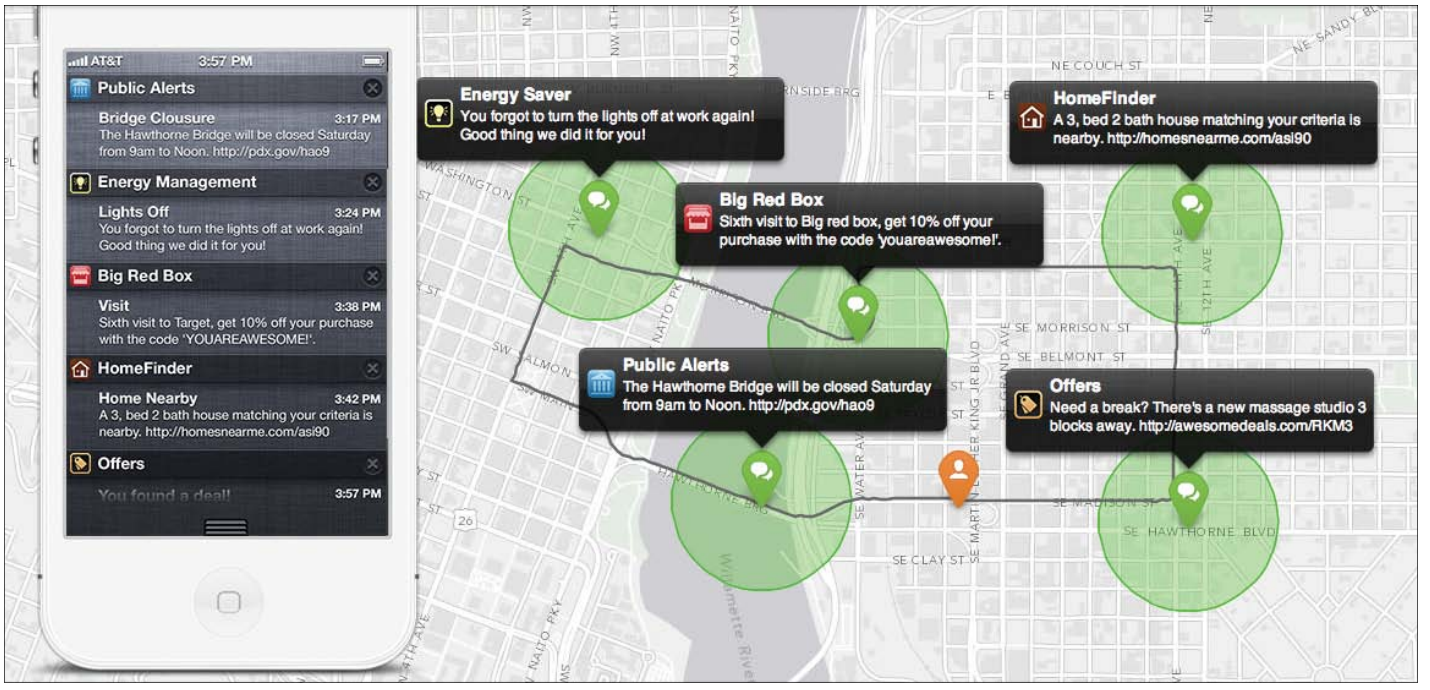
application but instead focused on creating a platform and set of services that can be used by mobile application developers in virtually every industry Esri serves. Since Esri's acquisition and integration of Geoloqi technology in September 2012, the company is bringing the power of location-aware mobile applications to ArcGIS Online customers.

Now developers can provide customers with a satisfying experience with the following types of use cases:

- Targeting customers with geographically and context-aware information
- Protecting private digital data when a user is outside an unauthorized area
- Computing users' dwell time at places that matter to you and your application
- Optimizing customer service by being aware of when to expect a customer to arrive at a site
- Allowing field-workers to leave notes and data at places for other field-workers to receive upon arrival at that location
- Monitoring field-workers' location in real time while they are in dangerous areas, and alerting them automatically if they get too close to a danger zone
- Bringing public attractions to life by informing tourists about featured locations as they explore your city



Individual Geotrigger notifications are automatically pushed to mobile users upon crossing a geofence.

The Geoloqi team adds both leading-edge mobile location tracking and the Geotrigger platform, as well as deep expertise in how to create and publish application programming interfaces (APIs), software development kits (SDKs), and sample code that make the creation of geoenabled mobile applications efficient to build, simple to deploy, and scalable. ArcGIS users will see this approach to mobile application development extend across the ArcGIS Online feature set and APIs in the coming months.

How Does a Geotrigger Platform-Enabled Application Work?

By utilizing ArcGIS Runtime SDK for iOS or ArcGIS Runtime SDK for Android, developers can embed the Geotrigger library in their application, which allows it to send and receive location data from a cloud-based streaming server in real time. This then enables the application to know where it is in relation to relevant points of

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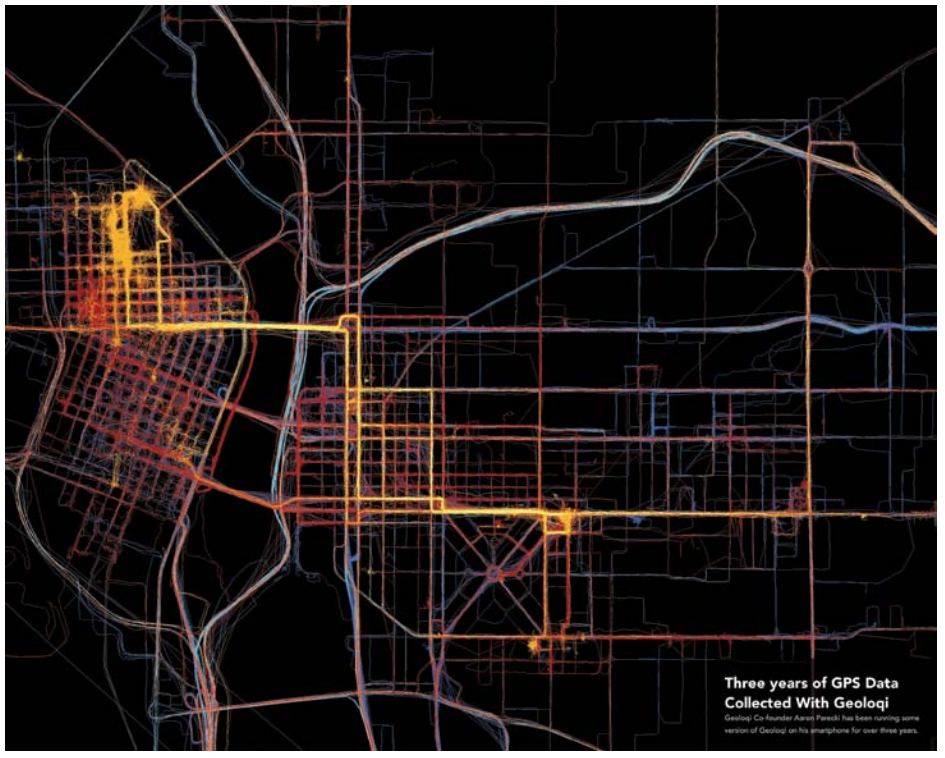
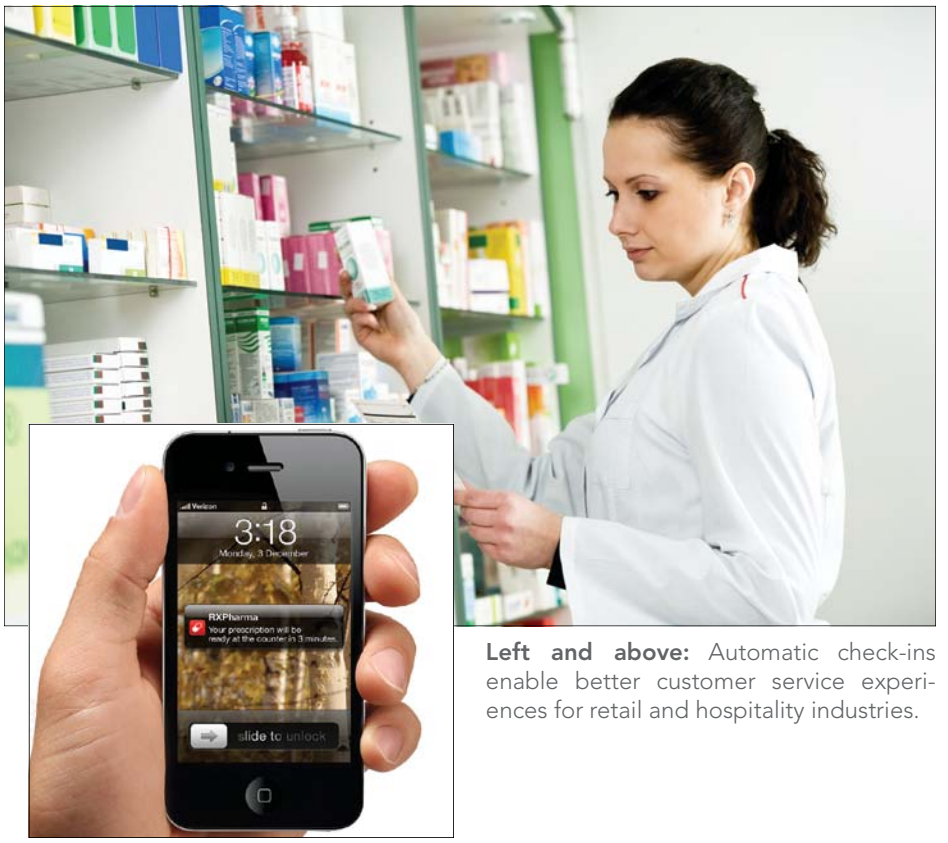
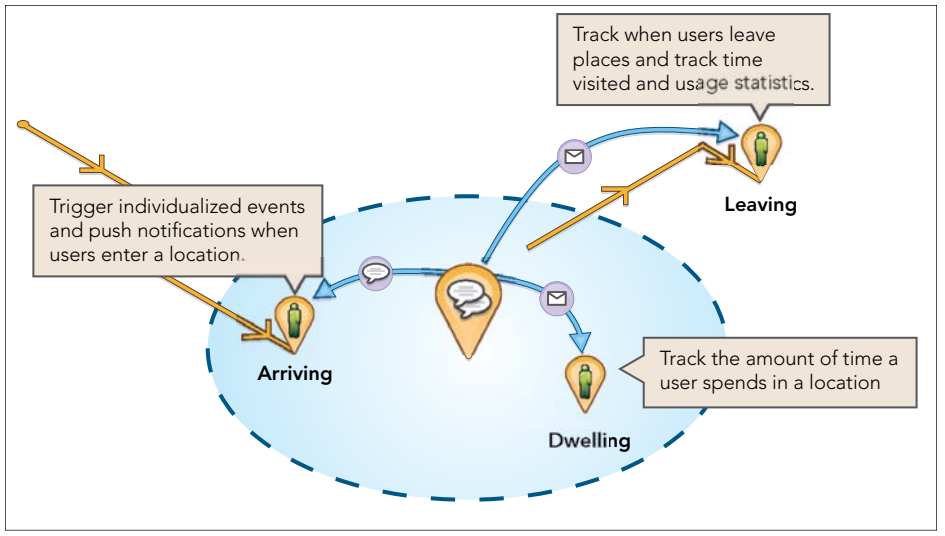
ArcNews (ISSN 1064-6108) is published quarterly by Esri at 380 New York Street, Redlands, CA 92373-8100, USA. *ArcNews* is written for the Esri user community as well as others interested in mapping and geographic information system (GIS) technology. It contains material of interest to planners, foresters,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



Real-time tracking in smartphone applications allows for deeper understanding of the behavioral and movement patterns of the user base.



Left and above: Automatic check-ins enable better customer service experiences for retail and hospitality industries.



A Geotrigger notification can be sent upon a user's arrival at a geofence, after a predetermined time dwelling within a geofence, or upon departure.

interest or geofences that have been created by the developer using a web-based API.

When the mobile user encounters a geofenced area, the cloud service will execute a developer-defined Geotrigger event, whether that is sending a push notification to the mobile user; computing and logging the dwell time until they leave the geofenced area; or sending a URL callback to an external service, such as a customer relationship management system or customer service portal.

How Does Geotrigger Differ from Other Geotargeted Messaging Systems?

Most geotargeted marketing/advertising platforms offer messaging solutions that use a geofence as a way to filter their user base and send messages to users who happen to be within the geofenced area at a given time. In other words, they figure out which opted-in users are within the geofence and then broadcast the same message to all users inside it. The Esri Geotrigger feature does the opposite, allowing an application to send messages in real time to individual users as they encounter a geofenced area. As a result, the application's action can be much more personalized, timely, and relevant to the user.

When Can You Use Geotrigger Technology in Your Applications?

The Geoloqi team, now at Esri R&D Center Portland (Oregon), is integrating Geoloqi technology into the ArcGIS Online core platform. ArcGIS Online with Geotriggers and geofencing is expected to be available in beta for developers by the second quarter of 2013. Full integration into ArcGIS Online is expected in the third quarter.

For more information on Geotrigger, visit **geoloqi.com**.

Esri Hosts WWW Conference—Reinventing the Art of Conversation

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The WWW Conference provided three days of dynamic dialog. Wurman's mandate was simple: pair amazing individuals together and spark conversation with a simple question, idea, or premise. Then let the conversation evolve, naturally and organically, without rehearsal, preparation, or planning of any sort.

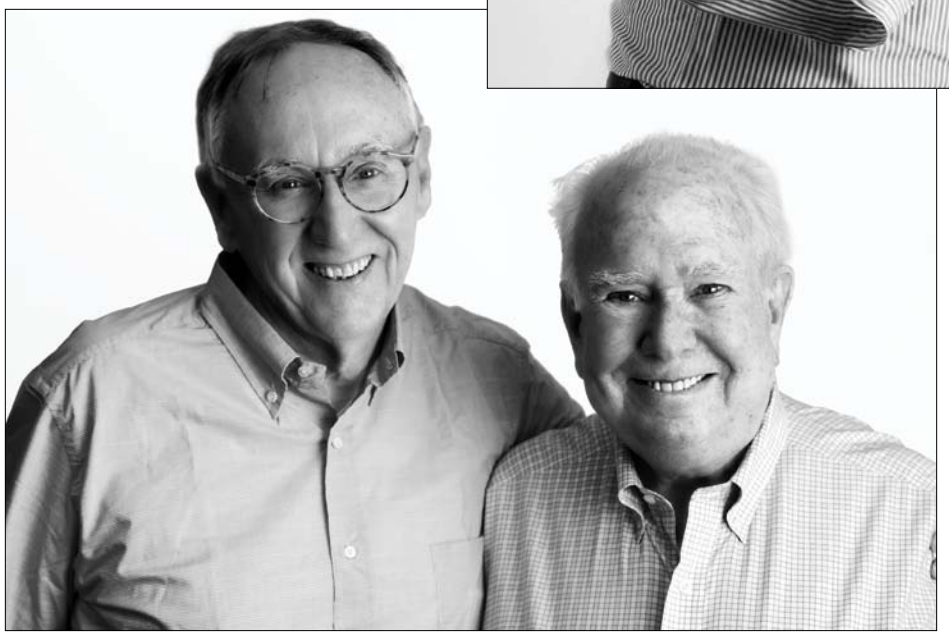
And while the idea might sound otherworldly, its originality proved to be enticing.

From musician and producer **Quincy Jones** to ocean explorer **Dave Gallo**, magician **David Blaine**, Tony Award-winning film and musical director **Julie Taymor**, experimental psychologist **Steven Pinker**, *The Simpsons* creator **Matt Groening**, theoretical physicist **Lisa Randall**, Pulitzer Prize-winning poet **C. K. Williams**, and Dallas Mavericks owner **Mark Cuban**, nearly 50 renowned personalities across diverse disciplines agreed to join in the intellectual and artistic stew.

Conversations lasted from 30 minutes to more than an hour. There were musical performances; poetry readings; and guests, such as astrophysicists, microbiologists, researchers, actors, playwrights, and CEOs, reinvigorating what it means to create truth, knowledge, and understanding.

"It was an energetic exploration of the lost art of conversing," says Wurman. "The most innovative ideas come from conversations between two individuals."

Yo-Yo Ma and David Blaine. (Photo by Jon Kamen.)



Jack Dangermond and Peter Raven. (Photo by Jon Kamen.)

When it came time to pick the perfect venue for the event, Wurman turned to friend, collaborator, and Esri president Jack Dangermond. In addition to delivering a keynote at the 2010 Esri International User Conference, Wurman has worked with Dangermond on several projects over the years. The two agreed to have Esri host the conference.

That the world's great thinkers descended on a location where geography is the great denominator of understanding our world was hardly an accident. What better place to have conversations around the theme of understanding our world?

"Richard Saul Wurman is a true visionary, and his work as author, architect, urban planner, and founder of TED put him in a unique position to carry out the WWW Conference in magnificent fashion," says Dangermond.

The Esri auditorium stage featured three couches. Two faced each other for the participants, and the third was placed between, where Wurman would kick off the conversation. To the audience's left was a magnificent interpretive glass arrangement called *Macchia Forest* by artist **Dale Chihuly**, and to their right, a grand piano. The simple and spartan design kept the focus on the people and the dialog they would exchange.

"It's an amazing place," Wurman said during the first morning at Esri. "I hope you see the contrast between this and the chapel [at the Mission Inn]. Only this is a chapel to understanding, of understanding our world through maps."

Each day featured an hour break in the morning and afternoon, and another hour-plus break for lunch. All breaks took place at the Esri Café, resulting in more conversation. And during those breaks, speakers and attendees alike often received high-tech demos of the latest geospatial solutions and best practices in places around the world. This, too, was off-the-cuff. People would wander out of the auditorium and into Esri technical areas to get a glimpse behind the magical map curtain.

Day two featured a special event that further explored the dynamics of location—in one room was a live camera feed to innovators in China that spurred impromptu conversation between a handful of attendees in Redlands and their counterparts halfway around the world.

"It's nice to have it in a city like Redlands, where I don't have to worry about losing people," said Wurman to the audience.

The Greatest Commodity of the 21st Century

What also attracted Wurman to creating the WWW Conference was cultivating the greatest commodity of the 21st century: understanding.

For years, Wurman has held that understanding precedes action. The type of intellectual honesty offered at WWW would be something never before seen, which leads to the question—and understanding—of what the letters *WWW* represent.

According to organizers, the first *W* stands for *World*. And from there, it gets interesting. The other *W*s stand for a whole host of words and ideas: *Water*, *Wealth*, *Women*, *Waste*, *War*, *Well-being*, *Wildlife*, *Witness*, *Wilderness*, *Work*, *Wisdom*, *Wit*, and the *Waking Dream*. That's for starters.

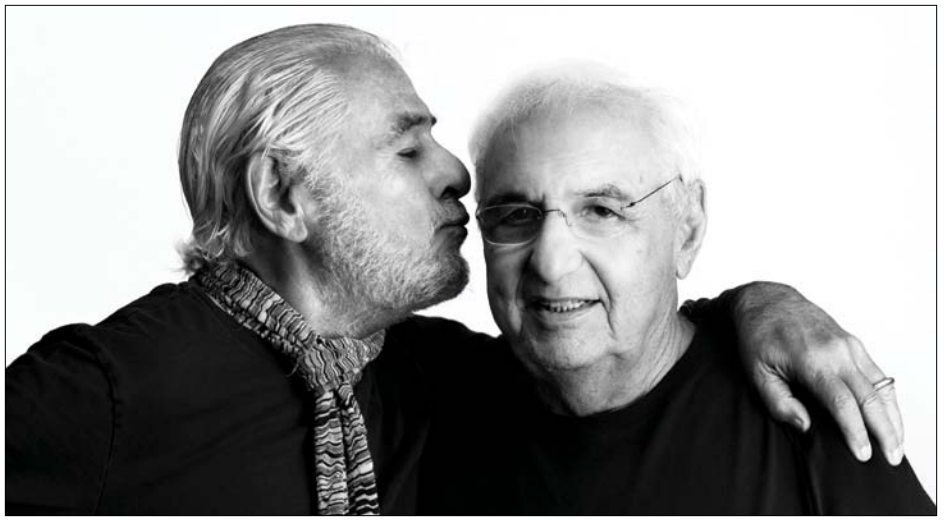
"WWW was a gathering of the greatest, most interesting, and curious minds in the world," says Wurman. "We celebrated the 21st century while drawing attention to new patterns and convergences affecting our health and our planet."

The event itself demonstrated improvisation at every turn. Opening night at the Mission Inn kicked off with virtuoso cellist **Yo-Yo Ma** making a last-second decision to perform before the 300-plus audience seated in the Mexican-Baroque styled St. Francis Chapel. Wednesday morning at the Esri campus went off script as well, with renowned soprano—and recipient of two double-lung transplants—**Charity Tillemann Dick** singing a personalized rendition of "Happy Birthday" to Norman Lear for his 90th birthday, which had just taken place in July. Then another birthday song was sung for the audience members whose birth year ended in a 5 or 0 (20, 25, 30, 35, etc.). There were moments of true spontaneity—like when Pulitzer Prize-winning journalist **Mary Jordan** was overcome with emotion talking about her experiences as a journalist traveling around the world and reporting and the need for individuals to reach

WWW Goes Mobile

Since its fall 2012 debut, the WWW Conference is living a virtual life via a mobile application available to attendees. The application is the next phase of the experience. Launched in December, the application features extraordinary visual imagery and uniquely curated material focused on the presenters. The application provides a rich experience for users interacting with information. More than simply archiving presentations, it offers a unique way to navigate, learn, and understand information based on one's own personal journey and vast online resources. These include Wikipedia integration, bibliographic references, social media connections, and a flood of illustrative and cartographic images that allow expansion and sharing of ideas as offered by the WWW Conference. The application will be continually updated with additional conversations captured during the breaks.

"We want to see the stuff that you don't see on YouTube or in citations or in an interview or speech, the stuff behind things and behind the process, the stuff that makes people human," says Wurman. "We want to see projects that Frank Gehry never got to build and handwritten notes and edits by C. K. Williams on his poetry."



Richard Saul Wurman and Frank Gehry. (Photo by Jon Kamen.)

E. O. Wilson and Craig Venter. (Photo by Jon Kamen.)

Lisa Randall. (Photo by Jon Kamen.)

out and do good to others. She shared a story about a woman working in a Mexican prison, who helped comfort prisoners who were forced to sleep on the ground outside the prison walls because there were no more rooms available.

A collaboration by Billy Idol guitarist **Steve Stevens** and musician/composer **Cristina Pato** on the bagpipes brought the crowd to its feet. It was preceded by a lighter moment.

"The brainpower in this room is different than the Viper Room," quipped Stevens, who was headed to perform at the notorious Los Angeles nightclub immediately following his session at the WWW.

A bus transported attendees and speakers alike to and from the Mission Inn and the conference each day. Even that commute yielded unscripted verbal exchanges and illuminations both during and after the actual conference.

A few of the conference highlights included the following:

The Maestro

Richard Saul Wurman mentioned during the first night that what the country needs is a "Secretary of Understanding." While that's something he's talked about for years, this created quite a buzz during the event. Understanding was a central theme throughout the entire event—for the humanities as well as the sciences.

The Performers, Entertainers, and Writers

Award-winning television producer **Norman Lear** and Dreamworks CEO **Jeffrey Katzenberg** both discussed the social, artistic, and technological influence their movies and television programs have held with society. Katzenberg spoke about the rate of technology change and the opportunity it provides today's filmmakers. He also talked about the first gifts we are all born with—watching and listening—and how the next phase of technology will involve moving from texting toward video, moving to the most fundamental, intuitive approach to consuming information. Lear talked about the social impact of *All in the Family* and the fact that he saw the ripple effect it left with people watching the show from all the mail he received.

Grammy Award winners and multiplatinum performers alike, **Herbie Hancock** and **will.i.am** spoke about the need for science, math, and technology education in the inner city. Of all the speakers, will.i.am brought an energy and engagement that was unparalleled. He proclaimed society didn't need another musician from the ghetto; it needed another Mark Zuckerberg from the ghetto. He talked about the work he's doing for his childhood neighborhood of Los Angeles. He leads the implementation of a science, technology, engineering, and mathematics (STEM) program at Roosevelt High School. For this and for all his philanthropic endeavors, he meets remarkable people so he can "sponge it up" and go back to the inner city where he can "rinse it out."

Yo-Yo Ma and Pulitzer Prize-winning journalist **David Brooks** talked about the conditions and requirements for the life of music and writing. While one is a virtuoso and the other an insightful wordsmith, both touched on the discipline that goes hand in hand with creativity. Yo-Yo Ma described his formative years, age 4 to 15, as a focused, concentrated time with thousands of hours spent forging his art. Brooks talked about the daily work—the tumult and toil—that goes into writing a weekly political opinion column, particularly in today's fast-paced society. The challenge is to focus our attention. As he put it, you have to be so committed to something that you lose yourself to find the meaning of things.

The Scientists, Architects, and Researchers

When asked about how he approaches a new project, architect **Frank Gehry** (whose projects include the Walt Disney Concert Hall in Los Angeles and the Guggenheim Museum in Bilbao, Spain) responded with a lesson a teacher gave him at an early age: no matter what you do, always make it the best. University of California, Los Angeles (UCLA), Department of Neurology chair and award-winning researcher **John Mazziata**'s study of the brain through scanning and imaging helps people understand more about how we learn: the types of information, how it is presented, and at what age it can be processed. Gehry posited how we teach students who don't fit into the traditional education system. Both of his sons did not do well on standardized tests, yet both succeeded in life. How do we help artists who don't know they are artists?

Botanist and environmentalist **Peter Raven** joined Esri president **Jack Dangermond** to discuss biodiversity, sustainability, climate change, and the need for greater awareness of these issues. Raven stated alarming statistics: there are three people alive today for every one of us when we were born. Another billion will be added to the population in 12 years. Both agreed—nations and corporations must get together to solve the problems of sustainability. Both also agreed that GIS is a fundamental platform for understanding. It brings people together to see, understand, and act. Raven summed up a life's worth of observation: learn all your life. Keep voting. Keep teaching. And above all, educate and encourage children.

Pulitzer Prize-winning biologist—and lover of ants and ant colonies—**E. O. Wilson** sat across from **Will Wright**, cofounder of Maxis and inventor of the wildly popular video game SimCity. Wilson went from discussing his research that involves complex social behavior in organisms, such as ants and bees, to a question for Wright: can we create games that take a person back in time 375 million years so that they can walk down a path in a cold forest during the Paleozoic period? That, said Wilson, would be a wonderful game—and teaching tool. Wright agreed. Wright shared that he felt games and storytelling are both educational tools. We have a limited bubble of experience. We supplement that with games and storytelling. They give us experience without risk.

The Next Big Thing(s)

Building on the themes of WWW, Richard Saul Wurman already has plans for more outlier events; in spring 2013, **Prophesy 2025** will take place over five sequential Mondays in five cities in five countries around the world, each a one-day event. An expert leader will make a prophecy—by way of long-form conversation—on what can be expected to happen in the next 12 years. It will invite conversation and connection between the generations. At least two of the five speakers will be from the region where the event takes place. The themes will not be religious or doom and gloom but rather constructive ideas for the near future. Similar to WWW, the events will propel innovation, inspiration, and intellectually invigorating conversation by the world's finest thinkers. The results will be broadly distributed through world media.

"Richard Saul Wurman somehow managed to undo all of the rules and redefine the conference format that he invented 30 years ago," says Paul Soulellis, a New York-based artist and creative director. "I left with the feeling that a few of the world's most brilliant minds had shared some of their passions and dreams. WWW was generous and intimate and of the moment."

U-Spatial: A Consortium for the Spatial University

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researchers working with spatial sciences and creative activities. The need for infrastructure support for the spatial sciences and creative activities has been apparent for some years, but the opportunity to build a broad-based infrastructure across traditional disciplinary and college boundaries has come much more recently.

Background

The spatial sciences compose a broad and fast-growing field that studies spatiotemporal aspects of people, places, and processes using information technologies that range from satellite imaging and GIS to computational technologies and social networks that rely on communication infrastructure. The US Department of Labor identifies spatial technology alongside nanotechnology and biotechnology as the three most important industries in the 21st century. Based on information from the Geospatial Information & Technology Association, the Department of Labor predicts widespread and diverse uses of geospatial technology, with the market growing at an annual rate of almost 35 percent (US Department of Labor, 2010).

For more than 50 years, the University of Minnesota has been a national and international leader in spatial scholarship and application development. Among many contributions, UMN helped create one of the first geographic information systems, the Land Management Information System, in the 1960s, as well as offered the first professional degree program in GIS in the United States. One of the key open software packages for displaying spatial information, MapServer, was developed at UMN. Along with a long history in cartography, geodesign, and geography, U-Spatial can build on a solid intellectual foundation in core disciplines ranging from computer science to remote sensing. The university has many internationally known spatial research centers, including the Center of Urban and Regional Affairs (CURA), the Remote Sensing and Geospatial Analysis Laboratory (RSGAL), the Spatial Database and Spatial Data Mining Research Group, the Minnesota Population Center (MPC), the Geographic Information Sciences Laboratory, and the Polar Geospatial Center (PGC).

From 2006, momentum steadily increased to develop a geospatial infrastructure that both leveraged UMN's spatial resources and met the array of needs for spatial research on campus. By 2011, there was a network of more than 100 spatial researchers. A call for proposals from the university to develop infrastructure to support research and creative activities was a key catalyst that mobilized this network to take the next step in developing common resources for spatial research on campus. After preliminary discussions, a core group drafted a preproposal that was circulated in this network. The preproposal was successful, and based on comments and many rounds of discussions, the group developed an ultimately successful proposal to develop U-Spatial with a combination of matching funds from more than a dozen units and university contributions, together totaling $2.5 million over five years.

Year One

U-Spatial is off to a great start. It is meeting its mission and having a very broad and substantial impact. Because of the size of the project and its need to establish governance practices among the large number of participants, the U-Spatial team has taken a "soft start" approach that involves the gradual development of U-Spatial services while allowing a more rapid development of support for existing research.

The U-Spatial team is particularly interested in developing successful and sustainable models of spatial infrastructure that recognize and facilitate the many ways in which spatial science and thinking are essential to support the core missions of the university: research, learning, and service.

- **Research**—Space and spatiality are increasingly central to many forms of research. GIS is being discovered by a wide array of disciplines as both an integrative approach and research topic in and of itself, be it use of 3D software to model the movement of dancers in space or geologists mapping oil deposits. Researchers are embracing digital environments, computational science, and e-science to the point where science is increasingly practiced via teamwork in traditional labs, international consortia, or citizen science in a way that is increasingly the central paradigm for generating new scientific discoveries. Spatial technologies are woven throughout these various facets of research.
- **Learning**—Spatial science runs through the UMN curriculum and is important to furthering excellence in teaching and student learning. Spatial thinking is a core element of learning across the curriculum. Spatial technologies underpin emerging educational and work force needs. The National Research Council report *Learning to Think Spatially* emphasizes that spatial science and systems together are "an integrator and a facilitator for problem solving across the curriculum. With advances in computing technologies and the increasing availability of spatial data, spatial thinking will play a significant role in the information-based economy of the twenty-first century" (2006, 10).
- **Service**—Spatial infrastructure is essential for the university to meet its long-standing mission of service to communities ranging from local to global in scope. Spatial systems are essential to community-based service learning projects and internships in ways ranging from learning to use GIS software to track home foreclosure to helping develop web mapping applications. The concept of service to the immediate university community is also seen in how enterprise GIS helps universities be effective managers of public resources required for operations, facilities, and planning.

Four Infrastructure Cores

Collectively, U-Spatial offers four infrastructure cores (thematic areas): (1) Central Core services include technical assistance, training, resource coordination, and development of the spatial science community; (2) Imaging Core infrastructure focuses on data and analysis of aerial and satellite imagery of the earth; (3) Data Core initiatives include development of data discovery and archiving tools, as well as shared computing infrastructure; and (4) Analysis Core efforts center on spatiotemporal modeling, geodesign, and mapping.

Central Core

The Central Core is in many ways the most visible component of U-Spatial and addresses overarching needs for helping organize and provide access to existing spatial resources on campus while also actively aiding spatial research via help desk support and training.

The most visible facet of the Central Core is the help desk. Since beginning operation in fall 2011, the help desk has assisted hundreds of researchers with questions ranging from locating data to creating interactive web maps. The goal of the help desk is to be the first point of contact when someone needs help with a GIS or spatial technology question. If help desk personnel cannot answer a question, they will find an expert in the U-Spatial network who can.

The Central Core regularly offers a popular GIS 101 workshop. This free, one-day workshop introduces participants to spatial analysis fundamentals, mapmaking, and working with common GIS applications. More than 500 people have attended the workshop, which often leads to contacts with the help desk or further consulting projects involving U-Spatial. Introduction to Web Mapping Using ArcGIS Online was recently added as a free three-hour workshop to introduce participants to how to create online maps using ArcGIS Online. Lidar 101 is another new workshop, offered this fall, that shows participants how to work with lidar data in ArcGIS for Desktop. Lidar data has been collected for the whole state of Minnesota and is currently being processed; having statewide lidar data has created interest among a wide variety of researchers.

To help sustain collaborative connections, U-Spatial supports bringing outstanding national and international researchers working on spatial issues to participate in colloquia hosted by departments/units. The primary criteria in making selections include the relevance of the speaker's spatial-related work to the university community and the capacity for presenting on topics that interest host departments, as well as the larger community. The aim of bringing in these speakers on the part of U-Spatial is to create a more persistent presence and framework for spatial science activities.

One of the first jobs that U-Spatial undertook was a census of spatial science researchers on campus. The U-Spatial team found that there are nearly a thousand people working with spatial information at the university. The sharing of information is crucial for people to expand their skills and knowledge, as well as foster research collaboration. In October, U-Spatial hosted the first U-Spatial Symposium, which brought together researchers from across UMN. The symposium featured a student poster competition and divided people into breakout sessions to discuss core interests for networking and provide guidance for the future of U-Spatial. In spring 2012, U-Spatial started a GIS user group for people to get together and share ideas. Having a regular meeting will allow people to learn who else is working with spatial data on campus and create a network of expertise. Anyone associated with the university is welcome to participate in the user group.

A final area where the Central Core has focused effort can best be described as raising awareness or marketing. The founding members of U-Spatial are well-practiced in their area of spatial research and for the most part are self-sufficient. But there are many colleagues at UMN who could make use of U-Spatial and resources described earlier. To make these contacts, the U-Spatial staff has been attending a variety of seminars and workshops, as well as countless meetings, to introduce U-Spatial. Growing U-Spatial participation is a first step toward making it sustainable beyond the five years of initial funding.

Imaging Core

Remote imaging, or capturing digital images of the earth from airplanes and satellites, is critical to research domains ranging from deforestation measurement to urban growth analysis. Given the vast amount of data involved and the expertise and systems necessary for converting raw data into a format suitable for scientific analysis, researchers cannot currently take full advantage of these resources. U-Spatial helps support research at regional, state, national, and global scales and make remote imaging more accessible to UMN researchers. Currently, RSGAL provides assistance to researchers interested in using imagery and also provides raw and interpreted data products to all researchers. U-Spatial leverages existing imaging research to create detailed histories of Minnesota land and water resources. RSGAL manages data from multiple sensor platforms and offers expert help on image collection and analysis. PGC, the department of Computer Science and Engineering (CSE), and the Institute of the Environment (IonE) specialize in acquiring and analyzing global-scale imagery and attendant data. U-Spatial is building on these and several existing UMN research projects to develop some of the best available characterizations of global features, such as land cover, agriculture, and urbanization.

Data Core

A special issue of *Science* titled "Dealing with Data" (February 11, 2011) argues that it's important to deal with the growing "deluge" of huge and complex datasets in the face of critical shortcomings in data archiving and discovery. These needs are writ large for spatial science research on campus. U-Spatial is helping researchers archive their data, curate it, and make it discoverable and reusable by others at the university and beyond.

The University Libraries and MPC leverage their deep expertise in data management, archiving, and discovery services to improve data *reuse* and *citation* capabilities. *Reuse* refers to the ability to archive datasets, making them searchable and available over time for multiple uses and users, thereby minimizing duplication of research. *Citation* goes beyond basic metadata concepts to provide a robust identification framework for connecting data sources to scholarly publications. Data management services will facilitate and regulate open access to contributed datasets via a data portal and web communities that assist with spatial knowledge discovery. U-Spatial is in the process of exploring the use of data architectures that facilitate sharing with other university institutions.

The Data Core has developed a plan for collaborating with large data projects and is developing a prototype data management and access environment for geographic information. Access to spatial data is being addressed from two directions. One group is piloting a web-based system to make spatial data easy to discover and access; a second group is focusing on the long-term archiving and preservation of data. Out of this work will be procedures for creating data management plans for all research projects, a huge benefit to researchers on campus. Throughout this activity, U-Spatial is collaborating with researchers at a variety of institutions around the world to ensure its efforts contribute to the development of broader information infrastructure that is open and standards based.

The University Libraries and MPC are working with the office of information technologies, Enterprise GIS (EGIS), and others to develop a shared U-Spatial Data Core server infrastructure for the university. In addition to hosting specific projects as needed to support data activities, it will host virtual servers and a technology stack of Fedora Commons Repository archive software; the Lucene/Solr indexer platform; and spatial tools, such as MapServer, OpenGeoportal, ArcGIS for Server, and ArcGIS Online.

Analysis Core

Research on complex systems and complex issues, such as climate variability and rapid social change, requires advanced spatial analysis. While U-Spatial supports all spatial research on campus, its initial focus is leveraging current interdisciplinary research on human-environment systems to develop a solid foundation for the sustainable research infrastructure of the spatial university. The Analysis Core has been making important steps in developing the specifications for a geodesign environment that will support researchers in the Hubert H. Humphrey School of Public Affairs (HHH); College of Design (CDes); and College of Food, Agriculture and Natural Resource Sciences.

Both IonE and Computer Science and Engineering have been collaborating on developing modeling for networked data. CURA has hired a research assistant to support requests for scientific data from the community by creating a web mapping application of CURA's project work statewide to facilitate handling and enhancing access to external queries, as well as supporting the development of more connections to the Urban Research and Outreach-Engagement Center by offering workshops on how to use ArcGIS Online.

These activities all involve the three areas of modeling, geodesign, and mapping.

- **Modeling**—IonE and CSE collaborate to develop modeling infrastructure, including a library of open source models and expertise for applying it to various domains. U-Spatial will also develop specific datasets that are currently in great demand, such as a spatially enabled public health database that is tied to census data or access to parcel data describing Minnesota and other places.
- **Geodesign**—CDes, IonE, and HHH focus on geodesign—the application of technology to allow decision makers to collaboratively construct and evaluate landscape plans using spatiotemporal modeling and three-dimensional visualization. Geodesign nodes will host touch tables and multiple display facilities that will be synchronously interactive using ArcGIS 10.1 for Server services and web-based client interfaces.
- **Mapping**—The University of Minnesota has several mapping initiatives under way. It is a beta tester and early adopter of ArcGIS Online subscriptions. This transformative service will help with curriculum, research, and administrative spatial analysis. Much of U-Spatial's testing of the service relates to how it can be implemented in a large and diverse organization. U-Spatial is working out issues with administration of ArcGIS Online that require the organization to look at how U-Spatial shares data and maps in a new way. CURA and EGIS build on successful GIS and web mapping programs that provide data and expertise to researchers working on scientific problems in Minnesota and elsewhere. The University Libraries have datasets for many regions of the world, consisting of thousands of data layers extending back to the 1800s, giving our researchers a competitive advantage in domains ranging from racial diversity to ecosystem services.

A Little Help from Friends

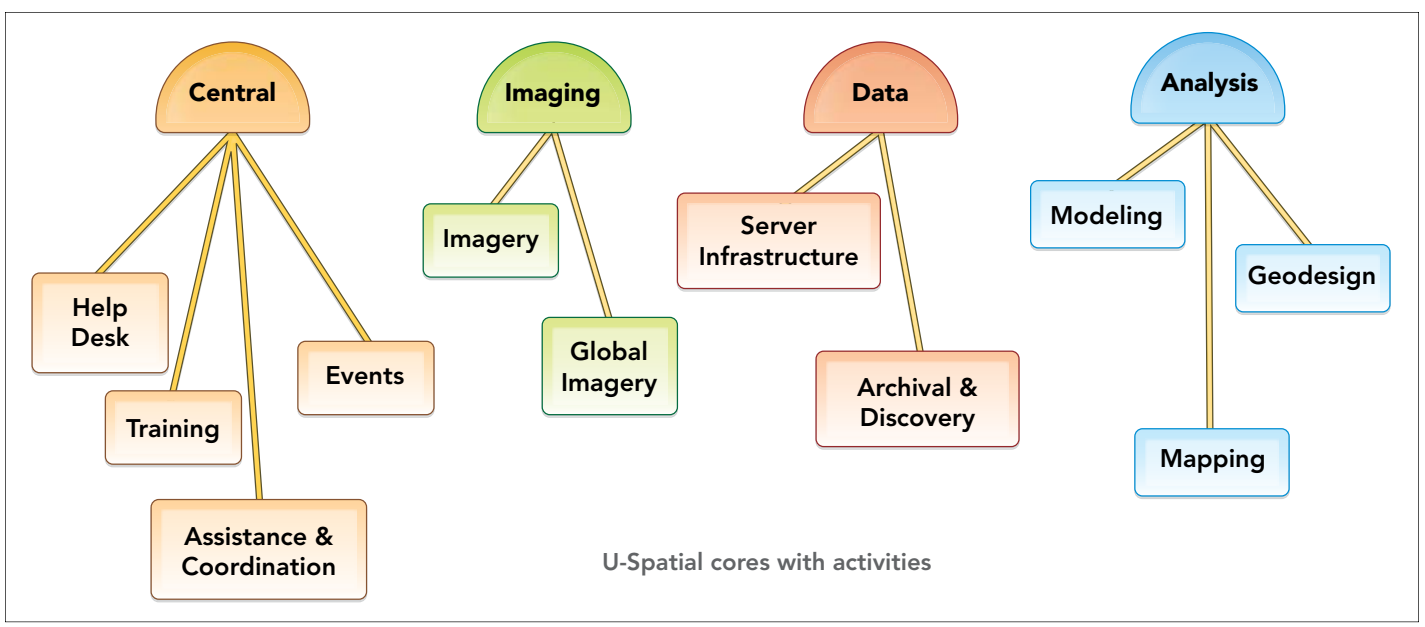
U-Spatial is only one piece of the future spatial university. Curriculum, outreach, and programs will have to evolve. U-Spatial is fortunate to have received significant support from the Office of Vice President for Research and the College of Liberal Arts in the stages that led to the successful U-Spatial collaborative proposal.

An important check for U-Spatial was a survey conducted in spring 2012. The staff contacted close to 300 people across the university with an invitation to complete a short survey to help refine the vision and prioritize the activities of U-Spatial. The responses gave broad and useful input for developing U-Spatial.

A Simple Concept with Many Impacts

U-Spatial is a simple concept for a large research university that provides the foundation for the development of the spatial university. When fully developed, U-Spatial will support the research, learning, and service missions of the university. The short-term goal is to ensure that U-Spatial provides an umbrella for science and creative activities and organizes researchers into an interconnected network of cores.

In addition to focusing on providing help and other services, for U-Spatial to be sustainable, it will also need to identify several layers of funding sources. At the large scale, it is actively participating with researchers throughout UMN to secure outside grants. At smaller scales, U-Spatial provides GIS and remote-sensing expertise to a growing number of research projects, helping them grow, and provide specialized training that is turning out to be an excellent value for those who take the courses. This diversified approach to funding and sustainability, along with providing good value to participants within U-Spatial, will help ensure that support for spatial research is pervasive at the University of Minnesota.



U-Spatial cores with activities

About the Authors

Francis Harvey is director of U-Spatial and associate professor of geography. He is one of the U-Spatial cofounders and contributed to previous projects as well. With input from across the University of Minnesota, he guides the implementation of U-Spatial on its path to becoming one of the world's premier centers for the spatial sciences. Len Kne (lenkne@umn.edu) is associate director of U-Spatial. Kne leads the day-to-day operations of the Central Core and looks forward to the day when everyone is thinking spatially. Steven Manson (manson@umn.edu) is an associate professor in the Department of Geography and directs the Human-Environment Geographic Information Science lab. He also cofounded U-Spatial and its antecedents, including the Geospatial Consortium, and is excited about continuing the development of spatial science and activities on campus.

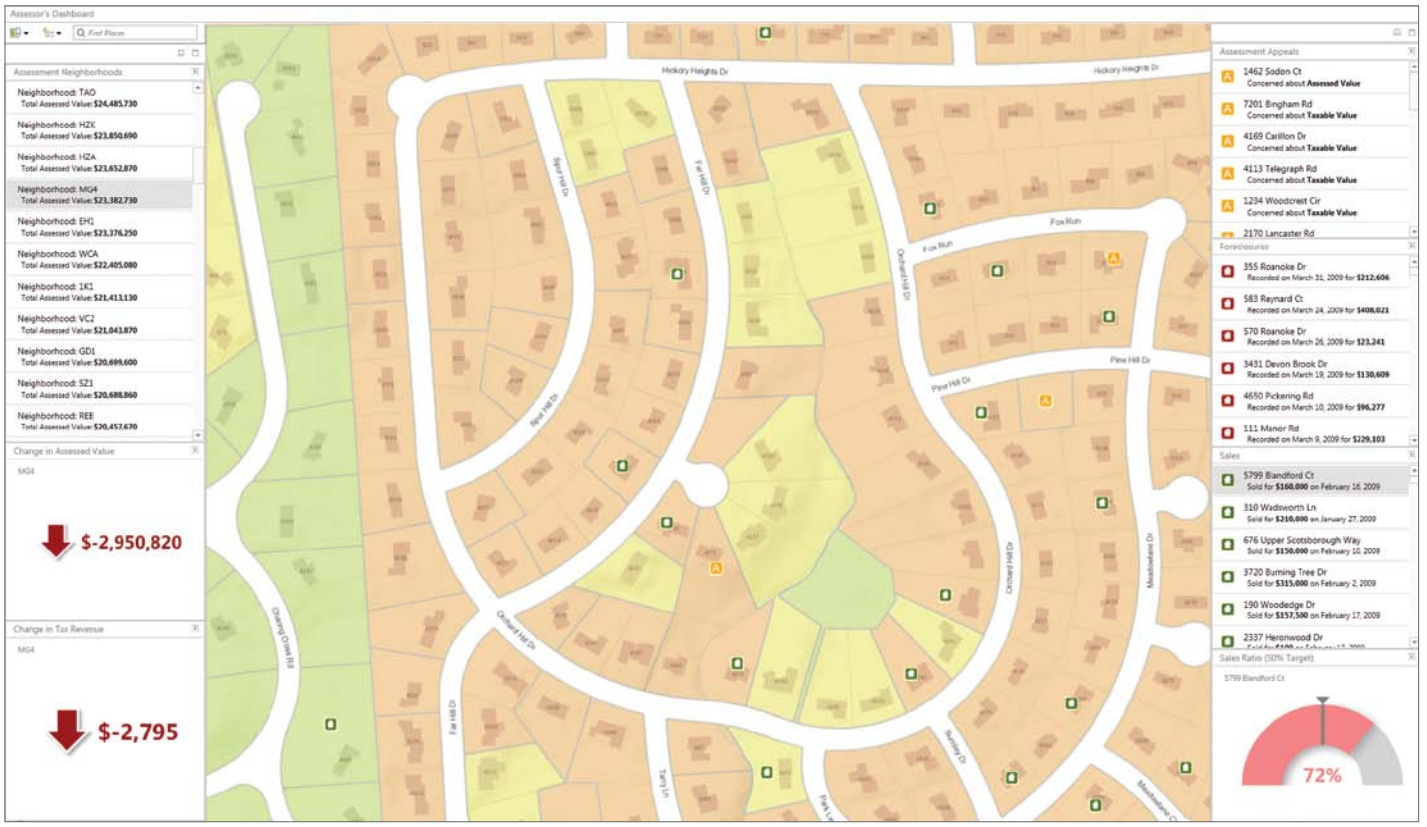
For more information, contact Francis Harvey, director of U-Spatial and associate professor of geography, University of Minnesota (e-mail: fharvey@umn.edu).

Transforming ArcGIS into a Platform

continued from cover

across organizations and the geospatial community at large. The initial release of these efforts was launched last summer in the form of ArcGIS 10.1 and ArcGIS Online. This initial effort is now being continuously upgraded by a dedicated engineering team with the ambition of fundamentally transforming GIS and how people use it. This new generation of our technology has been embraced by thousands of organizations and is already providing great value to our users in their efforts to leverage maps and geographic knowledge across their institutions and beyond.

While there are literally thousands of technical features that characterize this platform, I would like to begin by sharing our intent and what we believe ArcGIS as a platform means. These efforts will allow our users to better understand the big changes taking place and to take advantage of our work.



Operations Dashboard for ArcGIS showing a parcel assessor view of property valuation and transactions.

ArcGIS as a Platform—What Is It?

ArcGIS Online is an entirely new part of ArcGIS and extends ArcGIS into a platform, providing both online mapping/geographic analysis, as well as enterprise portal and geospatial content management. It complements and extends on-premises ArcGIS resources by providing cloud computing, as well as rich content and services.

ArcGIS as a platform provides open geospatial capabilities to any user and allows access by any application on any device anywhere, anytime. A new concept of dynamic web maps is a central aspect of this platform and facilitates the organization, sharing, and use of geospatial content, maps, and data within groups and across divisions of an organization, as well as between organizations and the public.

ArcGIS also includes a large library of applications and templates that are used to access and apply this content in multiple settings, including mobile, tablet, and desktop environments.

Some of the fundamental features of the new ArcGIS platform are the following:

- Ready to use
  - Self-service mapping
  - Applications across all devices and browsers
  - Content
  - Services (routing, address, geoprocessing, analysis, etc.)
- Strong developer access and tools
- Platform for easily hosting and sharing applications and content
- Dynamically scalable and redundant (cloud infrastructure)
- Open and accessible using standards
- Supports all geospatial data types, including real-time server networks
- Provides an ecosystem of applications, content, and communities for users and partners
- Provides simple access to GIS using a Software as a Service (SaaS) model
- Integrates with ArcGIS desktops
- Integrated with business intelligence (BI) tools (Microsoft Office, SharePoint, etc.)

Historical Context

Over the last four decades, Esri has evolved both its business model and technology offerings through four distinct phases always focused on GIS software services and support.

In the early years (1969 to 1980), Esri applied GIS as services work. These were largely GIS-based planning, engineering, and environmental projects. We used our own custom software to carry out hundreds of mapping and geographic analysis projects at scales ranging from small sites to global analysis.

In the 1980s and 1990s, Esri's focus shifted dramatically toward developing and disseminating generic GIS software tools and products. Our work centered on developing software products that enabled users to do their own applications and build full GIS systems. We also provided technical and educational support and implementation services and developed a robust partner network that resulted in our partners being technical and marketing leaders in their fields.

Over the last 15 years, Esri has focused on extending our products to support enterprise GIS implementations. This entailed expanding the capabilities of our products, adding enterprise licensing and support services, and providing new solution architecture needed to support enterprise-scale systems.

The next big step has involved transforming ArcGIS into a geospatial platform. This is a dramatic shift and a major turning point for both our users and Esri itself. One of the exciting parts of this shift is the huge opportunity this architecture provides our users. It is also worth noting that the engineering we have done ensures that the technologies that our existing users employ (desktop, server, databases, etc.) are fully integrated. The new platform has the effect of integrating existing deployments into a system of custom, leveragable, systemic resources.

ArcGIS as a platform leverages web and cloud patterns using an SaaS business model. It provides a place for sharing user content, as well as a large library of ready-to-use basemaps and geospatial services as part of the platform. Finally, the platform supports many easy-to-use applications, including self-service mapping and ready-to-use templates that support individuals, organizations, governments, and developers.

The Goal Is About Opening GIS to Everyone

One of the primary drivers of the ArcGIS as a platform initiative has been making GIS easier not only for new users but for advanced users, as well. In addition, the platform is open, extendable, and can be leveraged by others, facilitating both the integration of other geospatial technologies, as well as other enterprise IT and web services of many origins.

Who Uses the Platform?

The ArcGIS platform is designed to support three different user communities:

ArcGIS for Organizations—Professionals can use the platform for mapping, geographic analysis, and data management and sharing. The new ArcGIS Online framework enables organizations to easily share their information in a common environment while respecting the emerging policies and interests of providing open data. This technology has been carefully designed to integrate with traditional GIS workflows, as well as non-GIS geospatial systems. This includes users who wish to enable geospatial access across organizations with common platform technology, sharing services, content, applications, and related know-how. Over the last two decades, geospatial professionals have expressed this vision as a spatial data infrastructure (SDI). The ArcGIS platform allows the SDI vision to come alive with modern cloud/web architecture and, at the same time, integrate and respect the policy initiatives of governments around the world.

ArcGIS for Developers—Developers can use the platform to leverage its content and services to make their own applications and services that embed or interact with the core ArcGIS platform capabilities. Developers can extend the system into new areas and provide new focused workflows and tools for GIS and non-GIS users. We believe that enabling developers on the ArcGIS platform will be important to all our users.

ArcGIS for Location Analytics—Businesses and IT organizations can use the platform to integrate mapping and geospatial analysis into business systems (e.g., BI, ERP, CRM). We call this ArcGIS for Location Analytics.

In 2013, Esri is also focusing on the direct integration of the ArcGIS platform with a number of business system technologies. These include Microsoft Office and SharePoint and business intelligence solutions from IBM Cognos, MicroStrategy, and SAP. This integration is transforming the applications of GIS into other dimensions of IT within organizations. This technology pattern not only allows anyone in an organization to easily make maps with their business data but also supports the integration of traditional business data with the other types of GIS information traditionally housed within GIS organizations.

What's Next?

Moving forward, Esri will focus on four major areas: enterprise, online, applications, and developers.

The first and foremost direction of Esri will be to continue incremental releases of its enterprise technologies (desktop, server, etc.). With respect to desktop improvements, the upcoming releases will continue to take advantage of the most modern computing advances in the desktop/Windows space and add new features and make quality and functional enhancements in mapping 3D visualization and analysis. ArcGIS for Server technology has been extensively modernized at 10.1 but will continue to be advanced with new enhancements that support private clouds, big data, servers, networks, dynamic image processing, and other real-time streaming data. These and other improvements will be made available in a series of incremental releases every three to six months over the next few years.

The second major development direction involves the evolution and extension of ArcGIS Online. This cloud GIS environment is rapidly expanding in both capabilities and use. Today, users have created and shared more than 1 million maps, datasets, and applications and are creating more than 100 million online maps every day. This success is based and built on a large set of foundation mapping and content capabilities that are being extended with spatial analysis this spring. We also continue to add and improve our basemaps and content for our users to exploit, including imagery and geodemographic data, as well as related online services for geocoding, routing, and geographic analysis. For traditional users, it is envisioned that these online services will both complement and extend the work they do on premises at our user sites. This is bringing GIS to a whole new community that uses only ArcGIS Online via web clients and mobile devices.

Our third focus is the release of a new family of applications. These applications are easily configurable and support generic categories of geocentric work (e.g., data entry and editing, mapping, spatial analysis, geodesign, and 3D visualization). These applications are part of ArcGIS and will allow users to leverage not only the information contained in ArcGIS Online but

also distributed services located in on-premises servers, both in our customer base and from our partners.

Our final focus is on enabling developers to build applications and extend our system. Developers can leverage our tools to extend our applications, but they are also building new applications for the desktop, mobile devices, and web browsers. These applications both enable traditional GIS work and open up whole new opportunities to geoenable other systems, providing location awareness or a map-based paradigm for understanding information. Esri continues to support the leading development patterns (HTML5, WPF, .NET, Java, and others) and platforms, giving developers the choices they require.

The Role of Standards

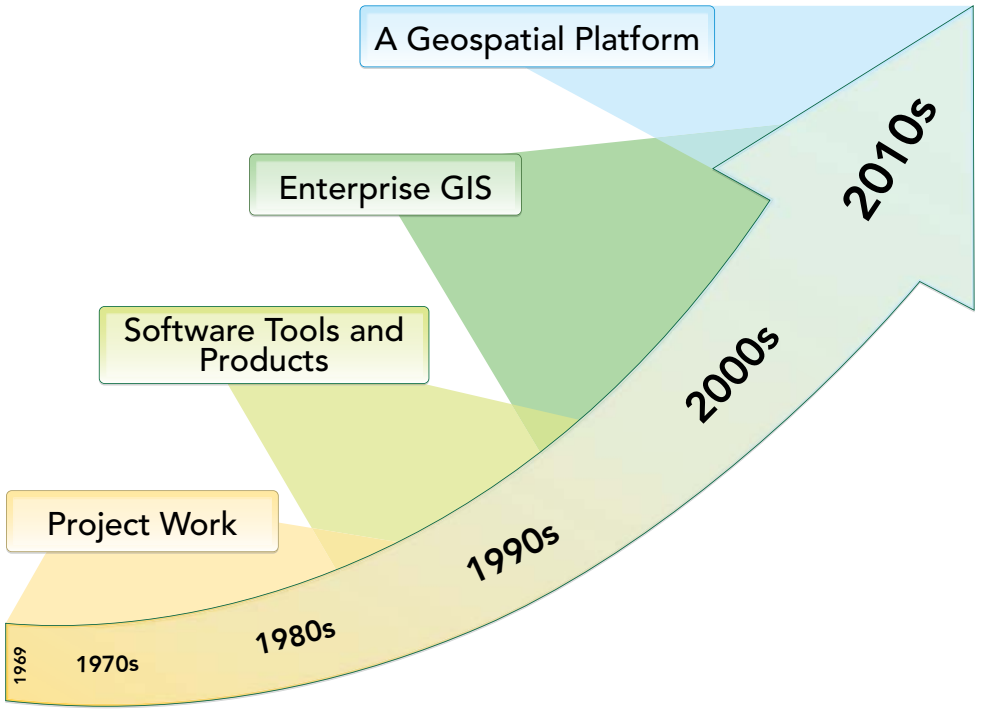
Key to the success of any platform is the adherence to open standards, and Esri has aggressively done this with its implementation of ArcGIS. Over the years, we have spent millions of dollars to ensure that our products support both geospatial, developer, and IT standards.

In addition, Esri has worked closely with the Open Geospatial Consortium, Inc. (OGC), for many years and remains one of its largest supporters, integrating its standards into our base platform. We are also working closely with the ISO and WWW communities so that our product suite remains standards based across the IT and web worlds.

A Platform for the Future

ArcGIS is a platform for sharing geospatial intelligence around the world. Looking to the future, we see our platform strategy as being of great benefit and value to our users, partners, developers, and ultimately the world itself. It is already creating an ecosystem and community of GIS users who are leveraging each other's resources and knowledge.

Let me conclude by saying that I appreciate the support of our user community. My sense is that this generation of technology will radically expand the world's awareness and appreciation of geographic knowledge. I am certain that this will make a difference on many fronts, and I welcome the opportunity to continue collaborating with our ecosystem and community of users around the world.



The evolution of ArcGIS as a platform.

A Look at Standards

While there are many standards organizations that cater to creating standards for the information technology community, the Open Geospatial Consortium, Inc. (OGC), and the International Organization for Standardization (ISO) Technical Committee 211 are the two leading geospatial standards organizations. Esri has had a long-standing commitment to standards and interoperability in the geospatial realm. It has maintained a leadership role as a member of the OGC board of directors and the planning and technical committees and has been a participant in numerous test processes, pilot projects, and specification products published by OGC.

Common Geospatial Standards

There are many geospatial standards. They generally fall into one of three categories: data, metadata, and services.

Data standards are used to store geospatial data in a common format or transfer data from system to system via extract, transform, and load (ETL) operations. Open geospatial data standards include KML, GML, OGC, and ISO Simple Features; the shapefile; and, increasingly, the file geodatabase via the File Geodatabase API.

Metadata standards are used to store, organize, manage, and share metadata for geospatial data. Open geospatial metadata standards include ISO Metadata Specifications, the Content Standard for Digital Geospatial Metadata—Federal Geographic Data Committee, OGC Catalog Service for the Web, and Z39.50 library catalog services.

Services are standards used to transfer data over the web or provide remote access to data stored on a web server. These services allow users to interact with the data, usually through simple web clients, on a live, real-time basis. This includes viewing maps, accessing and querying data, running analyses, and downloading data. Open geospatial services standards from OGC include Web Map Service, Web Feature Service, Web Coverage Service, Web Map Tile Service, and Web processing service (WPS). Additionally, in 2010, Esri released the ArcGIS REST API (GeoServices REST) as an open specification under the Open Web Foundation. GeoServices REST services allow web clients to communicate with GIS services via the REST interface. Esri is working with other members of OGC to make the GeoServices REST an established OGC standard.

Esri's Support for Standards

Esri has built the ArcGIS platform to support established standards from the ground up. The ArcGIS for Server architecture is an example of Esri's core services-based geospatial platform to use established standards to meet users' needs. ArcGIS for Server uses a RESTful pattern for its services—a pattern built on core HTTP roots. This makes the services simple to consume and increases the integration points available to connect ArcGIS with customer relationship management, business intelligence, and other enterprise-level systems. ArcGIS also supports non-RESTful geospatial standards to provide alternate integration points for interacting with other systems using geospatial standards from OGC or ISO. This design framework helps move the industry forward by leveraging new and improved workflows while making sure that standards-based interoperability considerations are effectively leveraged and maintained.

Developing New Standards

Standard development is a very long process that includes multiple working groups and technical committees. This can lead to long delays between the development of a standard and its industry-wide adoption. These delays lead to "sync issues," where the establishment of a standard fails to keep pace with the development of new technology. Also, standards—geospatial standards in particular—often have multiple released versions that many vendors support at differing levels. Esri strives to support the latest versions of established standards for the optimal level of interoperability.

Esri does not focus only on established and mature standards but also participates in OGC test beds and other venues for standards development. The WPS specification from OGC is still in development, but with ArcGIS for Server now supporting it at 10.1, Esri is pushing the envelope on building ArcGIS client technologies that support this standard. Esri is open to similar collaborative initiatives to not only keep current with latest technology trends but also build for the needs of tomorrow.

To view resources related to this article, visit **esri.com/StandardsPapers**.

	KML	GML	Simple Features
ArcGIS for Server	X	X	X
ArcGIS for Server using ArcSDE technology (Oracle, SQL Server, PostgreSQL, Informix, DB2)			X
ArcGIS for Desktop	X	X	X
ArcGIS.com map viewer	X		

ArcGIS support for data formats standards.

	KML	WCS	WFS	WMS	WMTS	WPS
ArcGIS for Server	X	X	X	X	X	X
ArcGIS for Desktop	X	X	X	X	X	
ArcGIS.com map viewer	X			X		
ArcGIS Viewer for Flex	X			X		
ArcGIS Viewer for Silverlight	X			X		
ArcGIS API for JavaScript	X			X	X	
ArcGIS API for Flex	X			X	X	
ArcGIS API for Silverlight	X			X	X	
ArcGIS Explorer Online	X			X		

ArcGIS support for web service standards.

	ISO 19115/19139	CSDGM (FGDC)	CS-W	Z39.50	INSPIRE	ISO15836 (Dublin Core)
ArcGIS for Server	X	X			X	X
ArcGIS for Desktop	X	X	X	X	X	X
Esri Geoportal Server	X	X	X	X	X	X

ArcGIS support for metadata standards.

Greg Babinski: Tireless Advocate for Expanding GIS Use in Local Government

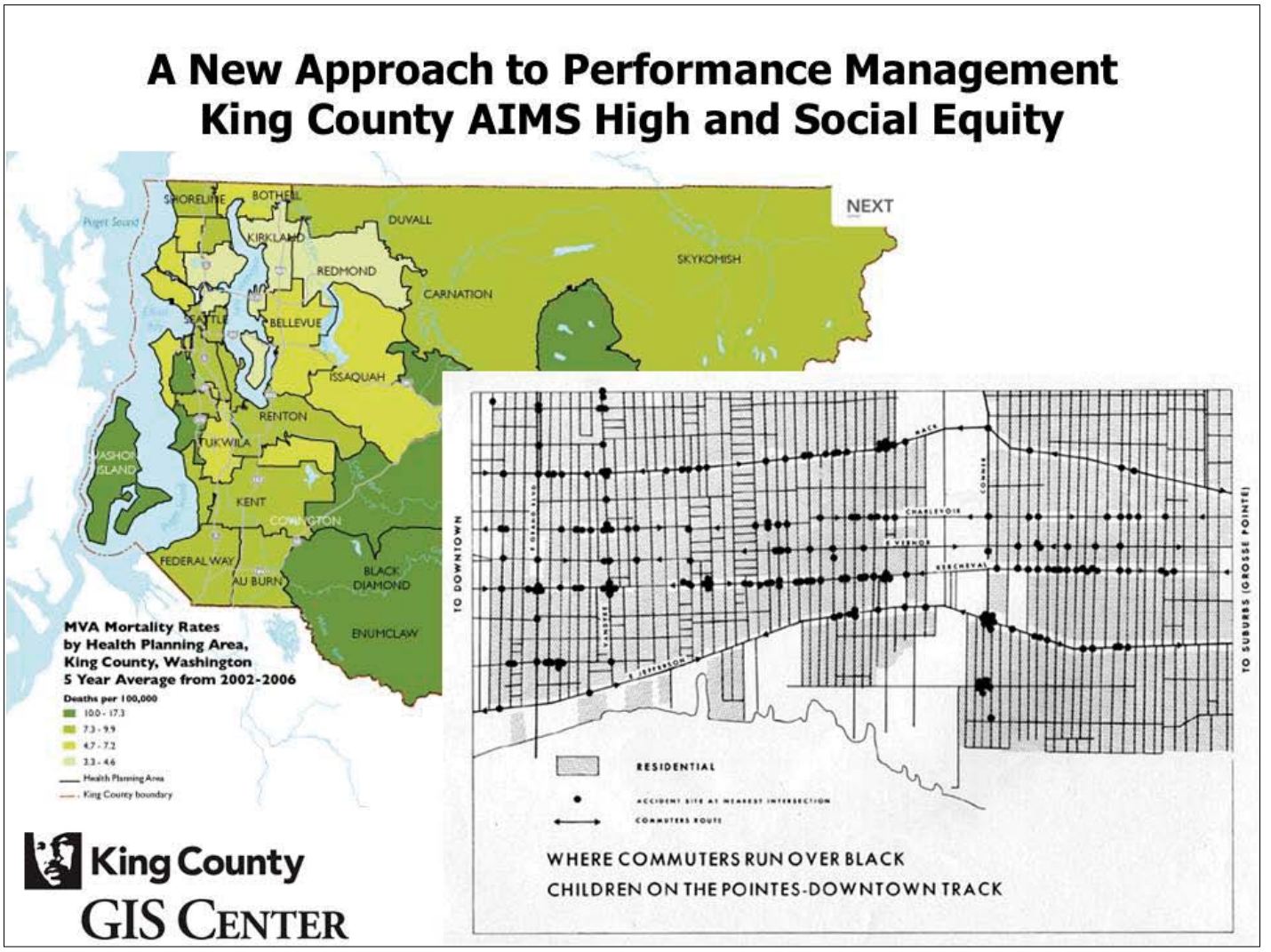
GIS Hero

Greg Babinski

In 1971, when there were few employment opportunities for geography students beyond the classroom, Greg Babinski graduated from Wayne State University in Detroit, Michigan, with a bachelor's degree in geography. One of his teachers was William Bunge, who contributed to the understanding and application of quantitative geography. This research was later further developed with the expanded use of GIS technology. "Influenced by the social unrest of the 1960s, Bunge became a political radical," says Babinski, "but he had great insight into the power of spatial analysis for social justice."

Babinski decided to continue his education at Wayne State and earned his master's degree in geography in 1977. Upon graduation, Babinski went to work as a drafting technician for the Michigan Wisconsin Pipeline Company before moving to California. He worked on the Prudhoe Bay Oilfield project for the Sohio Construction Company and later worked for Johnson Loft Engineers, where he oversaw computer-aided design (CAD) work. "Using CAD provided me with the opportunity to better understand how computer-based design and mapping could be best applied in the real world," says Babinski.

In 1989, Babinski went to work for the East Bay Municipal Utility District in Oakland, California, as the GIS mapping supervisor and began his lifelong affair with GIS. For the past 15 years, he has worked as the finance and marketing manager for the King County GIS Center in Washington State.



King County GIS supports social equity goals with geospatial awareness pioneered by William Bunge.

The King County GIS Center is set up as an internal service fund within the county. "This allows us to control our own budget," says Babinski, "but also means that we have to pay our own way. We rent office space from the county and purchase our own equipment and materials, as well as pay for network services, and so on." A key part of Babinski's job is to explain the benefits of using GIS to other county divisions and how it would fit into their workflows and support their business models. "The center is steward of hundreds and hundreds of datasets and data layers, and we can help county agencies make better use of them for mapping, applications, and analysis," says Babinski. "The business advantage is that we can help these agencies see their data differently, which allows them to use it more productively." Because agencies understand the business benefits, Babinski has developed a GIS funding model based on objective usage metrics that provides financial support from 35 county agencies, as well as external customers. "It is important for GIS managers to show their customers the connection between their financial support and the benefits and services that GIS provides," says Babinski.

The GIS center has three primary business lines, including enterprise operations for data management and system maintenance, matrix staffing for special long-term projects and programs, and client services in which the center acts as a consulting service.

Ultimately, the client services section developed into the county's GIS Services Express, which provides regional agencies with targeted, low-cost help to get the most out of their use of GIS. Users can select from an extensive menu of services and products, including GIS data, mapping, web design, database support, training, programming, and GIS program support. "GIS Services Express is based on the service delivery model that has successfully supported distributed GIS activity in King County for many years," says Babinski.

Babinski argues that the ultimate goal of the client services section should be to put itself out of business by encouraging GIS users in the county to make better use of GIS themselves so that they can reduce their costs and make their departments more self-sufficient. "I think that we should always be looking for opportunities to create simple GIS tools or applications or provide training," says Babinski. "We will serve the county best by putting GIS tools in the hands of the end users."

A few years ago, Babinski contacted Dr. Richard Zerbe, director of the University of Washington's Benefit-Cost Analysis Center at the Evans School of Public Affairs, to determine the feasibility of conducting an analysis of the long-term cost benefit of an enterprise GIS in King County. Cofunded by the county and the State of Oregon, Zerbe and his associates studied the use of GIS by the county from 1992 until 2010 and determined that during that 18-year period, King County accrued net benefits of between $776 million and $1.7 billion, with costs totaling $200 million (see "King County Documents ROI of GIS," *ArcNews*, Summer 2012).

Building on the successful King County GIS cost-benefit study, Babinski would like to see a future GIS return on investment study of 10–15 cities throughout the United States and Canada to determine if those cities are experiencing similar financial benefits. "We'd be looking at return on investment, but we would also want to get other comparative information from each municipality," says Babinski. "What are the components of their GIS? How is it organized? How's it structured? What are the applications? What other technology are they using in conjunction with the GIS?"

Babinski's interest in this outreach comes from his longtime involvement with the Urban and Regional Information Systems Association (URISA), a national organization of professionals who use GIS and other information technologies to solve challenges in state, regional, and local government agencies and departments. Babinski has served in various national leadership positions in URISA, including secretary; treasurer; and, most recently, president.

As president of URISA, Babinski promoted an initiative to attract more international members to the organization. At the moment, there is a URISA Caribbean chapter, as well as four chapters in Canada, and a new one in the United Arab Emirates. Babinski hopes that within the next 10 years, 50 percent of the membership will come from outside the United States. "I think that expanding the international scope of URISA will be beneficial to the entire membership," says Babinski. "The organization is 50 years old, and we have much to share with those outside the United States. However, there is also a great deal that we can learn from those using GIS and other information system technologies in local government throughout the world. What are their challenges in implementing IT technology? How do they differ from our own? What are the similarities? I think there is a lot of opportunity for mutual benefit by extending our outreach internationally."

Babinski recently announced the GIS Management Institute (GMI), a new initiative by URISA (see "Geospatial Society, the GIS Profession, and URISA's GIS Management Institute," *ArcNews*, Fall 2012), at the 2012 Esri International User Conference. According to Babinski, "GMI will develop resources and services that focus on promoting the advancement of professional best practices and standards for the management of GIS operations." The new initiative will begin by building on resources that URISA has already developed, including the GIS Capability Maturity Model (see "URISA Proposes a Local Government GIS Capability Maturity Model," *ArcNews*, Winter 2010/2011), used to assess an organization's ability to accomplish defined tasks, and the Geospatial Management Competency Model (GMCM). The GMCM specifies 74 essential competencies within 18 competency areas that characterize the work of most successful managers in the geospatial industry and is an element of the US Department of Labor Employment and Training Administration's Competency Modeling initiative.

"I think that the future of GIS and of extending the concepts of geospatial thinking within society relies on professional standards-based education," concludes Babinski. "Whether in formal university degree programs or through classes and initiatives supported by professional organizations, such as URISA, or for that matter, the GIS classes we conduct at the King County GIS Center, maps can help us better understand and analyze the relationship between seemingly unrelated things or events. And nothing gives me greater satisfaction than seeing the use of spatial analysis for social justice that Bunge pioneered being applied here at home in King County or worldwide via URISA's GISCorps. After more than 40 years, for me, geography is still where it's at!"

For more information, contact Greg Babinski, MA; GISP; finance and marketing manager, King County GIS Center; URISA GIS Management Institute Committee chair (e-mail: greg.babinski@kingcounty.gov, tel.: 206-263-3753).

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ArcGIS Online What's New?

This regular column contains information about the latest updates to ArcGIS Online, including new features and capabilities, as well as updates to basemaps and content contributed by the global user community through the Community Maps Program.

Map Viewer Enhancements

You can now create interactive filters that allow you to discover and present focused views of your data in a hosted feature layer. You can answer simple questions such as, What is in this dataset? and What information applies to my work? To the person viewing a filtered web map, the filter appears as just another layer in the map. For example, you might create a filter on crime data to show only a specific crime type, such as arson. Your audience can select a different type of crime instead. In addition, you can display an interactive table of the attribute information in a web map, giving you a way to quickly view the data in the feature layer of a map.

You can now set layers to display within a range of map scales. Previously, you could set visibility on only certain types of feature layers. You can also now control time settings at the map level. Time settings include a minimum and maximum time extent for the map, a refresh interval for layers, and map display in local time.

As the owner of an editable feature service, you can disable editing on the layer in a web map. This is useful if you want the service to be editable but also want to display the feature data in a web map without allowing people viewing the map to edit the data.

Publishing Enhancements

With your ArcGIS Online subscription, you can publish hosted tiled map services from your tile packages. This allows you to publish your maps on ArcGIS Online without regenerating your tiles if you have already created them on your server. You can also now publish hosted tiled map services from your feature services directly on ArcGIS Online without needing ArcGIS for Desktop. In addition, you can now publish time-enabled feature services on ArcGIS Online. You can use your temporal hosted service to create time-enabled web maps.

Sharing Enhancements

When you register secured ArcGIS for Server token-based services with ArcGIS Online, you now have the option to store authentication credentials along with the service item. This means that ArcGIS Online does not prompt end users for authentication when they access the service, for example, in a web map.

ArcGIS Online administrators can now create view-only groups, where only the group owner can contribute content. Members of the group can access items added by the group administrator but cannot share their own content with the group. Administrators can also directly add members to a group, specify a default field for sorting the order of items, and remove items from a group.

The template gallery for creating web mapping applications has been updated. A new mobile routing template; a multiviewer template for desktop, tablet, and phone use; a feature viewer template; and a social media template have been added. Templates that have been retired from the gallery are still available as items on ArcGIS Online. You can search ArcGIS Online with the keyword *template* to find all the available web mapping templates.

Administrators of an ArcGIS Online subscription now have the ability to use the organization's print service for printing web maps with their own map layouts.

Content owners can now subscribe to an RSS news feed for comments on an item. This is especially useful if you want to be notified through your favorite RSS reader when somebody has feedback on one of your items.

Other Enhancements

CityEngine users can now create and author 3D city scenes with CityEngine 2012 and publish and share them directly to ArcGIS Online. Using the CityEngine web viewer, anyone can interact with 3D urban landscapes using a web browser. You can navigate the map by zooming, panning, and rotating; change the viewpoint; choose specific layers to view; search for objects and attributes; change sunlight and shadowing; share through various social media; and view additional information about the map. Visit the CityEngine Web Scenes group in ArcGIS Online to explore some examples. To find the group, go to **arcgis.com** and type in *CityEngine Web Scenes* in the search box. Make sure your search is set to Search for Groups.

The World Imagery Map now includes 1-meter GeoEye IKONOS imagery for Accra, Ghana, and other parts of Africa.

The latest release of Esri Maps for Office now supports these nine languages in addition to English: Arabic, Chinese (Simplified Han), French, German, Italian, Japanese, Portuguese (Brazil), Spanish, and Russian. You can download the latest version in the language of your choice at **esri.com/mapsforofficedownload**. Please note that you need an ArcGIS Online paid or trial subscription to use Esri Maps for Office.

A number of enhancements have been made to make it easier for administrators to manage their organization's ArcGIS Online site. Some of the configuration settings have been reorganized into more focused categories. For example, sharing options are now in the Security section. There is also the ability for administrators to disable comments on items owned by their organizations, and for organizations to register their own print service for their own use.

Developers can now add routing and direction capabilities directly to their applications through the Network Analysis Services API.

Support for more languages in ArcGIS Online continues to grow. In the December 2012 release, these languages were added, bringing the total number of supported languages to 20: Danish, Hebrew, Lithuanian, and Portuguese (Portugal). The language setting determines the user interface, as well as the way time, date, and numerical values appear.

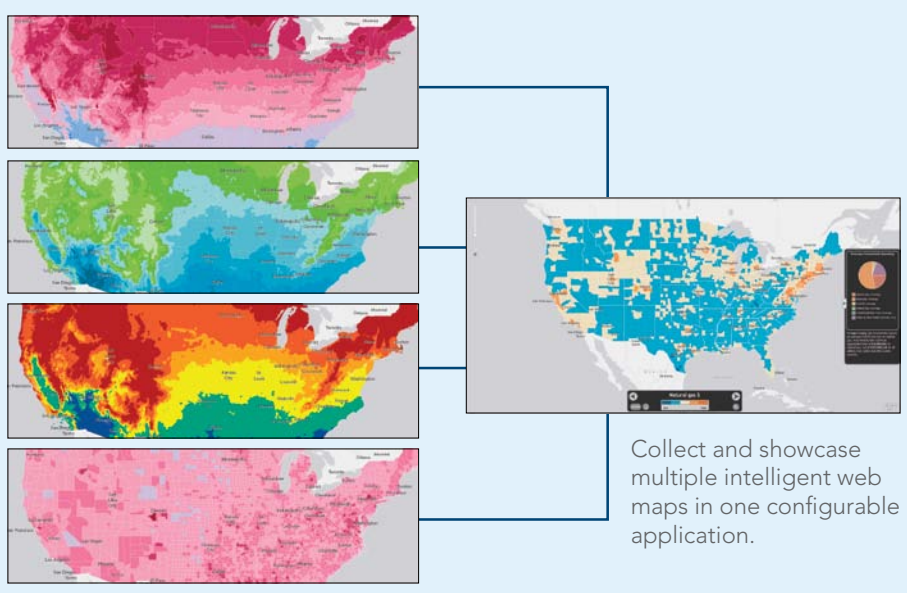
Free Sample Atlas Displays Shared ArcGIS Online Web Maps

Feature Multiple Web Maps in One Application

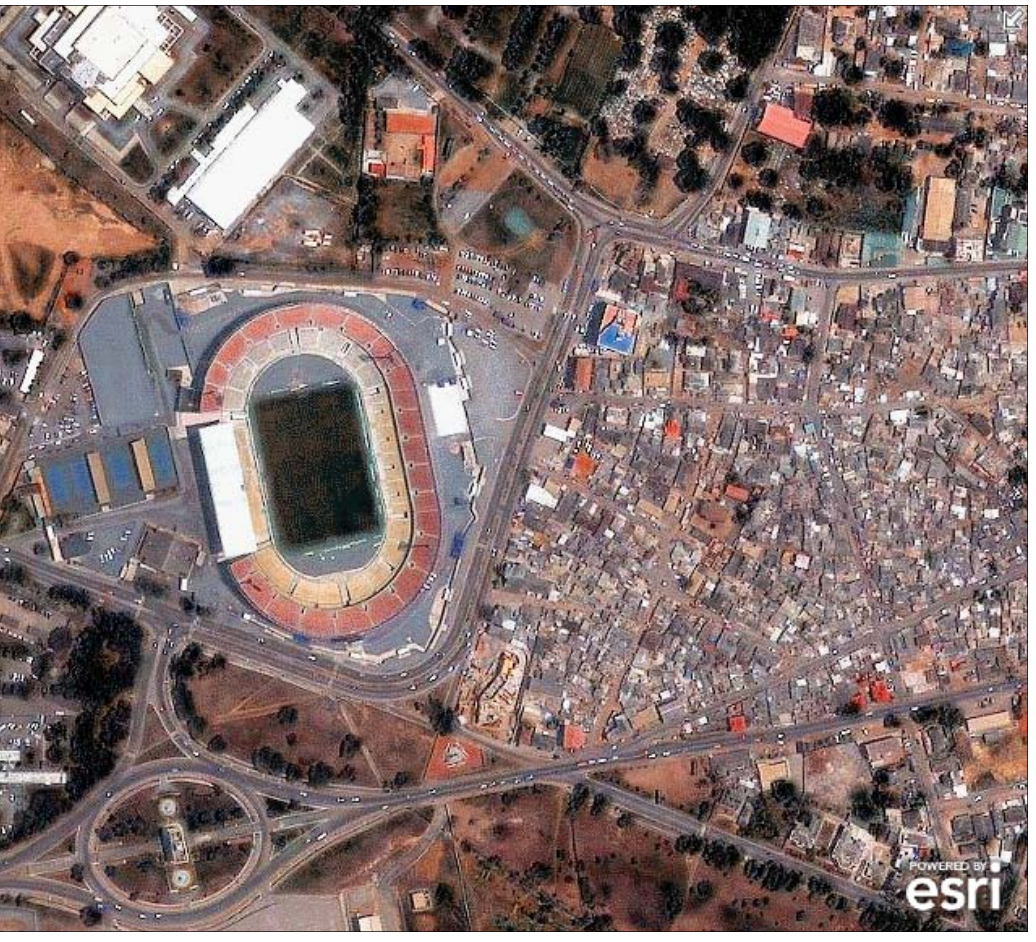
The Esri Thematic Atlas Sample Application is a configurable web application that helps users display a collection of intelligent web maps. The atlas showcases ArcGIS Online web maps in a specific sequence and relationship, with a simple interface for nontechnical map consumers. These thematic maps include pop-up windows with charts and other attribute information about populations, the climate, and more. The maps included in the atlas are designed to work with one another, each focusing on one part of a particular subject—for example, global development, health, or energy usage. The sequence of themes and maps allows users to move progressively through the map collection to look for patterns and explore countries, provinces, counties, and neighborhoods. The application greatly reduces the workload for the audience, dynamically adjusting the map and pop-up window from theme to theme.

Built on ArcGIS API for JavaScript, the application uses web maps created and shared in ArcGIS Online. The atlas is designed to support a GIS team that needs to share multiple thematic maps with a non-GIS audience. The application is a free download and contains a configurable HTML application and JavaScript source code.

To start making your atlas, visit **atlas.esri.com**.



Collect and showcase multiple intelligent web maps in one configurable application.



ArcGIS Online Basemap Updates
The last set from GeoEye's IKONOS 50 million-square-kilometer high-resolution imagery has been added to the World Imagery Map. The set includes expanded coverage of 1-meter resolution GeoEye IKONOS imagery for parts of Afghanistan, Africa, Australia, India, New Zealand, and South America. Contributions to the World Imagery Map through the Esri Community Maps Program include several regions in Canada and Switzerland.

In December 2012, Esri also started adding DigitalGlobe imagery to the World Imagery Map, with 30-centimeter and 60-centimeter imagery from DigitalGlobe's Global Basemap layer being added for the United States and western Europe. More DigitalGlobe detailed imagery for the rest of the world will be added in the coming months.

Data Appliance for ArcGIS was also recently updated to provide the same maps as ArcGIS Online on a network-attached storage device for organizations that need to access these maps behind their firewall. In addition to updated basemap content, Data Appliance for ArcGIS now also includes the National Geographic World Map and the World Light Gray Base and World Light Gray Reference maps. For more information, visit **esri.com/dataappliance**.

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

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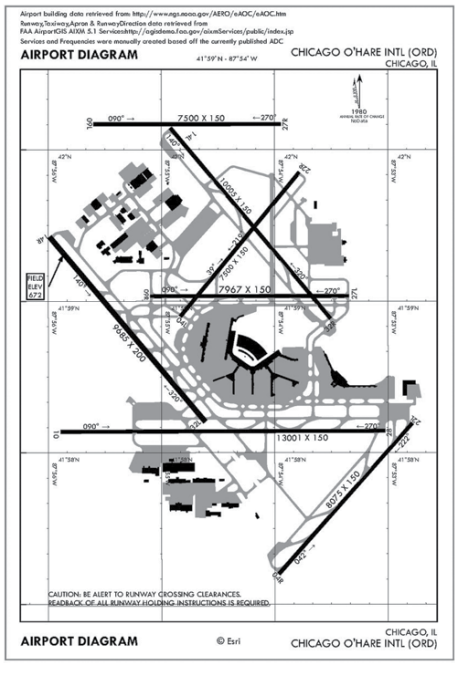
Esri Solution Enhances the Power of Spatial Data

ArcGIS for Aviation Improves Aeronautical Data Management and Chart Production

ArcGIS for Aviation is a new solution to support users in the aeronautical information management, air navigation service provider, and airport markets. This solution enables users to create, manage, review, and share aviation data. ArcGIS for Aviation includes ArcGIS for Aviation: Charting and ArcGIS for Aviation: Airports. Together, these products provide a comprehensive geospatial platform for aeronautical chart production and airport operations data management:

ArcGIS for Aviation: Charting (previously Esri Aeronautical Solution) improves, standardizes, and increases data and workflow management by allowing standards-based aeronautical data to be captured, maintained, and managed in a centralized database. With it, users can produce standardized and customized electronic and paper aeronautical charts.



Create aeronautical charts using AIXM datasets (sample chart–not for navigation).

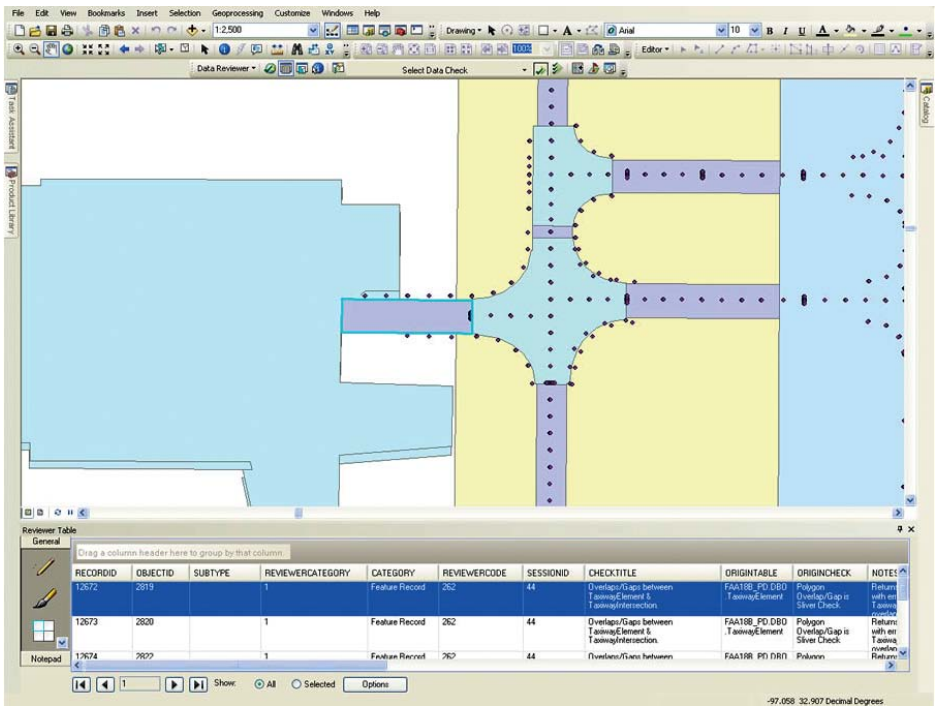
ArcGIS for Aviation: Charting provides the ability to do the following:

- Significantly reduce chart production times via automated batch cartographic processing
- Share data within the aeronautical community using the Aeronautical Information Exchange Model (AIXM) standard
- Enhance data quality through direct loading of digital changes and automating change verification

ArcGIS for Aviation: Airports assists airports and their consultants in complying with data management and quality standards, such as the Federal Aviation Administration's (FAA) Airport Surveying—GIS program. It provides tools, templates, and analysis functionality that introduce efficiencies and new capabilities into the planning, maintenance, and day-to-day operations of airports.

ArcGIS for Aviation: Airports allows organizations to do the following:

- Efficiently collect and manage airport data using a fully implemented airport data model based on the Advisory Circular 150/5300-18 standard
- Improve airport data quality and compliance via automated validation against a preconfigured rule base of more than 450 data checks
- Automatically generate 3D Obstacle Identification Surfaces for planning and analysis against obstacle datasets



Automated data validation tools come with more than 450 preconfigured checks developed from the Federal Aviation Administration (FAA)-18B specification.

"GIS is used across all sectors of aviation, but each sector has unique requirements," says Bruce Frank, Esri's ArcGIS for Aviation program manager. "ArcGIS for Aviation provides our aeronautical information management and airport customers with an optimized solution for their unique business needs."

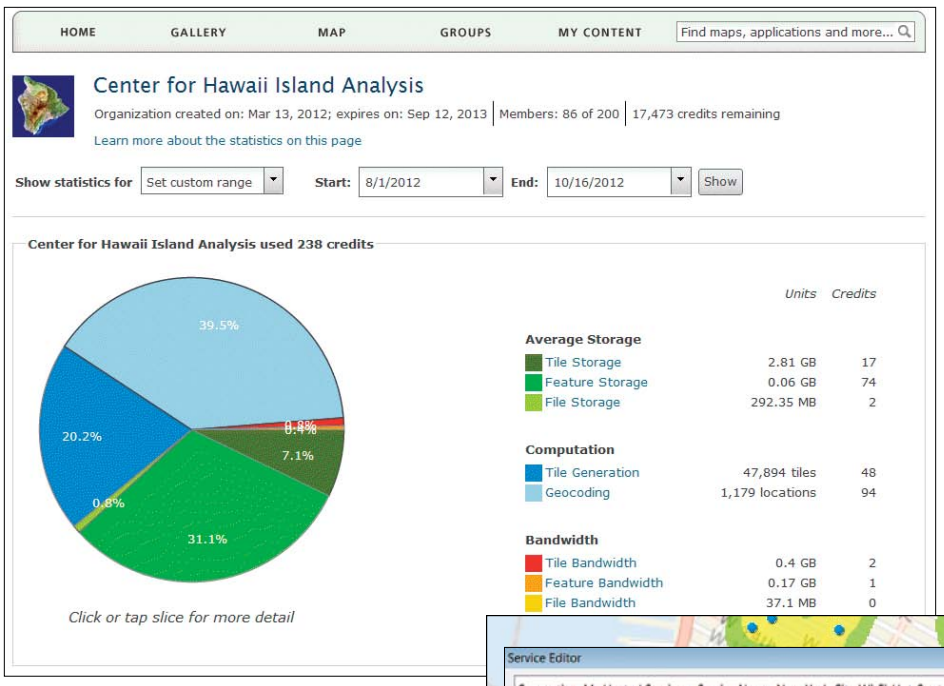
ArcGIS for Aviation is part of the ArcGIS platform to solve problems and gain efficiencies for civil, military, and commercial aeronautical agencies, airports, consultants, and related businesses. It enables organizations to manage aviation data, products, services, workflows, and quality. The platform provides significant efficiencies for creating and maintaining aviation data according to industry standards to support chart production, airspace analysis, airport operations, and regulatory compliance.

For more information on the ArcGIS for Aviation platform, contact aero@esri.com or visit **esri.com/arcgisforaviation**. Users in countries outside the United States should contact their local distributor.

A Clear Path to ArcGIS Online 10.1

Highlights

- ArcGIS for Desktop users are crucial creators and publishers of GIS content to ArcGIS Online.
- Publishers control authoritative content, ensuring data accuracy and currency and quality of the organizational site.
- Publishing and sharing of web services exemplifies the collaborative power of the ArcGIS Online platform.



Monitor ArcGIS Online usage across the organization.

See poster on pages 24–25.

With ArcGIS Online at 10.1, GIS professionals are presented with a ready-to-use cloud platform for supporting business solutions by enabling better communication and collaboration. ArcGIS Online works the way organizations work—supporting understanding and decision making by bringing together groups of key stakeholders and participants. At its core, ArcGIS Online is a full-featured system for organizing GIS projects and distributing maps, data, and tools, but its strength lies in giving users the ability to easily establish collaborative touch points with people—both inside and outside the organization—who need and will benefit from this information.

Account Administration

The first step for organizations new to ArcGIS Online is to set up their ArcGIS Online account. This process is most likely handled by a GIS manager or other departmental lead, who will serve as administrator for the account. The administrator role involves customizing the ArcGIS Online home page and becoming familiar with the built-in dashboard that provides detailed reports about an organization's storage, computation, and bandwidth usage.

Another key action taken by the ArcGIS Online administrator is to add users to the system. Administrators make sure that each new user is assigned one of three roles for interacting with ArcGIS Online. As mentioned, administrators manage the organizational site. They can also designate additional administrators. An administrator can add users—the decision makers, staff, and other essential viewers of the content provided through ArcGIS Online. Another role is that of publisher. Publishers are the content creators, the mapmakers and analysts who generate new content on a regular basis—namely, the ArcGIS for Desktop users and other trusted content producers.

Content Production and Publishing

Content production includes making maps using ArcGIS Online data and tools, adding data from a supported text file or other data format to maps, and making maps with Esri Maps for Office using Excel data. These are all basic tasks that can be performed by any user role and require nothing more than an ArcGIS Online subscription.

The publishing capability allows ArcGIS for Desktop users in particular to create web maps and other information products that can be accessed through browsers and mobile devices, as well as on the desktop. These products can be integrated with other systems, including Microsoft Office.

Publishers control authoritative content, ensuring data accuracy, currency, and quality and, as a result, are critical contributors to the significance of the organizational site. For example, GIS analysts with publisher privileges will use ArcGIS Online as the product delivery platform for the work they do. As they collect or derive new information and geoenable it for use in mapping, they can publish these products and organize them on ArcGIS Online.

Publishers have the unique ability to publish hosted services. There are two types: tiled map and feature services. Desktop users can publish both tiled map and feature services directly from ArcGIS 10.1 for Desktop. This gives the GIS analyst or specialist exceptional control over the quality and performance of web maps produced for the organization. To be sure, a publisher can publish hosted feature services (for end-user editing and querying) directly from ArcGIS Online, but once again, the publisher ensures content quality of products for the organization.

Collaboration and Sharing

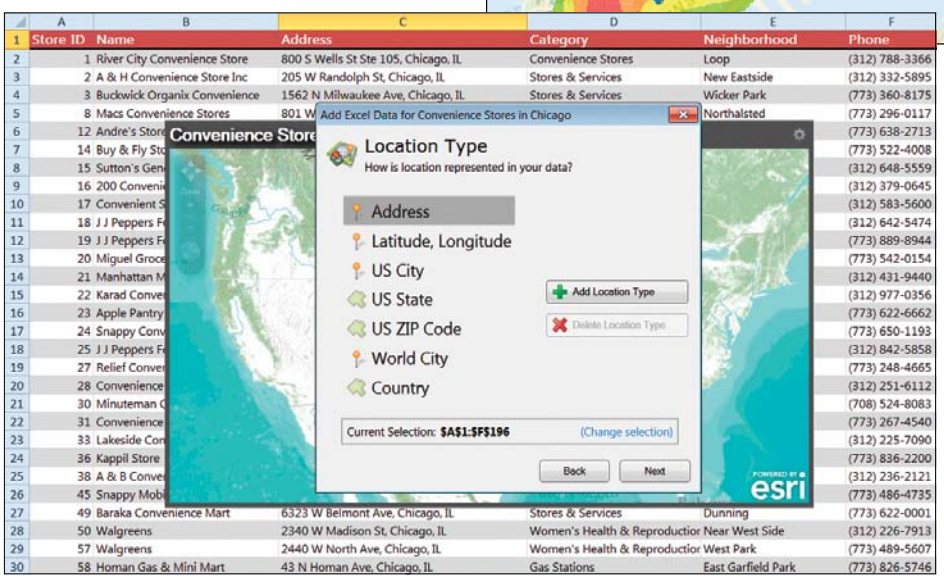
The publisher role also extends additional capabilities to ArcGIS users, particularly desktop users, by making it easier to collaborate with colleagues and business partners beyond ensuring the timely delivery of authoritative content to stakeholders and customers. The services created and then hosted on ArcGIS Online during the publishing process can be pulled back into ArcGIS for Desktop and used for further analysis and modification. This capability allows the GIS analyst to mine and repurpose corporate data, even hosted web services, using the full power of ArcGIS for Desktop. When the analysis is complete, the results can be published back to ArcGIS Online.

This back and forth use (publishing and sharing) of web services exemplifies the collaborative power of the ArcGIS Online platform. GIS professionals can exchange ideas and processes through analysis. They can also use a common, accessible framework to generate and share alternatives and what-if scenarios with decision makers and other knowledge workers, no matter where they are.

Additionally, ArcGIS Online makes it possible for publishers to create embeddable, interactive mapping products that can be placed in websites, blogs, and other social media venues.

Any of the designated user roles can create a group on ArcGIS Online. A group is simply an organizational tool—a specific place—to categorize related or like items of content. Both the ArcGIS Online group and the items contained in the group can be shared. This feature gives the content owner fine-grained control over who (inside and outside the organization) has access to the information. Departments and teams can share information and work on projects together, even if the team members live in different cities or countries.

Publish hosted tiled map services directly from ArcGIS 10.1 for Desktop.



Store ID	Name	Address	Category	Neighborhood	Phone
1	River City Convenience Store	800 S Wells St Ste 105, Chicago, IL	Convenience Stores	Loop	(312) 788-3366
2	A & H Convenience Store Inc	205 W Randolph St, Chicago, IL	Stores & Services	New Eastside	(312) 332-5895
3	Buckwick Organix Convenience	1562 N Milwaukee Ave, Chicago, IL	Stores & Services	Wicker Park	(773) 360-8175
8	Macs Convenience Stores	801 W		Northalsted	(773) 296-0117
12	Andre's Store				(773) 638-2713
14	Buy & Fly Sto				(773) 522-4008
15	Sutton's Gen				(312) 648-5559
16	200 Convenie				(312) 379-0645
17	Convenient S				(312) 583-5600
18	J J Peppers Fe				(312) 642-5474
19	J J Peppers Fe				(773) 889-8944
20	Miguel Groce				(773) 542-0154
21	Manhattan M				(312) 431-9440
22	Karad Conve				(312) 977-0356
23	Apple Pantry				(773) 622-6662
24	Snappy Conv				(773) 650-1193
25	J J Peppers Fe				(312) 842-5858
27	Relief Conve				(773) 248-4665
28	Convenience				(312) 251-6112
30	Minuteman C				(708) 524-8083
31	Convenience				(773) 267-4540
33	Lakeside Con				(312) 225-7090
36	Kappil Store				(773) 836-2200
38	A & B Conve				(312) 236-2121
45	Snappy Mobi				(773) 486-4735
49	Baraka Convenience Mart	6323 W Belmont Ave, Chicago, IL	Stores & Services	Dunning	(773) 622-0001
50	Walgreens	2340 W Madison St, Chicago, IL	Women's Health & Reproductior	Near West Side	(312) 226-7913
57	Walgreens	2440 W North Ave, Chicago, IL	Women's Health & Reproductior	West Park	(773) 489-5607
58	Homan Gas & Mini Mart	43 N Homan Ave, Chicago, IL	Gas Stations	East Garfield Park	(773) 826-5746

Make dynamic maps directly in Excel and share them in ArcGIS Online.

Conclusion

At 10.1, ArcGIS Online presents a new path that GIS professionals can take to advance mapping and GIS within their organization. It allows GIS departments—even small ones—to respond more proactively to the demand for GIS services by putting the necessary maps and applications in the hands of stakeholders while maintaining the integrity of spatial resources.

See how simple the steps are for administering, publishing, and collaborating with ArcGIS Online at **esri.com/agolquickstart**.

The Demographic State of the United States in 2012

Recession Still Affecting Economic Recovery

Highlights

- Esri's Updated Demographics can be delivered in a wide range of geographies, formats, and variables.
- Demographic estimates and forecasts were produced with proven methodologies.
- Updated Demographics integrates seamlessly into Esri Business Analyst software, as well as Community Analyst and ArcGIS Online.

Slow growth in employment and home values, and tight credit continue to hamper economic recovery. Although there are a few positive signs, such as modest increases in consumer spending and slightly higher sales of existing homes in some areas, effects of the recession are still impacting overall economic recovery. The US population also continues to change in terms of racial and ethnic diversity and different family types and households.

Population Diversity and Change

As of 2012, the US population is 313 million. Growing diversity continues to effect striking changes in the population. This is evident from use of Esri's proprietary Diversity Index, which summarizes racial and ethnic diversity in an area. This measure shows the likelihood that two persons, chosen at random from the same area, belong to different races or ethnic groups. The index ranges from 0 (no diversity) to 100 (complete diversity). Esri's Diversity Index for the United States has risen from 60.6 in 2010 to 61.4 in 2012, with a forecast of 63.8 in five years.

The composition of America's 118 million households is also becoming more diverse. Although husband-wife families remain the dominant household type, their share of all households continues to slip—from 52 percent in 2000 to 48 percent in 2010. From 2000 to 2010, the real increase in family households was in single-parent families, up by 22 percent, and multigenerational households, up by 30 percent. Husband-wife families increased by less than 4 percent in 10 years, and husband-wife families with children declined.

All family households increased by 8 percent from 2000 to 2010; nonfamily households increased by 16 percent. The fastest-growing nonfamily households, however, are unmarried partners—opposite-sex partners by 40 percent and same-sex partners by 52 percent from 2000 to 2010. At 80 percent, single-person households retain the highest proportion of nonfamily households, but the increase was less than 15 percent in the past decade. Nontraditional family types are the growing segments of households.

Housing

Although positive signs are noted in areas less affected by the housing boom/bust and employment decline, recovery of the overall housing market remains slow. The 2011 homeownership rate of 64 percent remains the same for 2012. Since 2010, housing growth has been sluggish. Fewer than 900,000 units were added annually, down from 2 million annually at the peak of the housing boom. Many markets are still coping with an excess of vacant, for-sale, and foreclosed properties left over from the collapse of the housing market and the Great Recession. Almost one in four counties shows no growth or a loss of housing from Census 2010 to 2012. Significant housing losses also occurred due to natural disasters in the past year, such as the wildfire in Bastrop County, Texas, and tornadoes in Indiana and Missouri.

Diverse reasons are behind housing growth in the following metropolitan statistical areas (MSAs): in the Jacksonville, NC; Killeen-Temple-Fort Hood, TX; and Manhattan, KS MSAs, because of the military presence. Growth is also apparent in the Morgantown, WV; Auburn-Opelika, AL; Logan, UT-ID; and Manhattan MSAs, which encompass large college towns with good climates and growing economies. Kennewick-Pasco-Richland, WA is a retirement hot spot—especially for Californians. The Austin, TX; Raleigh-Cary, NC; and Myrtle Beach, SC MSAs are also continuing to grow.

Employment

The US labor force is emerging from its most severe contraction since World War II. Since 2010, the economy added nearly 3 million jobs, raising the total work force to 142 million. This growth has been geographically broad, with every region and division adding people to payrolls. Only Alabama, Arizona, Hawaii, and Rhode Island registered a net reduction in workers. The total number of unemployed shrank from 16.7 million to 14.9 million people. The US rate of unemployment (the percentage of unemployed within the civilian labor force) declined. The US labor force participation rate (civilians employed, plus the unemployed as a percentage of the US population aged 16 years and older) also declined by less than 1 percent to 63.4 percent. The reduction in unemployment results from increasing employment or workers leaving the labor force.

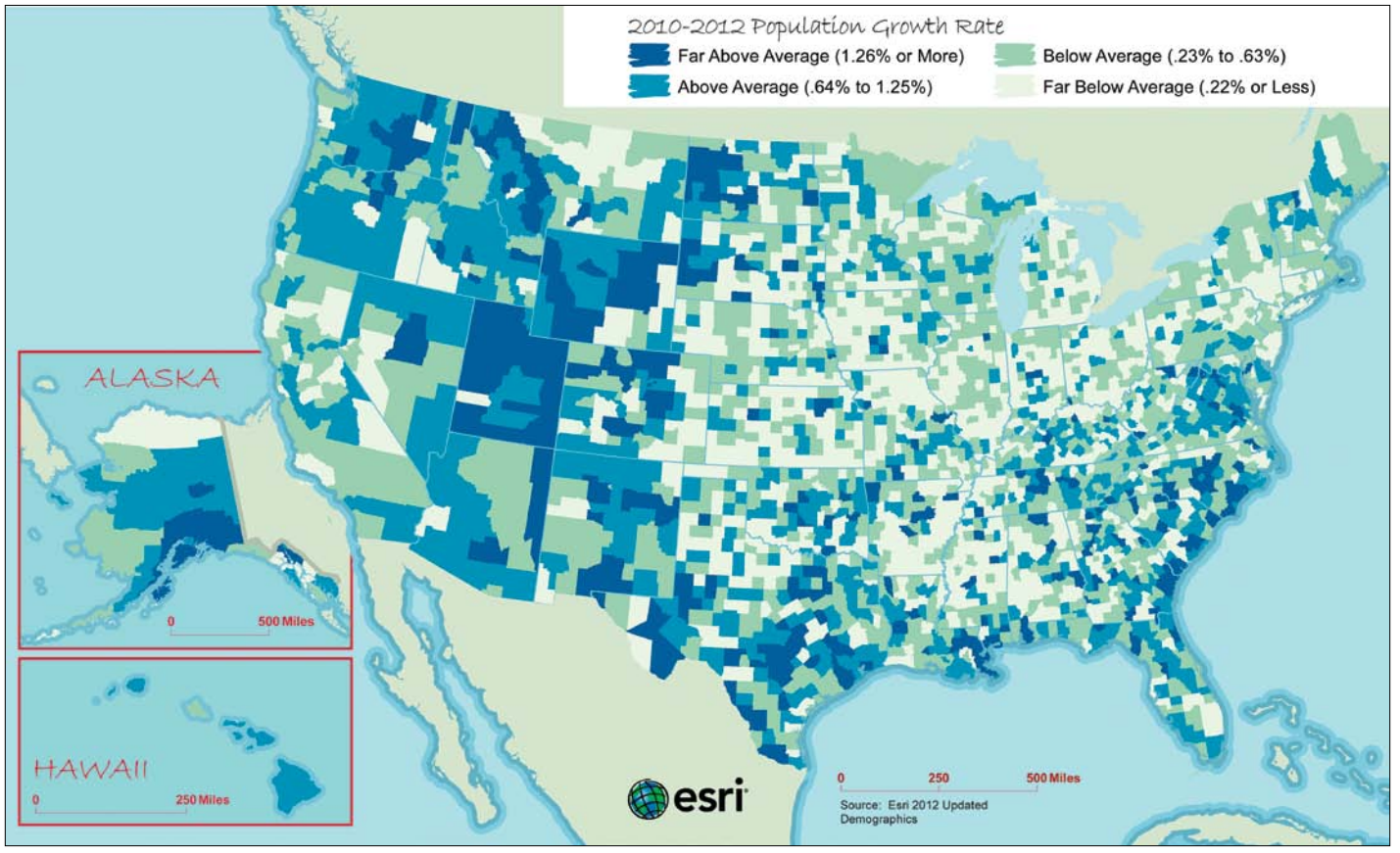
About 2012/2017 Updated Demographics

To perform actionable location analytics in these challenging times, you need the industry's most accurate, trusted data. The 2012/2017 Updated Demographics database includes a full roster of current-year estimates and five-year projections for population, income, race/ethnicity, home value, net worth, disposable income, and more.

Recently ranked #1 for accuracy in a blind, independent study, Esri's 2012/2017 demographic estimates and forecasts were produced with proven methodologies to provide the highest possible level of accuracy.

Delivered in a wide range of geographies, formats, and variables, Esri's Updated Demographics is available as an ad hoc database that integrates seamlessly into GIS software and is packaged in products including Esri Business Analyst Online, Esri Business Analyst for Desktop, Esri Business Analyst for Server, Esri Community Analyst, and ArcGIS Online.

For more information about Esri's 2012/2017 Updated Demographics, visit **esri.com/demographicdata**.



United States by county clearly shows pockets of growth that may indicate job opportunities in those areas.

Alexandria, Virginia, Gets Serious About Park and Play Space Improvements

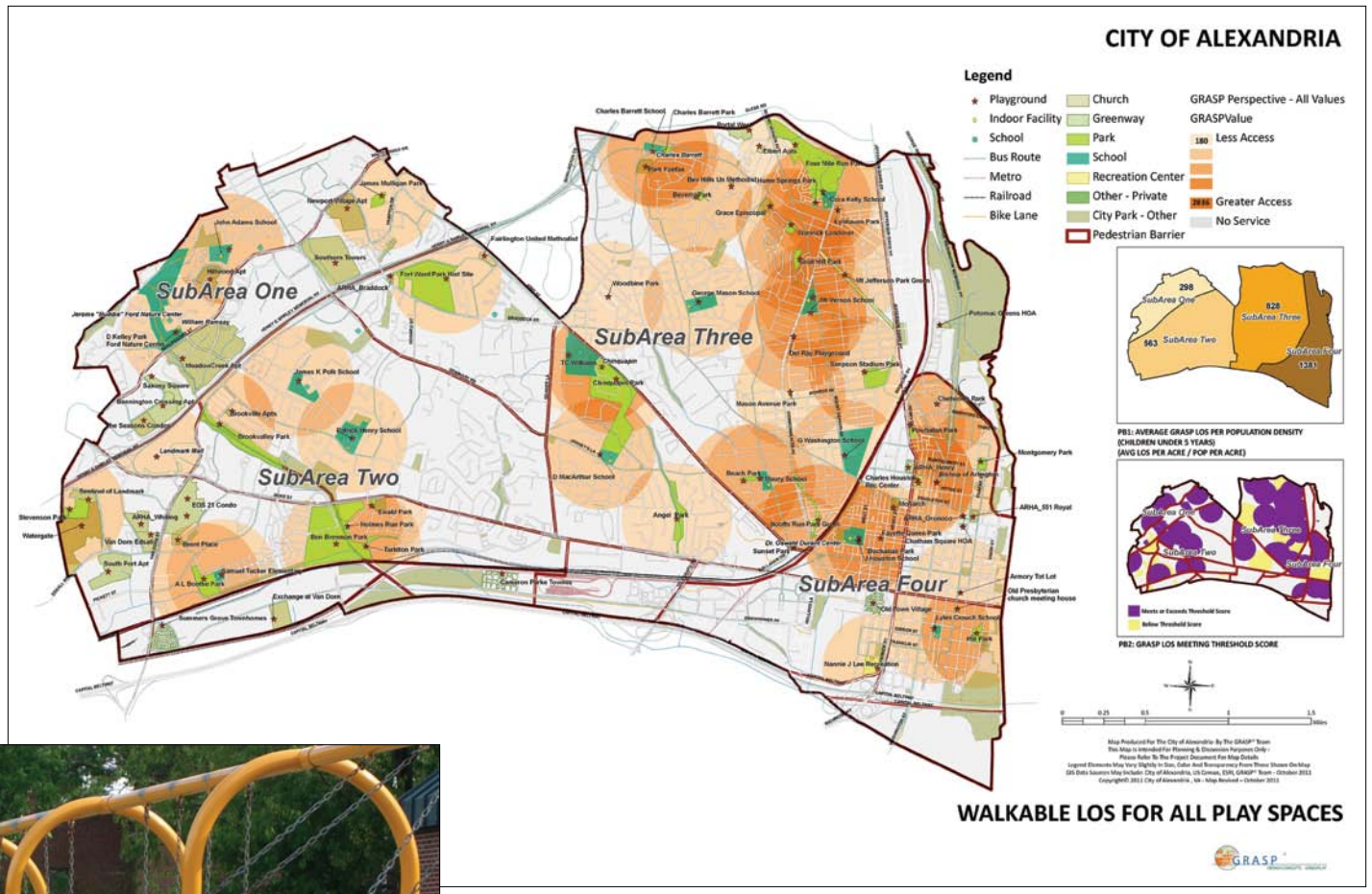
Optimizing Play, Creativity, Socialization, and Nature Appreciation

By Robby Layton, Design Concepts CLA

Highlights

- The city uses GIS to combat childhood obesity.
- ArcGIS is used to map the locations of play spaces and analyze play throughout the city.
- GIS allows planners to decide where play spaces should be improved or added.

The United States is experiencing an obesity epidemic. People in Alexandria, Virginia, have decided to do something about it. A 2007 study determined that more than 43 percent of children in the city between the ages of two and five were overweight or obese. Recognizing that getting children active through healthy play is one way to address the problem, several local organizations partnered to obtain a grant from the Kaiser Permanente Healthy Eating Active Living (HEAL) program to conduct a study and improve access to public and semipublic play spaces throughout the city. Team members were the Alexandria Childhood Obesity Action Network, the City of Alexandria, and others.



The heat map uses scores for each play space to produce a level of service (LOS) value for any location within the city.

The study of play in Alexandria will improve access to healthy play and combat childhood obesity.

GIS was a key tool in the study. The first step was to identify all public and semipublic play spaces throughout the city. A play space was defined as a playground, facility, or location where elements specifically intended for children's play are located. This included play spaces at public parks, schools, and other facilities that were open to the public on at least a partial basis. A total of 86 play spaces were identified and located through the use of the following:

- Aerial photographs of the city taken in 2009 (provided by the City of Alexandria)
- Existing lists provided by project partners
- The general knowledge and expertise of the Alexandria Planning Department and the Alexandria Department of Recreation, Parks, and Cultural Facilities

A field evaluation of the 86 play spaces was conducted by playground experts in April 2011. The evaluation team developed a scoring system to assess the value of each play space by looking at five aspects of play considered to be beneficial to children:

- Physical Domain—The opportunity for appropriate physical activity
- Intellectual Domain—The opportunity to be creative
- Social Domain—The opportunity for children to engage with each other and with adults in positive ways
- Natural Domain—Opportunities for children to be in physical contact with the natural environment
- Free Play—Opportunities for unstructured play, such as open areas with appropriate surfacing for running, crawling, and rolling

In addition, a set of attributes that contribute to making a play space more inviting and comfortable were identified, including such things as ease of access, perceived safety of the location and its surroundings, protection from sun and rain, and the availability of restrooms and drinking water.

The scoring was entered into a geodatabase and used to calculate a numerical value for each play space. Play spaces could then be ranked and compared to one another in terms of the value they provide.

The consulting team has used Esri products for more than 10 years to perform a variety of geospatial analyses of communities related to parks, recreation, and public health. In this case, ArcGIS was used to map the locations of play spaces and analyze play throughout the city. All data management, mapping, and analyses were performed within ArcGIS, without the need to export, import, or join to other applications.

Assigning the scores for each play space to a buffer around it yielded a heat map that shows the cumulative value of all play spaces within one-third of a mile of any location in the city. This was assumed to be a walkable distance for children and their caregivers. Significant barriers that might restrict or impede pedestrians were incorporated into the analysis.

The resultant map shows a level of service value for access to play spaces for any location in the city. These values range from a low of 0, where no play spaces are within proximity, to a high of 2,836, where multiple facilities with high scores are within one-third of a mile.

The heat map was analyzed to determine where a basic threshold of service for play was being provided to children in Alexandria. The threshold used was the score that a single play space would achieve if it scored the median value for each component and modifier. When this threshold is applied to the heat map, it is now possible to determine whether any location in the city has access to a basic level of service for play spaces. Any point on the map where the value is at or above the threshold is shown in purple. Areas where the value is below the threshold but greater than 0 are shown in yellow. All other areas have a score of 0 and are shown in gray.

Overlaying this information in ArcGIS with a map of population densities of children in Alexandria allows planners to decide where play spaces should be improved or added. Where areas without service coincide with higher densities of children, new play spaces are needed. Areas where service is available but falls below the threshold may be considered areas of opportunity. Within such areas, there is at least one play space serving that location. By adding components or otherwise upgrading those play spaces, service in these areas can be improved, which will increase their score and bring them above the threshold.

About the Author

Robby Layton, ASLA, CPRP, is a principal at Design Concepts CLA, Inc. His work focuses on the value of the public landscape as an infrastructure that promotes happy and healthy communities.

For more information, contact Carrie Fesperman Redden, Alexandria Childhood Obesity Action Network/Partnership for a Healthier Alexandria (e-mail: carrie.fesperman@vdh.virginia.gov), or Robby Layton at Design Concepts CLA, Inc. (tel.: 303-664-5301, e-mail: Rob@dcla.net, web: www.dcla.net).

Website Helps Discover, Explore, and Improve US City Parks

Compare Parks and Determine Accessibility

By Breece Robertson and Bob Heuer, Trust for Public Land

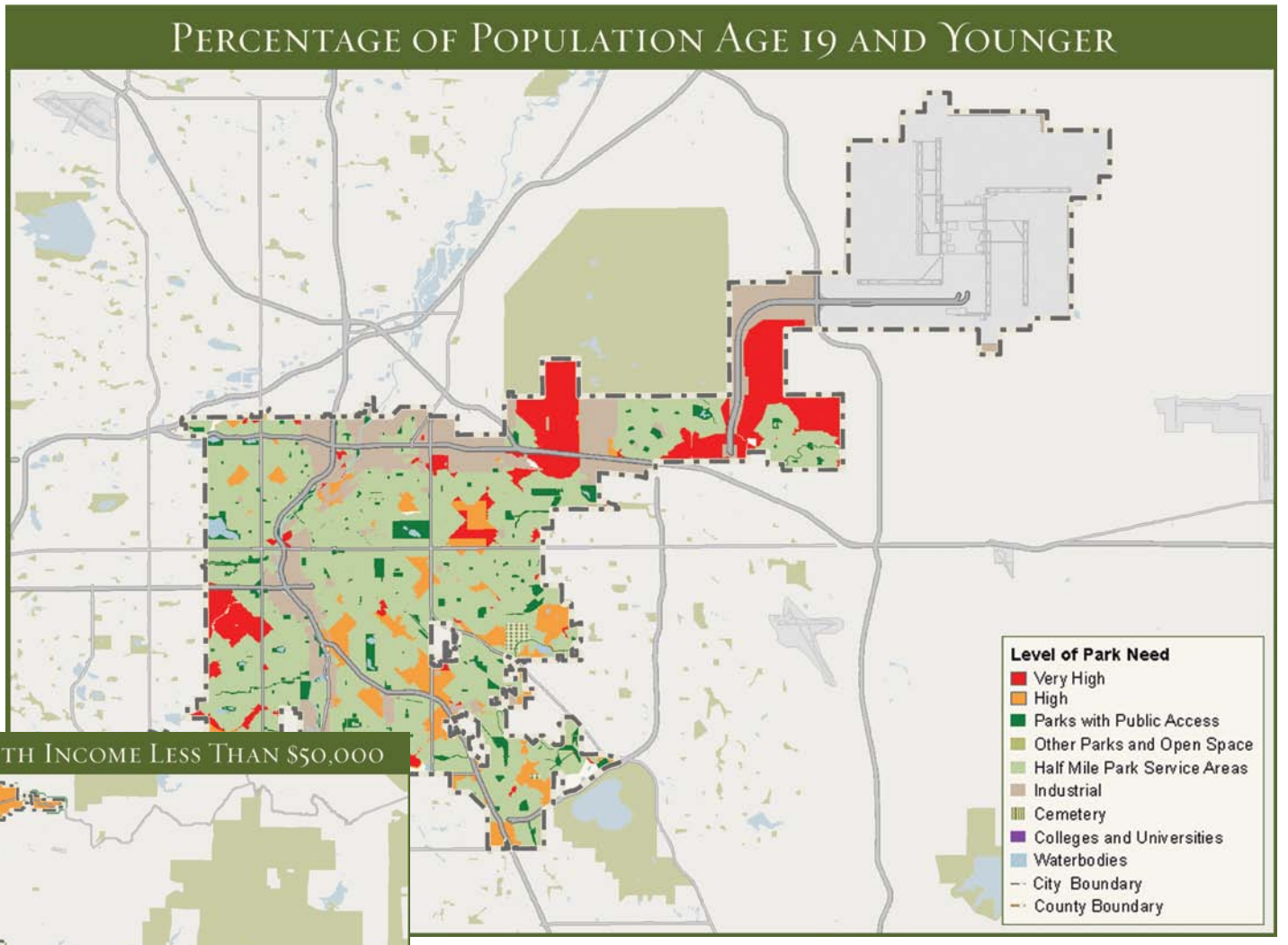
NGO Non-Governmental Organization

Highlights

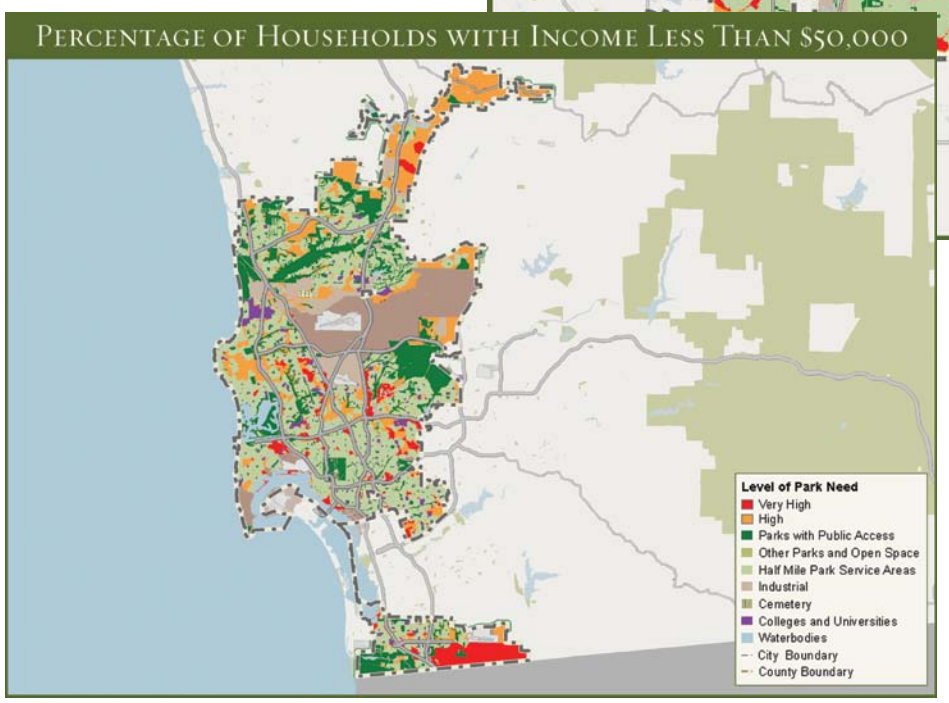
- GIS can be a valuable tool for improving park access.
- The Trust for Public Land ParkScore Project measures how well US cities are meeting the need for parks.
- Built with ArcGIS, ParkScore is a free tool that empowers both individuals and city leaders to improve park systems.

The 40 largest cities in the United States each have their own character and personality. But one thing that they all have in common is the need for a great park system. Some cities are well on their way to achieving this goal, but others have a great deal of work to do.

Parks are important to communities because nearby opportunities to exercise and experience nature are essential for physical and mental well-being. Studies show that parks can encourage physical activity, revitalize local economies, and help bring neighborhoods together.



This ParkScore map illustrates the level of park need for Denver's children and adolescents by showing the areas of the city with and without park access.



The level of park need in San Diego for those with a household income of less than $35,000 is illustrated by showing the areas of the city with and without park access.

This is why the Trust for Public Land ParkScore Project was developed. ParkScore is the most comprehensive park rating system ever developed and measures, on a scale of 0 to 100, how well cities are meeting the need for parks. The ParkScore website, **ParkScore.TPL.org**, is free and fully accessible to all. The goal is to empower communities to put more parks on the ground.

ParkScore serves two categories of users. The first consists of individuals and families. The website provides residents with a quick and easy way of seeing their city's park system in detail and allows them to compare their city with others across the United States. This will provide users with both a national perspective on their local park access and the tools to advocate for park improvements in their communities.

The second audience for ParkScore is city planners, park managers, and other local leaders. The website allows these users to dig deep into their city's park system. This helps leaders better serve their residents by providing them with the tools to jump-start local park system improvement plans. On the website, users can view the following:

- A citywide analysis of park access by age and income level
- Detailed information about each city park
- Data and analysis pinpointing where parks are needed most critically and identifying which improvements would provide the greatest benefit to local park systems

This kind of information is exactly what is needed to support comprehensive park system improvement programs.

The ArcGIS mapping technology used for this project identifies which neighborhoods and demographics are underserved by parks and how many people are able to reach a park within a 10-minute walk. The Trust for Public Land selected ArcGIS technology because it provides a robust set of tools and applications for detailed park system analyses and, since it is used by most local governments, allows an easy exchange of information. The ArcGIS platform was also selected because it allowed the creation of walking networks, providing a model for how people walk from their homes and other locations to parks and showing how park access can be increased.

City leaders, such as San Diego mayor Jerry Sanders, are already embracing ParkScore. San Diego's park system ranked 8th among the 40 largest US cities.

Says Sanders, "In San Diego, our parks system is a source of immense civic pride. From our community parks to our hiking trails to crown jewels like Balboa Park, San Diegans love to enjoy our famous sunshine in our public green spaces. We're proud that the Trust for Public Land has recognized our parks on a national level. Like all cities, San Diego has experienced tight budgets in recent years, but as we embark on a recovery, I've already tapped our parks as one of the first places to reap the benefits of increasing revenues. We hope to keep our parks among America's best for years to come."

Officials in Denver, whose park system ranked 13th, feel the same way. Lauri Dannemiller, manager of Denver Parks and Recreation, says, "We are proud to be opening parks in parts of Denver that have not seen new parks in a generation, and like most cities operating with strained resources, it is partnerships with groups like the Trust for Public Land that make this progress possible."

Joseph Lovell, a senior GIS analyst with Denver Parks and Recreation, says ParkScore's GIS technology makes it a powerful planning tool for city leaders. He continues, "ParkScore is unique because the GIS analysis didn't just measure park access by distance but also factored in whether there were barriers to access, such as a river or a highway, that would hinder park usage. In areas where there is limited park access and land acquisition isn't possible, we're using the ParkScore results to improve connectivity between citizens and existing parks."

The website's ability to offer city leaders a series of solutions and next steps for how to fill the gaps in local park systems that were identified by ParkScore analysis fits in with the Trust for Public Land's four primary services: analyzing local landscapes and identifying where there are gaps in park access, securing funding for land transactions, executing land transactions, and designing and developing parkland once it has been secured.

"You can't have a great city without a great park system," says Christopher Kay, chief operating officer of the Trust for Public Land. "The Trust for Public Land hopes that ParkScore inspires cities to focus on parks, and we're eager to work with municipal leaders and volunteers to help them build the best park systems imaginable."

About the Authors

Breece Robertson and Bob Heuer are with the Trust for Public Land. Robertson is the national director of conservation vision and GIS. She joined the organization in 2001 to create a comprehensive, coordinated GIS program. Heuer is the associate GIS director for the Trust for Public Land. He manages the GIS analysis for ParkScore, as well as a variety of other projects.

For more information, contact Breece Robertson, the Trust for Public Land (e-mail: Breece.Robertson@tpl.org), or visit **ParkScore.TPL.org**.

Assessing Accessibility to San Antonio Neighborhood Parks

By Shubhangi Jangam and Azza Kamal, PhD

Highlights

- ArcGIS helps identify neighborhoods lacking easy access to parks.
- Inequality of access to parks among children 0 to 15 years old is revealed by GIS.
- GIS proximity analysis is a strong tool for cities and counties to leverage park accessibility policies.

The significance of parks and recreational facilities was recognized and linked to social life and health in the past century. Since then, cities began to preserve land for parks and recreation. The city of San Antonio is being investigated in this study for its offering of adequate neighborhood parks.

The ease of access to neighborhood parks is said to be impacted by two aspects: first, the spatial distribution of these parks throughout the city, and second, the concern of public health matters. First, the inequality of spatial distribution of amenities in society is not only pervasive but also long-standing. Second, public health aspects are validated by abundant research relating the greater proximity of neighborhood parks to higher physical activity in young children. This subject also resonates with the Let's Move program commenced by First Lady Michelle Obama. Neighborhood parks are essential in improving public health, especially for children; their impact, though, depends on the accessibility, safety, and services these parks provide.

A neighborhood park serves the local community and its nearby neighborhoods. Typically, it includes basic amenities such as small playgrounds for young children, a number of casual seating areas, and walking and jogging trails. In Texas, the City of San Antonio added a more definitive classification for the neighborhood parks that encompasses only parks with a size restriction ranging from 3 to 10 acres. Moreover, the city has recognized that these parks should easily be accessed with nonvehicular means by all residents in the neighborhood. In 2004, the City of San Antonio developed a strategic plan for parks and recreation for the period from 2005 to 2015, wherein input from the public was accommodated.

ArcGIS for Desktop, through an Esri university site license, was used to conduct all the study analyses. GIS was used to generate a map of the neighborhood associations with children between 0 and 15 years old being more than 25 percent of the entire population in each neighborhood. Parks data was based on information from the City of San Antonio GIS department. ArcGIS was used to select those parks conforming to San Antonio's restricted size for a neighborhood's park. ArcGIS proximity analysis enabled the creation of a walkable buffer of 10 minutes, which corresponds to a walking range of half a mile around each park. A two-mile biking buffer was also created around each park. Desired neighborhoods were mapped based on neighborhood association information published by the City of San Antonio. Half-mile ranges were preferred for pedestrian accessibility because, on average, it takes 10 minutes to cover half a mile for healthy people—reasonable for incorporating recreational activities into a daily routine. Similarly, for a proper biking distance, a two-mile range is covered in less than 10 minutes at an average speed of 12 miles per hour.

Analysis was started by identifying the areas within the boundaries of San Antonio neighborhood associations with at least 25 percent of their population between 0 and 15 years old. Data from 2012 census tracts within each neighborhood for Bexar County, where the city of San Antonio is located, was utilized.

The map that was generated showed two types of neighborhoods: first, neighborhoods that have walkable access to existing neighborhood parks, and second, neighborhoods that do not have neighborhood parks within a walking distance. Based on the buffer analysis, the study classifies the first group of neighborhoods into four categories according to their accessibility to parks:

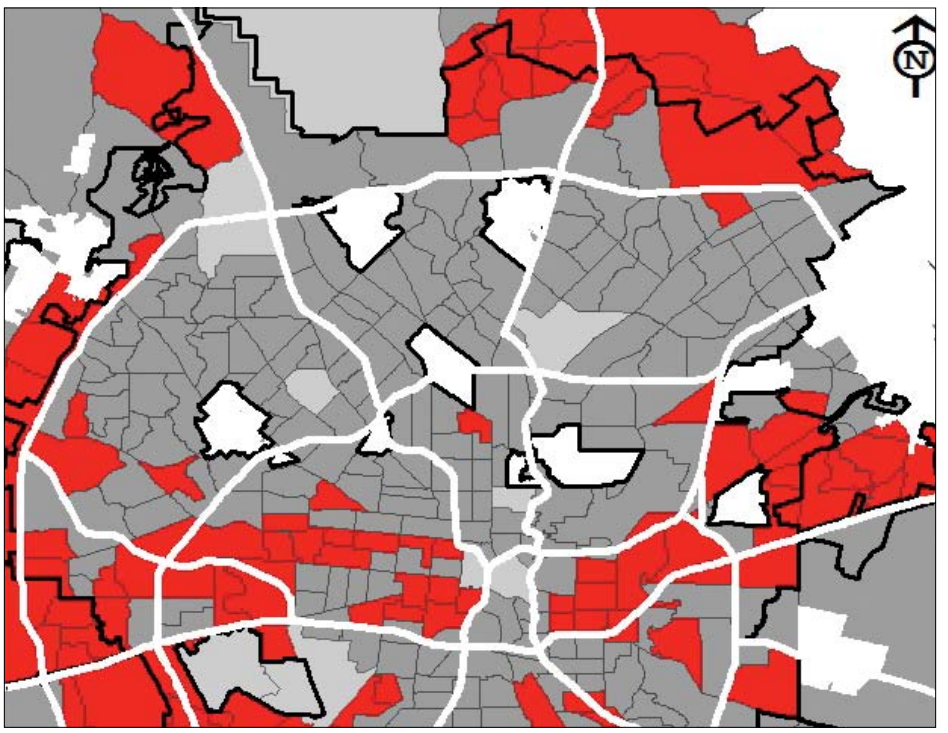
- Good pedestrian accessibility range
- Fair pedestrian accessibility range
- Good bicycle accessibility range
- Fair bicycle accessibility range

Additional qualitative methods were used in this study, such as observation, to highlight the amenities in each park. Accordingly, the study showed that multiple areas with more than 25 percent of their population being children between 0 and 15 years old have a fair pedestrian accessibility to their neighborhood parks. Most neighborhoods are located within a two-mile biking range to the neighborhood park, but they don't offer safe and feasible biking lanes.

The study concluded that more investigation is needed for the biking routes, and more amenities need to be installed in neighborhood parks.

About the Authors
Shubhangi Jangam is a graduate student in the master's in urban and regional planning program in the College of Architecture at the University of Texas, San Antonio. Dr. Azza Kamal is a senior lecturer on architecture and urban planning in the College of Architecture at the University of Texas, San Antonio, and an affiliate with the Center for Urban and Regional Planning Research at the same college.

For more information, contact Shubhangi Jangam (e-mail: shubha_j20@yahoo.com).



Spatial distribution of neighborhoods with more than 25 percent of the population within the range of 0 to 15 years old. (Courtesy of Neighborhood Association, City of San Antonio.)

Understanding GIS: An ArcGIS Project Workbook

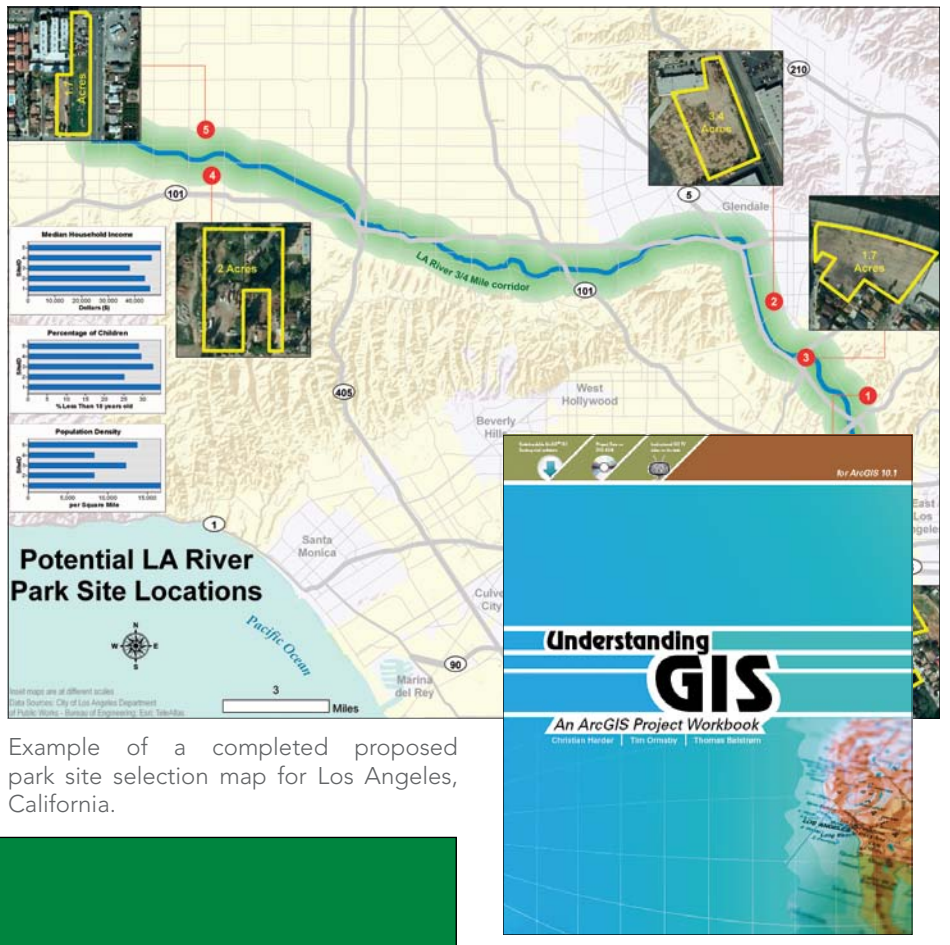
Model a New Neighborhood Park in Los Angeles, California

The new edition of *Understanding GIS: An ArcGIS Project Workbook* (for ArcGIS 10.1) takes a fresh approach to teaching the essentials of ArcGIS for Desktop. Where the majority of introductory GIS workbooks are organized around the features and functions of the software, *Understanding GIS* is built around a *real-world geographic analysis project*.

The problem to be solved is the selection of suitable land for a new neighborhood park in Los Angeles, California. Criteria include proximity to the Los Angeles River, land parcels of a certain size, minimum thresholds for population density and presence of children, as well as median household income levels. Starting data for the project is provided on a companion DVD.

The book guides readers through the best practices for conducting an analysis. First they get an overview of the problem and the study area. Next they assess the data requirements and review the geospatial data provided (in various formats) before selecting the most appropriate layers, processing them as needed, and building them into an Esri geodatabase. After some final data editing, a series of analytic steps are carried out to find a handful of candidate sites. These analytic steps are then encapsulated into a model that documents the methodology and makes it easy to repeat or modify the analysis with adjustments to the input parameters. To communicate the analysis results, the student is next guided through the process of designing and producing a rich cartographic product with inset maps, charts, and other annotation. Finally, in the book's concluding lesson, the results are shared online and made available to the public at large.

Understanding GIS provides context and meaning each step of the way so that the student reaching completion of the project knows why each step was carried out the way it was. Hundreds of annotated graphics, illustrations, and photographs enrich the user experience; full-page topic articles and callouts make this a reference book that will prove useful again and again as readers apply the skills learned to their own GIS projects.



Example of a completed proposed park site selection map for Los Angeles, California.

The book's companion website includes material for further study, as well as a series of fully narrated demonstration videos that readers can use to follow along as they complete the work themselves.

In this new 2013 revision of *Understanding GIS*, the included trial version of the software has been updated to the 10.1 version of ArcGIS for Desktop and extended to a full 180-day license, making it ideal for semester-length college courses, as well as self-study audiences. Whether you're new to ArcGIS for Desktop or a working professional looking to deepen your knowledge of geospatial analysis, *Understanding GIS: An ArcGIS Project Workbook* will fit the bill.

The book's coauthors have decades of combined GIS and analysis experience between them. Christian Harder is the author of several volumes of GIS case studies and was the founding publisher of Esri Press; Tim Ormsby has authored or coauthored numerous GIS workbooks, including the worldwide best seller *Getting to Know ArcGIS Desktop*; and Thomas Balstrøm is a professor of geography at Aalborg University in Denmark and the coauthor of the Danish-language *The Book on GIS Geodata*.

Understanding GIS: An ArcGIS Project Workbook—ISBN 9781589483460, 364 pp., US$79.95.

GIS Helps Fight World's Leading Cause of Preventable Blindness

Tracking the Global Distribution of Trachoma

Highlights

- Esri spatial technology is helping international efforts to eliminate blinding trachoma by 2020.
- Smartphone data transferred to ArcGIS servers and maps reveal hidden prevalence of trachoma.
- ArcGIS for Server pushes the data onto detailed maps that show the entire survey area.

It feels like thorns scraping your eyes each time you blink.

Repeated infections during your childhood lead to scarring of the conjunctiva, or inner mucous membrane of the upper eyelid. Your eyelashes turn inward and scratch the cornea. Slowly, painfully, you may go totally blind.

The affliction is called trachoma, and it affects mostly women and children among the poorest of the poor, especially in regions that have limited access to sanitation and water. There are more people suffering from trachoma in Africa than on any other continent. And because this bacterial disease is transmitted via close, personal contact, it tends to occur in clusters—often affecting entire families and communities.

Approximately 110 million people worldwide live in endemic areas and require treatment, with 210 million more living where trachoma is suspected of being endemic, according to International Trachoma Initiative (ITI) at Task Force for Global Health, based in Decatur, Georgia.

"Affected people are said to be living beyond the end of the road," says Dr. Danny Haddad, director of ITI. "In some instances, you need to walk half a day to get to some of these villages."

Neglected No Longer

Until recently, a better means to identify enclaves of a rogue's gallery of so-called neglected tropical diseases—such as leprosy, river blindness, roundworms, elephantiasis, African sleeping sickness, and trachoma—has proved elusive.

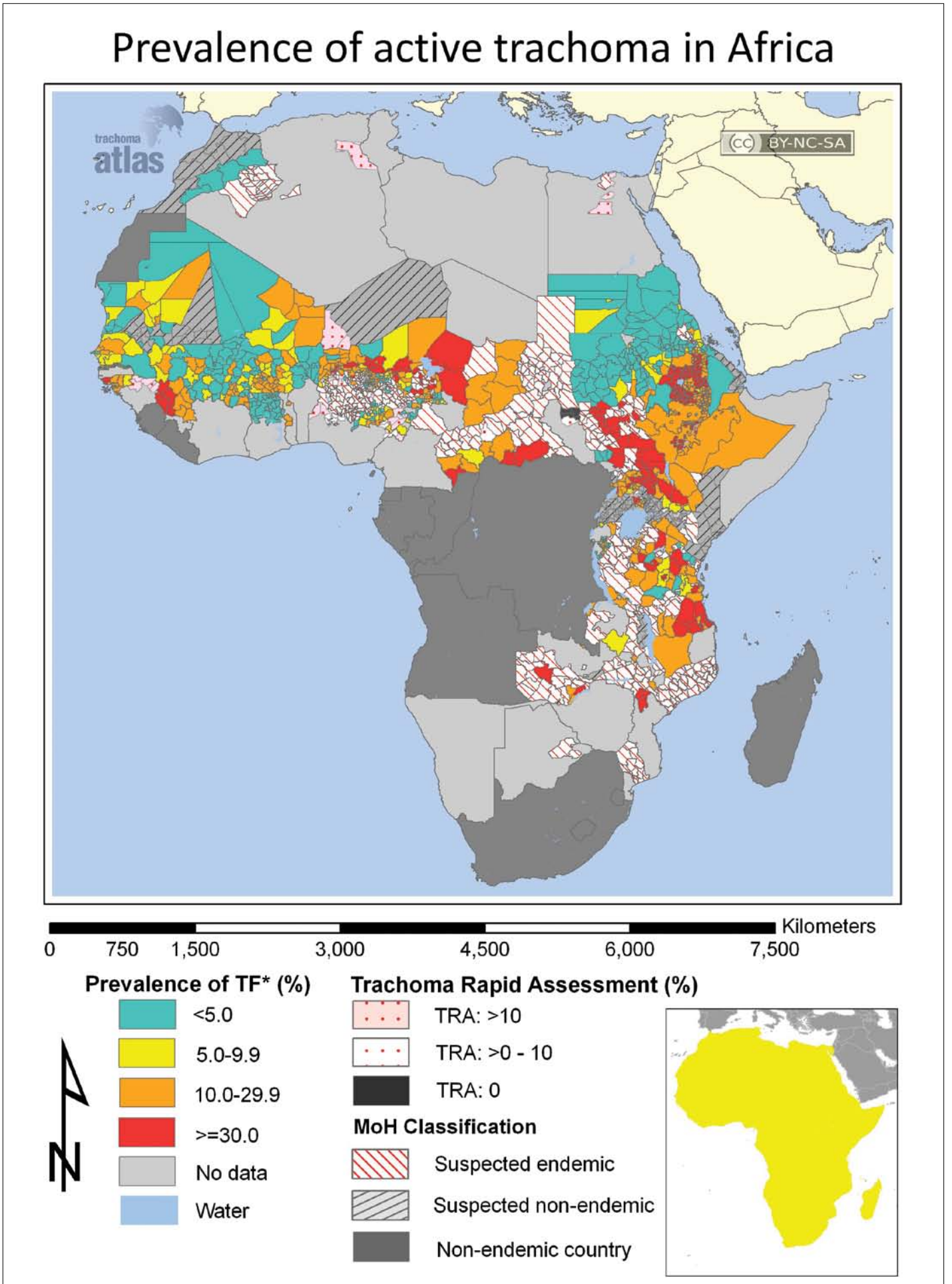
Fortunately, according to Haddad, researchers combining smartphone and Esri technologies have figured out a quick way to visually assess the prevalence of trachoma in remote regions and pinpoint gaps in prevention and treatment services.

A trachoma developmental study of the latest data collection, transfer, and visual display process using ArcGIS began in mid-October 2012 in the Oromia region of Ethiopia. Several layers of smartphone and Esri technology enabled the immediate transfer of vast amounts of collected data to distant hardware and software platforms for data display, analysis, and sharing.

Esri software was chosen because of its dynamic capabilities, says epidemiologist Alex Pavluck, a senior manager of research information technology at ITI. Not only are GIS maps useful as visual tools, but they also offer real-time transfer of data and automated updates that provide much-needed efficiencies.

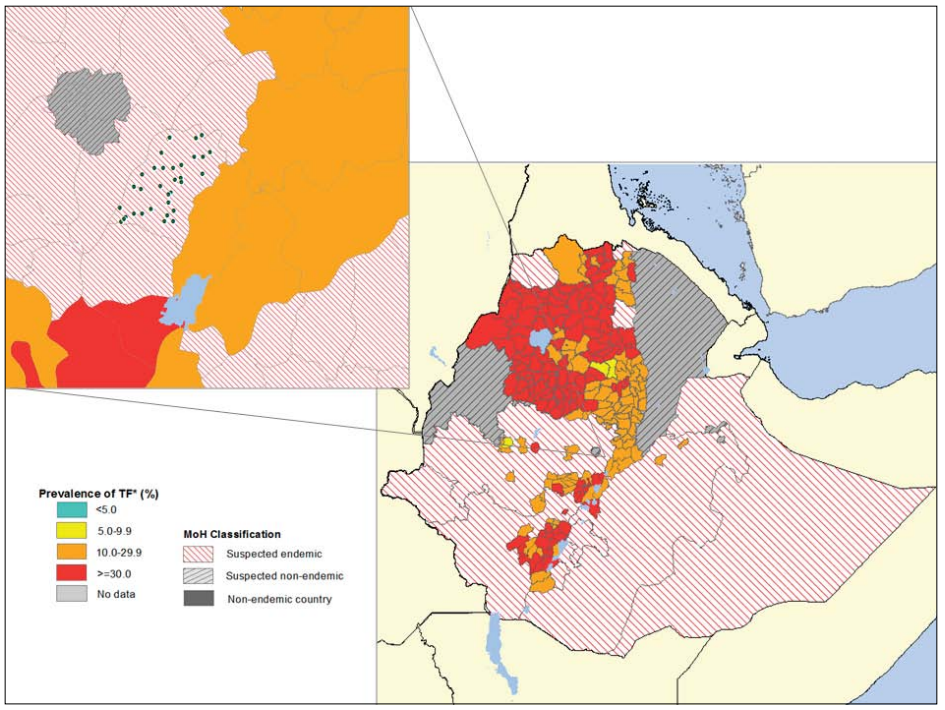
"One thing we wanted was the ability to produce layered maps," Pavluck says. "These are really the key here to show prevalence overlaid with areas currently receiving treatments, such as donated drugs."

The goal was to help realize an ambitious plan endorsed by World Health Organization (WHO)—a dream, if you will, of endemic countries with organized national trachoma control programs—called Global Elimination of Blinding Trachoma by 2020, or GET2020.



This map of Africa from www.trachomaatlas.org illustrates the known distribution of trachoma and the data gaps across the continent.

According to Haddad, the Esri technology-enhanced system was built on one already developed for a variety of neglected tropical diseases, including trachoma. It relied on Android devices, which made it easy for field-workers to use. A robust reporting back end allowed data to be sent via cellular network or Wi-Fi to a web-based system at Task Force's headquarters.



The point features generated by the Esri Python script can be aggregated to the health district—turning the health district classification from "suspected endemic" to a prevalence value. This knowledge drives health interventions.

It didn't take long for this approach to achieve surprising results—transmitting data from 18 countries on elephantiasis.

"Before we used the Android tools, we had piles of paper that had to be manually entered after a survey," recalls Haddad. Initial success encouraged public health workers in endemic countries to realize that a system such as this—but even more capable—was needed to reach WHO's ambitious GET2020 goal.

Global Atlas of Trachoma—developed in 2011 by ITI with the support of partners, such as the Bill & Melinda Gates Foundation, Carter Center, and London School of Hygiene & Tropical Medicine—provided up-to-date regional maps of trachoma's geographic distribution. This tool allows health workers to reach more people with preventive hygiene, corrective surgery, and an antibiotic—azithromycin (Zithromax)—donated by pharmaceutical manufacturer Pfizer Inc.

Nevertheless, researchers discovered that the database supporting the atlas identified more than 1,200 health districts that still lacked the data needed to guide interventions. "We still didn't have the entire picture," says Rebecca Mann, geographic information systems data manager, ITI.

Heart of the System

The latest Esri software-enhanced system is designed to correct that. Here's how it works: Trained field-workers initially collect data on smartphones and tablets using Android technology. "That's the beauty of it," says Mann. "The app can go on any device running Android."

Then, the devices quickly transfer data to a website on a server housed at the Task Force in Decatur, where it is summarized, checked for errors, and mapped. Using a 3G connection, the data can be transmitted to the server in real time.

Next, the data moves to a central MySQL Server linked to an ArcGIS mapping server. Python script automatically converts tabular data into feature points that link to ArcGIS map templates embedded in a project website

A health care worker collects data using a smartphone.

on **arcgis.com**. These points accumulate on the web maps as data is collected, illustrating the distribution of surveyed clusters and ensuring selected samples spatially represent the entire survey area. The server makes the data widely accessible to researchers and managers worldwide, who then can review the accumulating information in real time and approve it for wider dissemination, such as in the trachoma atlas.

ArcGIS for Server pushes the data onto more detailed maps that show the entire survey area, providing visual displays that aid health workers in more quickly identifying affected areas and people needing treatment.

"It was nice that we didn't have to reinvent the wheel," says Esri Professional Services applications developer Danny Hatcher, who set up the servers and wrote the Python script. "We could fit hand in glove with the existing process and turn it into a map ITI could use."

Proof of Concept

Mann recalls her excitement when the Ethiopian developmental study began. Pavluck needed just half a day to train a team of local field-workers how to use the smartphones.

"Because the system is so simple, it isn't necessary to train a highly specialized team," Mann says.

When the field-workers in Ethiopia started collecting data, Mann and colleagues in Decatur could actually see it flow from the phones to their server.

"Python script ran at 2:00 a.m. every morning, converting the data into feature points, which I personally added to the first mapping template," Mann notes. And as more data came in, the system automatically updated the website.

The researchers plan to add features if the system runs smoothly. "As we get into the rhythm of things, I'm sure we'll want to tweak our system," Mann says. "But right now, we're trying to keep it as simple and straightforward as possible."

Haddad says researchers are looking at other neglected tropical diseases and, thanks to GIS, can more clearly see gaps in defenses against them. "This system is making a huge impact on how we run our programs," he says. "It allows us to make much faster decisions on what we need to do."

For more information, contact Rebecca Mann, geographic information systems data manager, International Trachoma Initiative, Task Force for Global Health (e-mail: rmann@taskforce.org, tel.: 404-592-1467), or Danny Hatcher, Esri (e-mail: dhatcher@esri.com). Also, visit **www.taskforce.org**, **www.trachoma.org**, **www.trachomaatlas.org**, and **www.trachomacoalition.org**.

Improving Service Delivery and Collaboration in South Africa

Highlights

- Using ArcGIS for Server, the Corporate GIS unit has made its data available to all local municipalities through a web portal.
- The Frances Baard Municipality District fixed spatial errors by re-creating the parcels in ArcGIS based on the coordinates provided in source documents.
- GIS has facilitated more accurate utility billing, which in turn has created a better revenue stream for the district.

Named for one of South Africa's 20th-century democracy advocates, the Frances Baard Municipality District is situated in a mostly rural area of the country's northern central region. A sunny and semiarid climate and natural rivers make it a popular tourist destination for bird-watchers, hunters, and photographers. The region is well known for its agriculture, with exports of fruit and vegetables, as well as mining activities.

While Frances Baard is the smallest district in the Northern Cape province, it's actually the most populous of the Northern Cape districts, with nearly 325,000 citizens spread through the local municipalities of Sol Plaatje, Phokwane, Dikgatlong, and Magareng.

Like all municipal districts in South Africa, officials for Frances Baard are charged with assisting local municipalities in carrying out the basic functions of local government. Responsibilities include promoting social and economic development while delivering basic services, such as water, electricity, waste removal, and health care. Frances Baard must also carry out integrated development planning for the district, which serves as an overall framework for future development that coordinates with both the municipal and provincial governments.

The rural setting where staff and selected students were trained to use Trimble GPS units.

Frances Baard created a formal GIS organization in 2009 (called the Corporate GIS unit) to facilitate water and electricity service delivery and assist with rezoning, infrastructure development, and maintenance. While the district already had a legacy system in place, it determined that an enterprise solution was the only practical way to connect and collaborate directly with the local municipalities it must support.

After a thorough internal review with stakeholders from the Corporate GIS unit and district leadership, Frances Baard contacted Esri South Africa (Pty) Ltd. to implement an enterprise solution based on ArcGIS.

Developing an Accurate Land Base

The Corporate GIS unit's first major task was to perform a comprehensive audit of existing land records for all the local municipalities it supports. Using data, such as cadastral and lease data provided by the surveyor general, the Corporate GIS unit created a new cadastral dataset that served as a starting point in the audit process. The unit also obtained land records information from the Deeds Office that could then be used to verify and update ownership information and property boundaries.

After converting all the data to a common coordinate system and projection, staff began auditing the data by selecting five random parcels from each General Plan (an area of establishment that can number more than 200 individual parcels). Technicians compared the selected parcels to the diagrams and boundary documents from the surveyor general. They fixed any spatial errors by re-creating the parcels in ArcGIS based on the coordinates provided in source documents from the surveyor general. When coordinate information was insufficient due to age or imprecision, the technicians used aerial photography to create boundaries that reflected information in the diagrams.

Once the spatial audit was completed, the cadastral dataset was then linked to the Deeds Office database to compare and update ownership information. Any properties that matched between the new cadastral dataset and the Deeds Office records were moved to a registered cadastral layer. When properties did not match, staff researched deed information from the surveyor general and linked the property to the last known owner before adding it to the registered cadastral layer. Any properties that did not match and could not be resolved were registered back to their parent properties and moved into the registered cadastral layer.

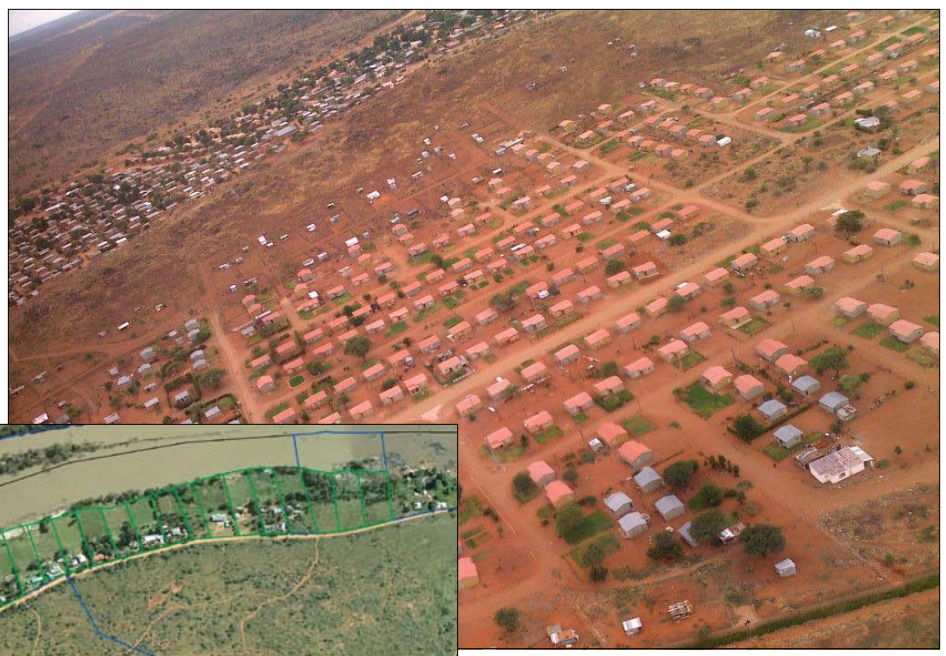
Updating Community Facility and Water Infrastructure Data

Equipped with the approved cadastral layer, the Corporate GIS unit needed to survey and record information related to community facilities and water infrastructure to create a complete GIS database for the district. To obtain the most accurate and current information possible, the district purchased Trimble Juno GPS units for field data collection. Staff from the local municipalities and selected students were then trained on the units and directed to capture data about key facilities, such as schools and clinics throughout the district. This project had the joint effect of developing more accurate data for the district and promoting technical education for both the students and local staff.

Similar to the community facilities effort, the district once again employed field data collection to confirm and, in many cases, update existing water utility information in ArcGIS. Data from the field was compared to existing GIS data to confirm as-built drawings and determine the actual location of various infrastructure. To date, the district has only completed verification of bulk water infrastructure but plans to address reticulation infrastructure in the future.

Improving Revenues and Planning

The creation and verification of Frances Baard's GIS database have improved service delivery for the district, as it now has a better understanding of where customers are located and how many are being served in each area. This has led to more accurate utility billing, which in turn has created a better revenue stream for the district. The updated infrastructure data has also helped the district better maintain its facilities and plan for the future.



The Frances Baard Municipality District includes mostly rural areas of South Africa's Northern Cape province.

Implementing ArcGIS has allowed the Corporate GIS unit to produce detailed landownership maps for the various municipalities it supports.

Using ArcGIS, the Corporate GIS unit has made its data available to all municipalities through a web portal at **www.francesbaardgis.co.za**. Local authorities at the municipalities can use this information for decision making, planning, and asset verification. As a result of the shared data and field data collection projects, the local municipalities have also begun identifying staff that can serve as local GIS coordinators to maintain data and support future projects.

For more information, contact Mashudu Mudau, GIS manager, Frances Baard District Municipality Corporate GIS (e-mail: mashudu.mudau@fbdm.co.za, tel.: 27-53-838-0991), or Lauren Sweidan, Esri South Africa (e-mail: lsweidan@esri-southafrica.com).

Creating a National Park from the Bottom Up

The Democratic Republic of Congo's Lomami National Park and GIS

Highlights

- The creation of Lomami National Park is proposed in the Democratic Republic of Congo.
- GIS operation in the field allowed community participation in defining boundaries of the park.
- The digital basemap was built from the ground up in central Africa.

NGO Non-Governmental Organization

Three rivers surround 40,000 square kilometers of mysterious forest in the heart of the Democratic Republic of Congo (DR Congo). Until very recently, it was unexplored. It has no airstrips; its paths are without bridges. No four-wheel vehicles can come even to the sparse settlements, which are limited to the area's periphery. In 2007, an expedition—made up of conservationists with experience from exploration and wildlife inventory in other parts of DR Congo—entered this forest situated between the basins of the Tshuapa, Lomami, and Lualaba Rivers. The TL2 project, as it is now known, was led by Lukuru Foundation researchers John and Terese Hart, who set out to survey large mammals and human activity and now are promoting the creation of a protected area in this, one of the world's last unexplored tropical forests.

The TL2 project mission is to build effective conservation, from a village base to national administration. It is a locally based project, built on the diplomatic and field experience of the Harts and a cadre of Congolese field biologists with whom they had worked on previous projects. More and more local people have joined the project, bringing the advantage of long experience in the forests, languages, and cultures of the TL2. Their combined observation and diplomatic skills are critical for the scale of coverage and tying results together to give the products needed for enduring conservation. Since 2007, these teams have surveyed the forest by walking over 5,000 kilometers of compass-directed inventory tracks.

From the beginning of their surveys, the Harts sought GIS support to explore; document; and, eventually, define the area for conservation. An innovative partnership was developed in 2007 with Canadian Ape Alliance, a nongovernmental organization based in Toronto, Canada. Nick January, a volunteer GIS application specialist with the alliance, directs the collaboration with Lukuru's TL2 project through an Esri Conservation Grant, which has been generously supported since 2005. Fully equipped with multiple ArcGIS for Desktop, ArcGIS Spatial Analyst extension, and ArcPad licenses, the Harts are now able to capitalize on an existing mapping system that documents, stores, analyzes, and provides end products in support of their conservation efforts.

The development of an accurate and comprehensive basemap—an essential tool—was a daunting challenge. How could the TL2 teams accurately map a proposed protected area in such a remote and inaccessible region of central Africa?

It quickly became apparent that the available data was inaccurate and would have limited use for the scale of the TL2 project. For DR Congo, digital basemap data was restricted to widely distributed, publicly available national shapefiles (including transport, vegetation cover, river networks, political boundaries, protected areas, and elevation data). To successfully delimit the

The lesula monkey *(Cercopithecus lomamiensis)*, a new species of monkey documented by TL2 project researchers in the middle of Lomami National Park.

newly explored area, an early focus for the TL2 GIS was a complete overhaul of local geospatial data for the basemap.

GPS field data from multiple reconnaissance surveys was being rapidly collected and added to a growing volume of TL2 data (spreadsheets, databases, KML files, field notes). This stream of invaluable data was collected on the comprehensive and collaborative Lukuru/Canadian Ape Alliance GIS platform for TL2. The TL2 contributors learned a routine for documenting, storing, maintaining, editing, and analyzing the geospatial data so that final cartographic products would become more sophisticated and precise for what had recently been unexplored, inaccessible forest.

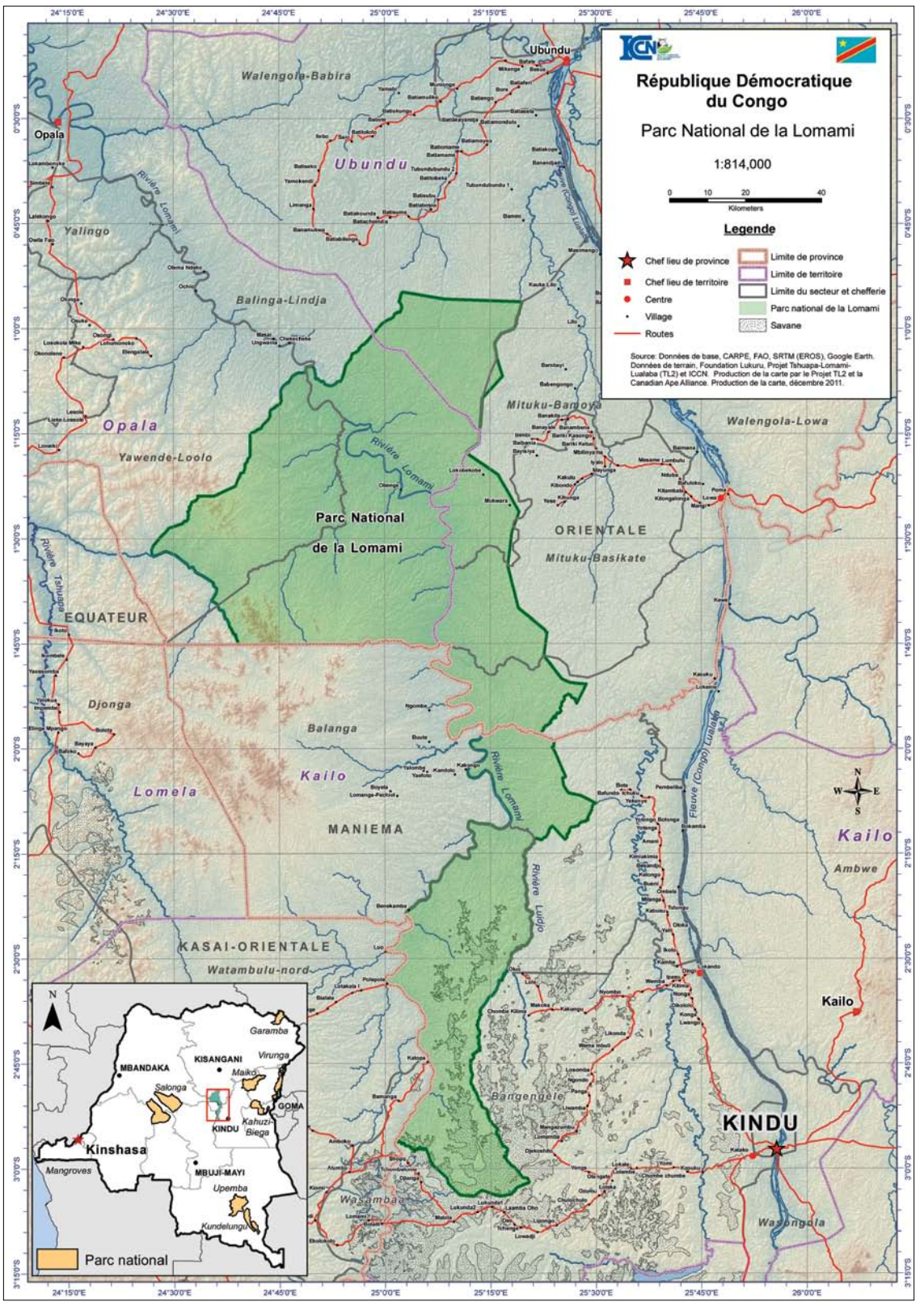
As TL2 field data became available, January worked on creating a more reliable basemap. To eventually get a delimited map of the proposed protected area, all map features needed to be digitized, including river networks, villages, and roads that had long since turned into footpaths. These were logical park boundaries. This background work included the use of Arc Hydro to create watersheds and drainage patterns, the incorporation of GPS field data to accurately map settlements, and the use of satellite imagery to further confirm location accuracy and content. Older maps and legal documents were used to correctly lay out internal political boundaries.

The Esri Conservation Grant expanded as the TL2 project added staff and ArcGIS expertise. Esri's technical and administrative support from both US and Canadian offices became critical to the GIS operation. Not only was a smooth integration and analysis of volumes of field data from a variety of sources possible but so too was a seamless transfer to web-based platforms, such as ArcGIS Online. With Esri software licenses and training materials, it was possible to have multiple installations under dispersed field working environments despite many hardware malfunctions.

In five years, the TL2 project has made important progress toward establishment of Lomami National Park. Exploration has led to the definition of boundaries for the remote park; these are delimited through the incorporation of GIS technology and Esri support. Surveys have resulted in previously undocumented populations of bonobo chimpanzees, okapis, elephants, monkeys, and Congo peacocks. One of the most important discoveries of the TL2 project has been the documentation and confirmation of a new monkey species living in the park area, the lesula monkey (*Cercopithecus lomamiensis*), an event that garnered international attention for the species, as well as Lomami National Park.

Once the park is officially established, the TL2 project will continue to monitor wildlife populations and hunting in the region. It will conduct conservation outreach programs in town centers, villages, and state capitals. The project will also train local people and students to protect, monitor, and promote conservation in Lomami National Park and in the DR Congo overall. With collaboration from the Congolese parks authority, outside experts will be able to visit and experience this extraordinary region and continue its exploration, documentation, and preservation.

For more information, contact John A. Hart, PhD, scientific director, Lukuru Foundation (johnhartdrc@gmail.com), or visit **bonoboincongo.com**; contact Terese Hart, PhD, director, TL2 project (terese@bonoboincongo.com), or visit **www.bonoboincongo.com**; or contact Nick January, GISP, Canadian Ape Alliance (nickjanuary@gmail.com), or visit **www.great-apes.com**.



Proposed Lomami National Park, Democratic Republic of Congo.

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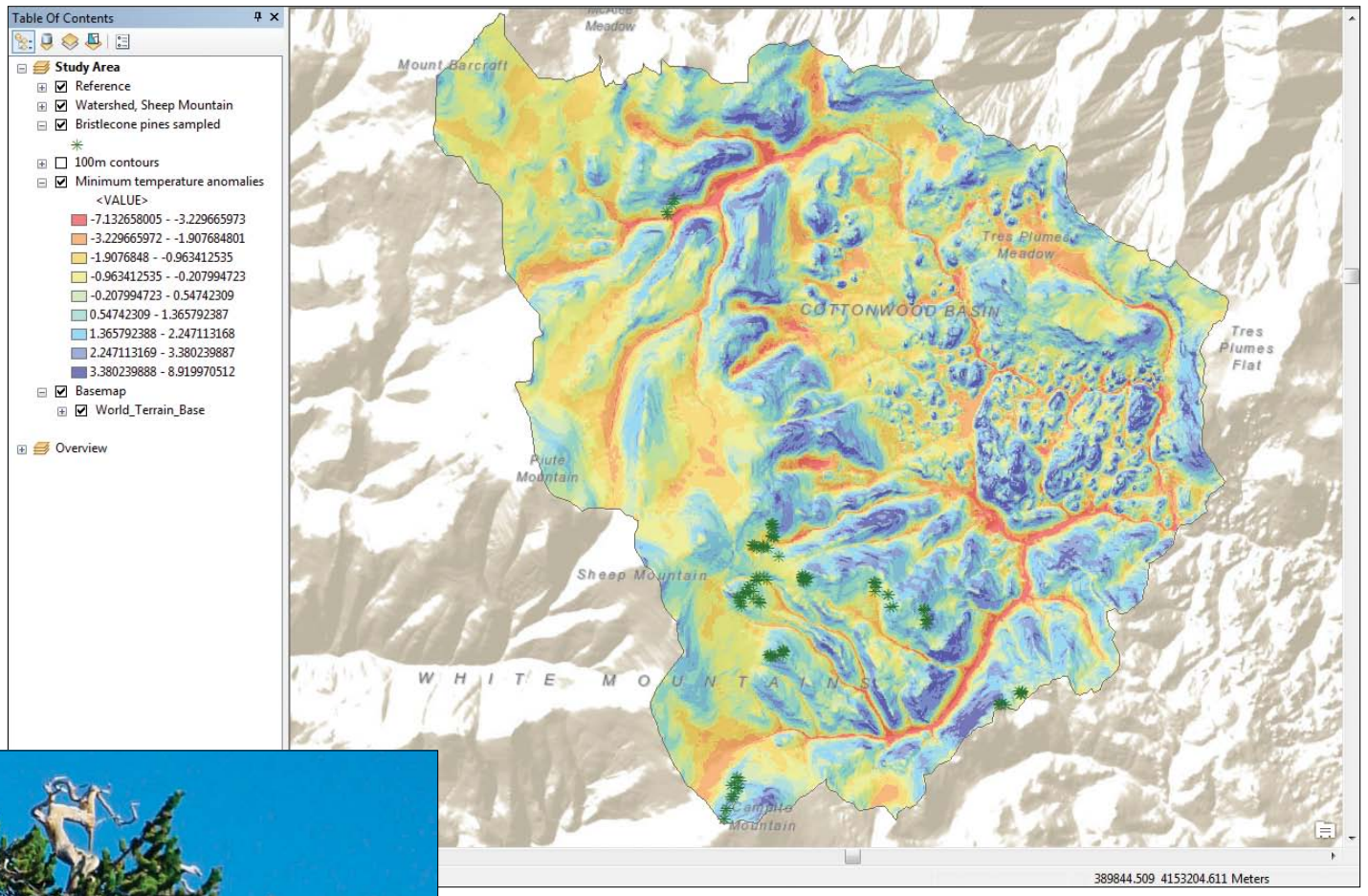
GIS and Ancient Trees Reveal Past Temperatures and Climate Change

By Matthew Salzer, University of Arizona's Laboratory of Tree-Ring Research, and Andy Bunn, Western Washington University

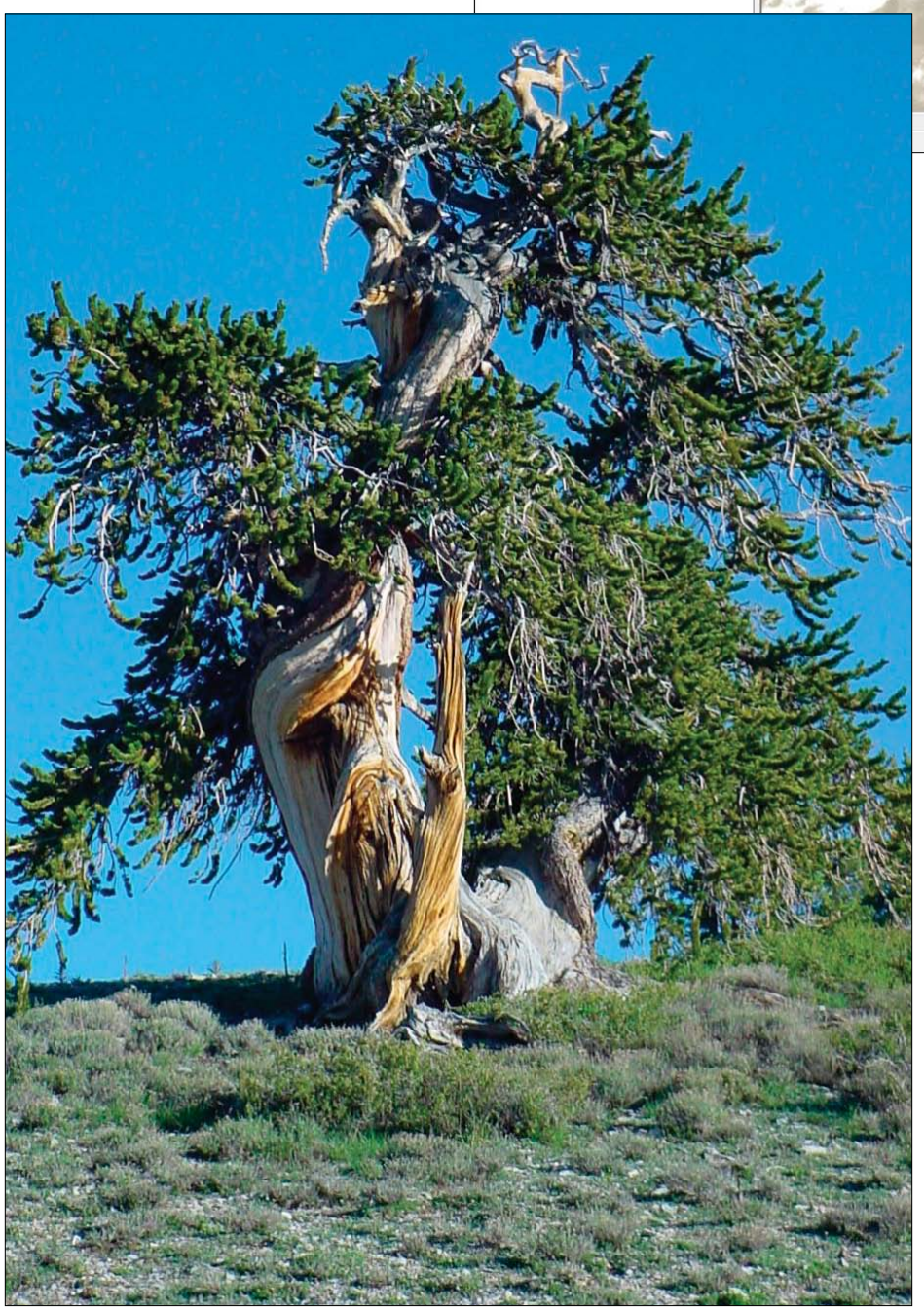
Highlights

- GIS helps determine the varying climate conditions individual trees experience in complex mountain environments.
- Using mountainside temperature data, ArcGIS Spatial Analyst spotlights summer variations of several degrees for individual trees.
- ArcGIS shows that over centuries, positions of trees have fluctuated up and down the mountain slope as temperatures changed.

Walking among living trees that have stood on the side of a mountain since the times of Christ and Buddha is a humbling experience. In the White Mountains of California, ancient bristlecone pines grow to about two miles above sea level; above that, the weather is too harsh for trees to thrive or to even survive. Many of these trees are more than 3,000 years old and have made a living in an intensely harsh climate that is very dry, very cold, and very windy. The slopes are rocky and steep. The topography is complex.



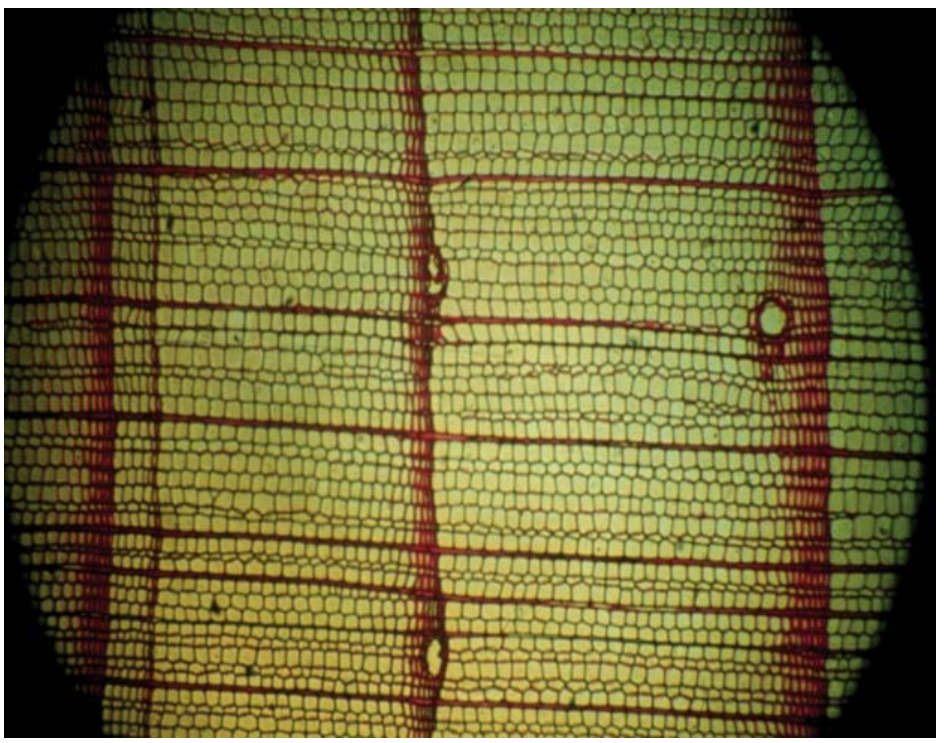
Minimum temperature anomalies are derived using topographic indexes in conjunction with relatively cheap temperature loggers arrayed over a rugged mountain landscape. These anomalies can be used to understand the microclimates experienced by individual trees.



This ancient bristlecone pine *(Pinus longaeva)* growing near the top of Mount Washington in the Snake Mountain Range in Nevada is very near the upper elevational limit of growth for the species. It is trees like this whose ring-width records reflect past variability in temperature.

There is almost no vegetation—just rocks and sand underfoot. The great ecologist Edmund Schulman called this amazing feat of survival "longevity under adversity."

These trees, and others like them, represent an amazing opportunity to unravel a tricky problem: How do we better understand what the climate was like in the times before instrumental records? Some ancient trees can be considered the rain gauges and thermometers of the past. The annual layers of growth (tree rings) put down by trees are influenced by the environmental conditions during which they form. There is abundant evidence that tree-ring width



Tree rings are produced annually as large thin-walled cells grow during the early part of the growing season, followed by smaller cells with thicker walls as the end of the season nears. The ring boundary is the abrupt change in cell size from the small thick-walled dark cells to the large cells formed at the beginning of the next growing season. In this image, the direction of growth is left to right, and the large openings are resin ducts. Note that some annual rings are relatively narrow and some are relatively wide; this is the result of different climatic conditions encountered during the growing seasons.

This very large dead bristlecone pine *(Pinus longaeva)* in the White Mountains of California stands at an elevation over 11,500 feet above sea level and looks down on the harsh tree line environment. The ring series sampled from this tree date from 663 BC to AD 1024.

in dry regions can provide a first approximation to the total rainfall over an interval of many months. In the high northern latitudes and in alpine tree line ecosystems, tree-ring width most closely approximates summer temperature. But, of course, trees are not rain gauges, nor are they thermometers. Trees are biologic organisms potentially subject to the influence of multiple environmental and biologic factors that affect their growth during their lifetimes. It is the job of dendrochronologists (*dendro* = tree; *chronology* = time) to interpret these growth records.

Work done at several universities, but most notably at the University of Arizona's Laboratory of Tree-Ring Research, over the last 50 years has shown that the growth of ancient bristlecone pine (*Pinus longaeva*) growing at the highest elevations in the mountain ranges of the Great Basin in western North America is sensitive to temperature. Recently, researchers have become more interested in exactly which individual trees are most sensitive to temperature and how a spatial approach can improve understanding. For instance, using ArcGIS for mapping (through an Esri university site license), recent research has shown that the position of the trees themselves on the mountainside have fluctuated up and down the mountain slope as temperatures have changed over the last several thousand years. There are stands of dead, twisted, and gnarled trees rooted in the ground more than 100 meters above the current tree line. These dead trees are reminders that the earth's climate is dynamic. They were alive during a period called the Holocene climatic optimum—a warm period that lasted from about nine thousand to about five thousand years ago. The climate then was more suitable for these high-elevation trees (summers were warmer), and the tree line was higher than it is today. As the earth's orbit changed over thousands of years, the climate cooled, and those trees eventually died. However, these mountains are so dry and cold, and the bristlecone pinewood is so tough, that the wood has remained on the landscape for thousands of years. The record of growth in those rings speaks volumes about how climate has changed in the past and how it might change in the future.

Dendrochronologists strive to develop the best possible tree-ring chronologies of year-to-year changes in temperature obtainable from ancient bristlecone pine. Meteorological records of temperature from actual thermometers are only available for these regions for roughly the past century. A much longer time frame is required to adequately understand the evolution of the earth's climate. By using the bristlecone pine chronologies as a proxy record of temperature, tree-ring scientists can better understand how variable the earth's climate has been over several millennia and test climatic theories and output from climatic models that many view as important for the future sustainability of modern society.

For decades, dendrochronologists have been working with the long bristlecone pine record to infer variability in past temperatures—if you can build a mathematical model between current climate and tree growth, you can apply that model back in time and determine the climate. But the challenge is in knowing exactly which climate variables are limiting a tree's growth. As the botanical and ecological literature can attest, cambial growth (tree-ring width) in high-elevation trees is a complex biologic process. Thus, the most appropriate trees must be selected for field sampling—trees whose annual growth rings will reflect variability in past temperature rather than, say, variability in growing-season soil moisture. The advent of precision GPS and detailed elevation models help determine which trees are the best temperature recorders based on their precise location.

GIS technology can help determine the climate conditions that individual trees experience in these rugged and complex mountain environments. For example, micrometeorological models of temperature anomalies from cold air pooling, solar radiation models (like the Solar Radiation toolset in ArcGIS) that take topographic shading into account, and remotely sensed information on the timing and direction of water from snowmelt all can be used to determine the physiological factors limiting tree growth. More specifically, combining data from inexpensive temperature loggers deployed on the mountainside with the hydrologic modeling tools in the ArcGIS Spatial Analyst extension shows that individual trees are experiencing variations in minimum daytime temperatures of several degrees in the summer. A tree growing in a colder microclimate resulting from cold air draining down the mountain might be limited by temperature more so than one of its neighbors growing only a few meters away if that neighbor is located on a patch of ground that is relatively warmer by comparison. Indeed, the ring widths of trees growing on the same mountain slope vary in conjunction with their biophysical setting in predictable and measurable ways. Determining exactly which climate variables were limiting growth was not possible at such a fine scale before dendrochronologists began to exploit the power of geospatial data. Now that these tools are becoming easier to use, the collaboration between those that are interested in time and those that are interested in space is poised to move the field of paleoclimatology onto firmer, clearer ground.

About the Authors

Dr. Matthew Salzer is a dendrochronologist with the University of Arizona's Laboratory of Tree-Ring Research and an expert on paleoclimatology. Andy Bunn is an environmental scientist at Western Washington University who brings geospatial tools to bear on a variety of ecological questions. He's been using Esri software since the command line days and currently uses ArcGIS 10 on a site license for Western Washington University.

For more information, contact Matthew Salzer, University of Arizona's Laboratory of Tree-Ring Research (e-mail: msalzer@ltrr.arizona.edu), and Andy Bunn, Western Washington University (e-mail: Andy.Bunn@wwu.edu).

Small Town Upgrades Storm Water Management

Applying Geodesign to Mitigate Flood Risk in the Town of Cobourg, Ontario

Highlights

- With GIS, officials view multiple georeferenced surveys at once and get a complete snapshot of the event.
- ArcGIS 3D Analyst and terrain dataset helped develop an accurate 3D representation of the town's surface terrain.
- Calculations are automated within the GIS, minimizing data preparation and maximizing time spent assessing flood-related issues.

The hydrology of landscapes surrounding urban areas is constantly changing due to the expansion of urban boundaries. As such, established and newly developing areas must implement cost-effective means for restoring or minimizing the impact of change while planning for future growth. Among the many issues that can arise from increased urbanization, storm water management can pose significant challenges, particularly for municipalities located on floodplains.

Situated in southern Ontario, Canada, the town of Cobourg is home to just over 18,000 residents and is rapidly growing. With four major creek systems that run southward through Cobourg to Lake Ontario, the town is especially vulnerable to flooding and has experienced several major floods over the past few years.

Charged with mitigating the likeliness and impact of floods in Cobourg is the Ganaraska Region Conservation Authority (GRCA). The organization strives to conserve, restore, develop, and manage natural resources for 935 square kilometers of land. To better equip the town of Cobourg for ongoing expansion and subsequent flood risk, GRCA leverages GIS to simulate, test, and propose effective storm water management initiatives. It recently received a grant from the Ontario Ministry of the Environment's Showcasing Water Innovation Program that will be used to explore novel approaches to floodplain mapping that can be shared across the province.

Harmonizing Man-Made Structures with the Environment

In strategizing to mitigate flood risk, GRCA is challenged to accommodate both existing and proposed development. "There are many heritage developments built on floodplains that simply would not be approved for construction today," says Ian Jeffrey, GIS/remote-sensing specialist, GRCA. "We're tasked with modeling the impact of potential flood events so that structures can be put in place to effectively mitigate risk in these areas." Concerns also arise over new development that may exacerbate flood hazards.

"As development occurs across the landscape, sustainable management and appropriate planning are required to ensure that current and future actions do not degrade, alter, or destroy the existing environment," says Jeffrey. "When significant development happens in a small town, it is imperative to consider the bigger picture."

For informed planning, GRCA applies classic principles of geodesign, using robust tools to design and evaluate structures that work in harmony with nature. This allows the town to meet goals related to both sustainability and regulatory compliance. The town has found that Esri's terrain dataset, along with the ArcGIS 3D Analyst extension, allowed staff to develop a digital elevation model (DEM), an accurate 3D representation of the town's surface terrain.

The DEM is used to calculate floodplain elevations and map floodplain boundaries. Capturing this level of accuracy supports effective analysis so that recommendations can be made for the design and implementation of new storm water management infrastructure and detention ponds throughout the town of Cobourg.

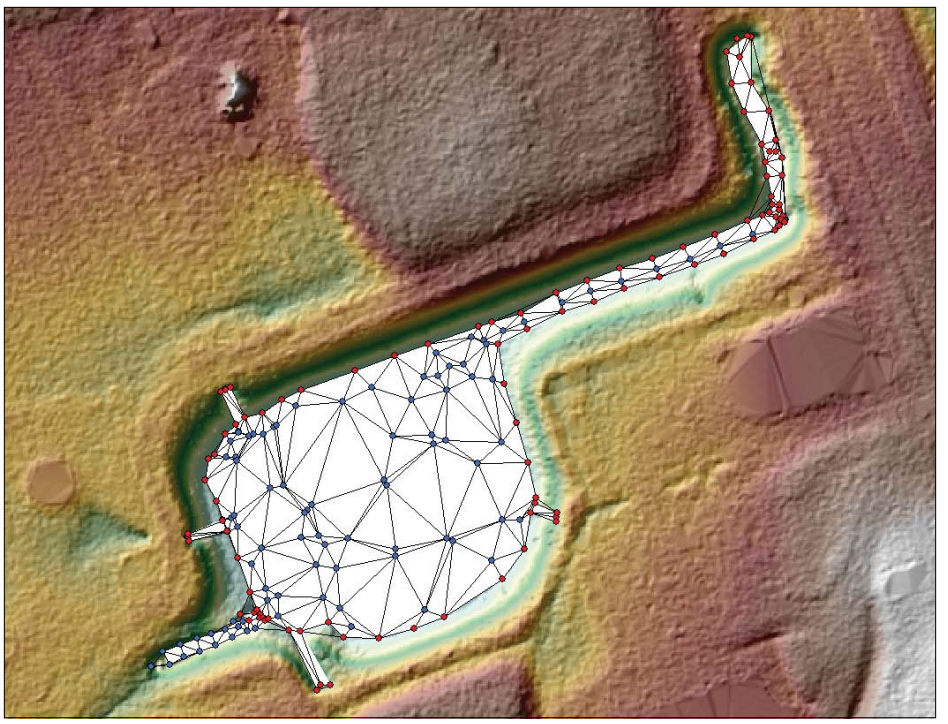
Detention Ponds to Diminish Storm Water Surges

Detention ponds are storm water management facilities designed to protect against flooding and, in some cases, downstream erosion by storing water for a limited period of time and then releasing it slowly. They are also used to collect suspended sediments, which are often highly concentrated in storm water due to roadways and hard surfaces being washed off during rainfall.

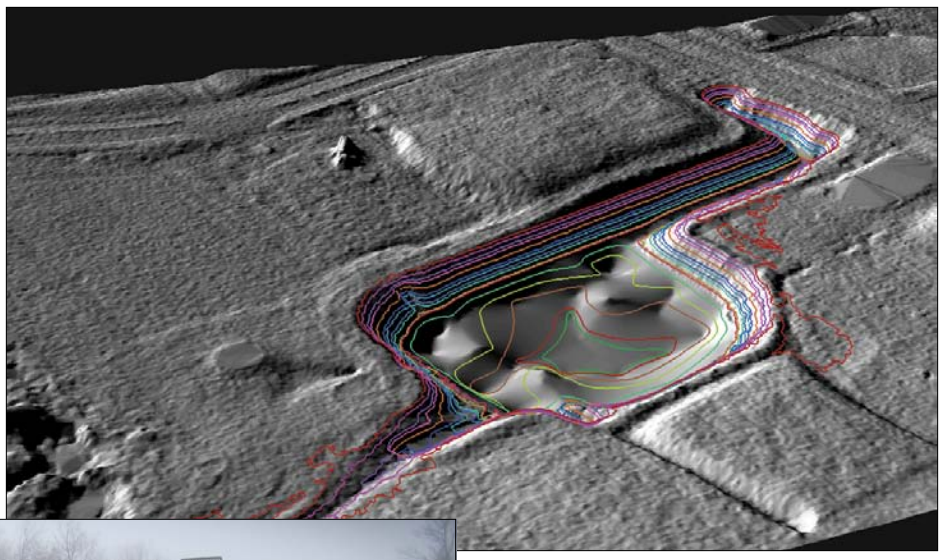
These ponds are a necessary fixture of growing urban areas because flood events are often greater in magnitude and frequency within increasingly urbanized landscapes. Furthermore, surfaces associated with urban areas, such as roads, parking lots, and rooftops, prevent the natural infiltration of water into soil, which can potentially cause widespread flooding downstream. When analyzing existing or potential pond sites, GRCA leverages the ArcGIS 3D Analyst extension to incorporate multiple criteria into the decision-making process. This can include land availability, geographic conditions, and site-specific legal and jurisdictional considerations. Using GIS, it's also possible to evaluate the performance of a detention pond, including its attenuation efficiency (the ratio of runoff retained in a pond versus the amount flowing in), prior to construction.

By visualizing lidar fused with GPS survey data, GRCA can also determine the amount of sediment accumulation within each pond that should be prioritized for removal. When new development occurs, the DEM is leveraged to forecast flow capacities along the floodplain and flag potential spill inundation areas that may require the implementation of new storm water management structures.

"We've created a living terrain dataset that can be exported at any time to produce an updated DEM," explains Jeffrey. "This means that we don't have to purchase new datasets every time new construction occurs, and we can use our existing model to analyze how water flows over the new terrain features."



Images were created with real-time kinematic GPS bathymetric survey data of a storm water management pond and surrounding terrestrial DEM generated using lidar.



The final fused hydraulic DEM with contours extracted to support the GRCA engineering department in its analysis of the hydraulic function of the urban storm water management system.

With four major creek systems that run southward through Cobourg to Lake Ontario, the town is especially vulnerable to flooding and has experienced several major floods over the past few years.

Modeling for Reduced Risk

The updated DEM is used for both hydrologic and hydraulic analysis. GRCA first produces a hydrologic DEM, which is conditioned to support hydrologic models that simulate storm water runoff into watercourse features. The next step is to introduce hydraulic information in the form of in-stream 3D representations.

To support hydraulic analysis, in-stream features are captured using real-time kinematic GPS and fused with the hydrologic DEM to produce a hydraulic DEM. Features such as top-of-bank breaklines, stream centerlines, and cross-sections provide the necessary 3D representation within river banks, which is typically not captured during DEM production. GRCA can then extract cross-sections from the hydraulic DEM and import them into a hydraulic model for engineering analysis. The results are used to estimate flow for storm water systems during various types of rainfall events.

Floodplain maps are used not only to inform the development of storm management infrastructure but also to develop flood-related emergency response procedures. Because calculations are automated within the GIS, more time can be spent assessing flood-related issues, and less time is spent on the mechanical tasks of preparing data. Three-dimensional modeling using the ArcGIS 3D Analyst extension also makes it easier to communicate requirements with engineers and gain buy-in from stakeholders.

For more information, contact Ian Jeffrey, GIS/remote-sensing specialist, Ganaraska Region Conservation Authority (e-mail: ijeffrey@grca.on.ca).

Tracking Vessels Supports EU Sustainable Fishing Policy

Croatia Extends the Value of Its Fisheries with GIS

Highlights

- The Republic of Croatia is monitoring its fishing fleet along the shoreline of the Adriatic Sea by using ArcGIS to track and monitor vessels.
- GIS will help the country meet the European Union's stringent fisheries policy.
- VMS is an open system compatible and easy to integrate with existing GIS environment and informational systems.

The European Union (EU) requires that fisheries be sustainable and not jeopardize fish stocks for future generations. Even so, Europe's fish populations continue to decline. Therefore, the EU Commission Reform of the Common Fisheries Policy (CFP) has been assessing the way EU fisheries are managed and the challenges they face. The commission concluded that the main contributor to overfishing is that the fleet's fishing capacity is greater than its fishing opportunities.

To counter this problem, the commission has recommended baseline standards that will reduce the fleet's capacity, including the gross tonnage of a vessel, gear selectivity, trawler equipment, twine thickness, and so forth. It also recommended stabilizing fish stocks by implementing catch quotas by species, creating seasonal closures, and restricting access to areas where young fish are developing. In addition, the commission noted that waters need to be managed within a regulated transparent and sustainable framework so they are not overfished.

This is easier said than done. Tracking vessels and monitoring catches can be an overwhelming task. In 2010, the EU's 27 member countries registered a total of 83,796 vessels. Fortunately, the EU's soon-to-be newest member, the Republic of Croatia, has an effective GIS fishing industry solution that helps it monitor vessels, gear, catches, seasonal fishing areas, and more.

Croatia's Ministry of Agriculture, Department for Fisheries, asked GDi GISDATA LLC, Esri's distributor in Croatia, to build a geoinformation system for fisheries. GISDATA developed the Vessel Monitoring System (VMS). The department uses it to identify and track the country's 260 large fishing vessels. This information can be used for monitoring boat activity and as evidence for law enforcement.

The main components of VMS are the department's centralized database, tracking devices, and ArcGIS. Whether at the department, in the harbor office, or on a boat, an inspector can access the GIS to track a vessel and get information about its owner, type, and gear on board and a host of other information.

The fishery information system, built to accommodate the EU's fisheries registry requirements, includes nine data modules. It is capable of providing additional information for various other uses. The person-register module contains ID numbers, owner information, and fishing licenses, as well as vessel information, such as title, registration, length, gear, and equipment. In accordance with the EU regulation, Croatia's fleet register keeps track of the vessel's entire life cycle from entrance to and exit from the fleet. Every data change for the vessel is recorded as an event, thereby keeping the entire fleet database current.

A catch module includes information that fishers complete on an inquest register, as well as descriptions of the catch, catching effort, and rejected catch. An analyst can filter the catch module by date; regional unit; type of sea organism; fishing gear; and vessel type, length, strength, and weight. This gives the analyst a good picture of the relationship of fishing capacity and fishing opportunities.

The first sale module is used to compare catch data with sale data to reveal any discontinuity. The blue diesel module monitors fishing vessels' fuel consumption to gasoline quota. The aquaculture model contains fishers' preferences for farming freshwater organisms, and the marine culture module holds breeding site data. Other data modules include the sport and recreational sea fishing license, tuna fishing, and administration.

VMS in the Adriatic Sea is used to acquire, send, edit, and process data. Large vessels 14 meters or longer have onboard tracking devices that send vessel data to the database via general packet radio service (GPRS) and SAT (Iridium) satellites in different time intervals. GPRS/EDGE/UMTS (depending on signal quality and strength) have been customized to send data every 15 minutes or less (remote control) and over SAT every two hours.

VMS collects vessel information in real time, such as location, speed, direction, and even battery status. Developed on ArcGIS for Server using the ArcGIS API for JavaScript, the system integrates with vessel data stored in the Microsoft SQL Server database and publishes dynamic content.

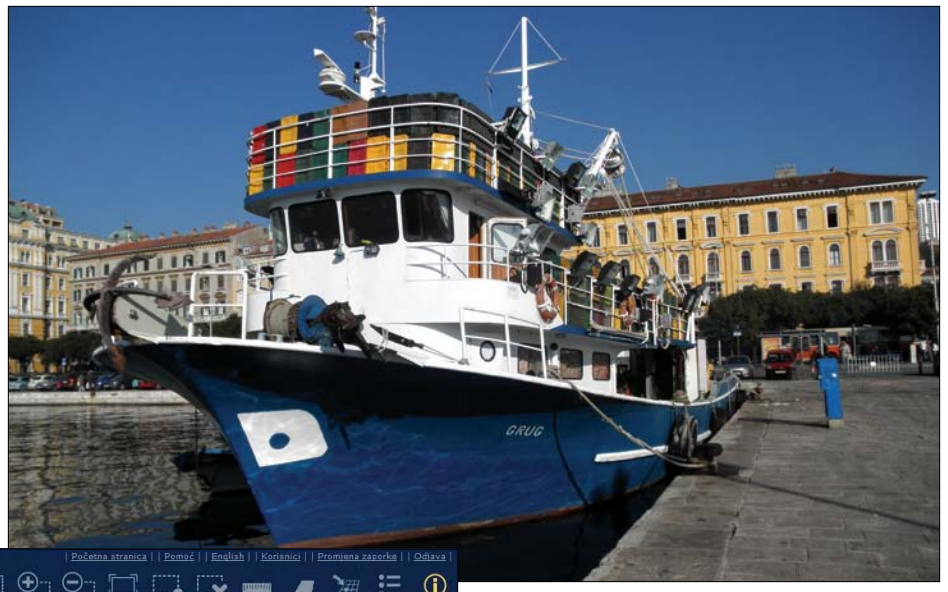
Users are then able to review and send detailed data reports about a vessel's position, speed, type, and so forth. Along with this, basic users can selectively manage and track historical and up-to-date data through filters and alarms. Alarms are divided into system alarms and spatial alarms alerting the department of problems in protected, forbidden, or time control areas. Alarms are automatically transmitted as text messages to inspectors in the field.

Department for Fisheries staff members use a web browser to access GIS web applications to see this information:

- An overview of the last available position of every vessel
- An overview of archive positions of monitored vessels during certain time periods
- An overview of basic data from the informational system of fisheries—a chosen vessel's owner, dimensions, and so forth
- Statistical data about vessel movement

The application also gives users tools to perform analysis, such as determine a path or calculate fuel consumption. They can also choose raster or vector data background layers and generate reports.

Staff whose job it is to do complete surveillance and vessel monitoring may want to use VMS tools in ArcGIS for Desktop. GDi GISDATA's ArcGIS extension, Vessel Analyst, enables users to generate spatial data from alphanumeric data in the VMS database for defined time periods, analyze it, and produce fishing vessel location maps. Depending on their work requirements, staff members can access VMS and work with basic GIS tools or have the full range of GIS functionality in a desktop



A Croatian fishing vessel.

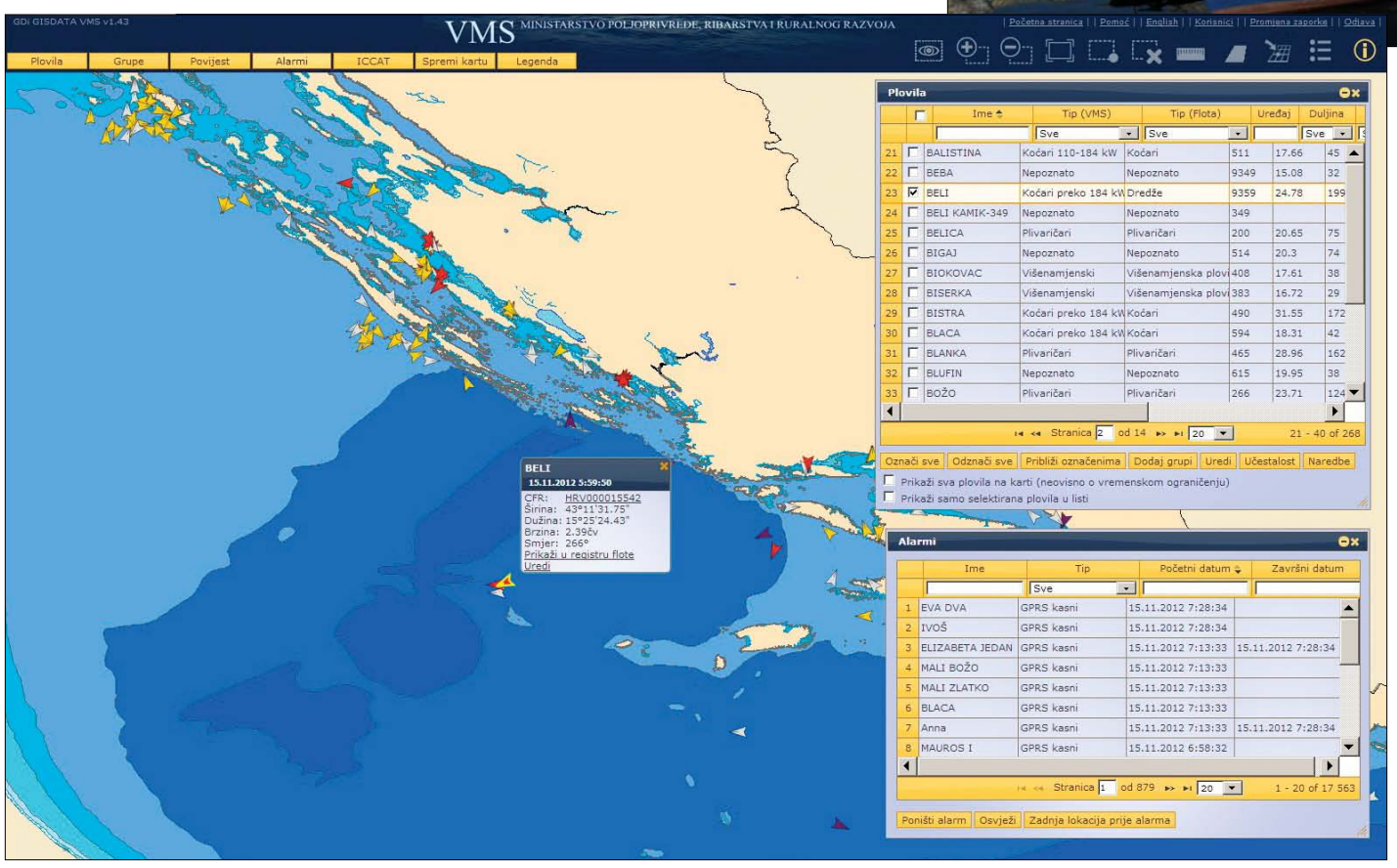
application to perform analysis. Security tools allow only authorized users access to the system. These users can perform top-level content management and build maps using many GIS and cartographic functionalities. The desktop application enables users to do these tasks:

- Create rich cartographic presentation in arbitrary scales and data layers
- Execute database SQL queries
- Publish configurable reports containing cartographic presentations
- Perform various spatial analyses using intersect, merge, and buffer tools

VMS is an open system based on standards and is compatible and easy to integrate with existing GIS environment and informational systems. It supports distributed workflows in the central office of the Department for Fisheries, county offices, and fishing vessel business offices.

Croatia can now use the system to study the impact of aquacultures on the environment. And in the event of a storm, responders can alert vessels and rescue vessels in distress.

For more information, contact Mr. Andrej Lonĉariĉ, managing director, Core Markets, GDi GISDATA (e-mail: andrej.loncaric@gdi.net).



An overview of the last available positions of every vessel gives the Department for Fisheries a near real-time picture of vessel activity. Detailed information about a vessel is quickly accessible.

A New Probe for CSI?

GIS Offers a Novel Way to Analyze Human Bones

Highlights

- ArcGIS software is used for the first time to map and analyze human bone microstructure.
- Mapping reveals spatial relationship of microscopic structures and how bone was used during life.
- University researchers prove that ArcGIS offers uses in forensic medicine, skeletal biology, and anthropology.

Bone researcher David C. Rose straddles two worlds.

The Ohio State University (OSU) doctoral student in anthropology is also a captain in the University Police Division, a unique vantage point in which he sometimes deals with forensic investigations involving human remains.

That exposure—and his focus on skeletal biology—prompted Rose to launch a project to determine if patterns of change inside human bones might reveal how they were used during life.

Rose and coinvestigators Amanda M. Agnew, Timothy P. Gocha, Sam D. Stout, and Julie S. Field used ArcGIS (through Ohio State University's Esri university site license) to identify and map features inside a human metatarsal (foot) bone—an entirely new way to study human skeletal and biologic variation. "I've got more than one career's worth of work here," quips Rose.

Rose began the project to explore how bones grow quickly, adapting to the load that is placed on them. "Patterns of tension and compression show up in our internal bone structure, and this software lets us look at those patterns in a new way," he says.

The research is relevant for studying not only human internal bone structure but also that of other species, such as horses, says Rose. "We can use GIS to compare species and see how animals differ from us."

Coresearcher Stout, professor of anthropology at Ohio State and Rose's doctoral adviser, explains why the findings—first published online in the June 14, 2012, *American Journal of Physical Anthropology*—are important:

"Dave's work allows us to visualize, analyze, and compare the distribution of microscopic features that reflect the development and maintenance of bones. We can then relate this to skeletal health and disease—for example, bone fragility in osteoporosis."

One other study—published by researchers in Madrid in the June 2012 *Journal of Structural Biology*—used ArcGIS to map human long bone differentiation in shape, size, and tissue type during development from embryo to adult. But to the Ohio State research team's knowledge, this is the first time anyone has used ArcGIS software to map and analyze the spatial distribution of bone microstructure.

The Genesis of a New GIS Application

How did Rose hit upon the novel notion of enlisting GIS into bone research?

Early on, he knew that GIS software could analyze nearly any kind of spatial data, from crime statistics to flood models. He even used it to map line-of-sight views while developing security plans for events on campus.

As it turned out, Rose had to take upper-level archaeology classes as part of his graduate school curriculum. His instructor, Field, an assistant professor of anthropology at Ohio State, used GIS extensively in her fieldwork to map the location of objects uncovered at excavation sites.

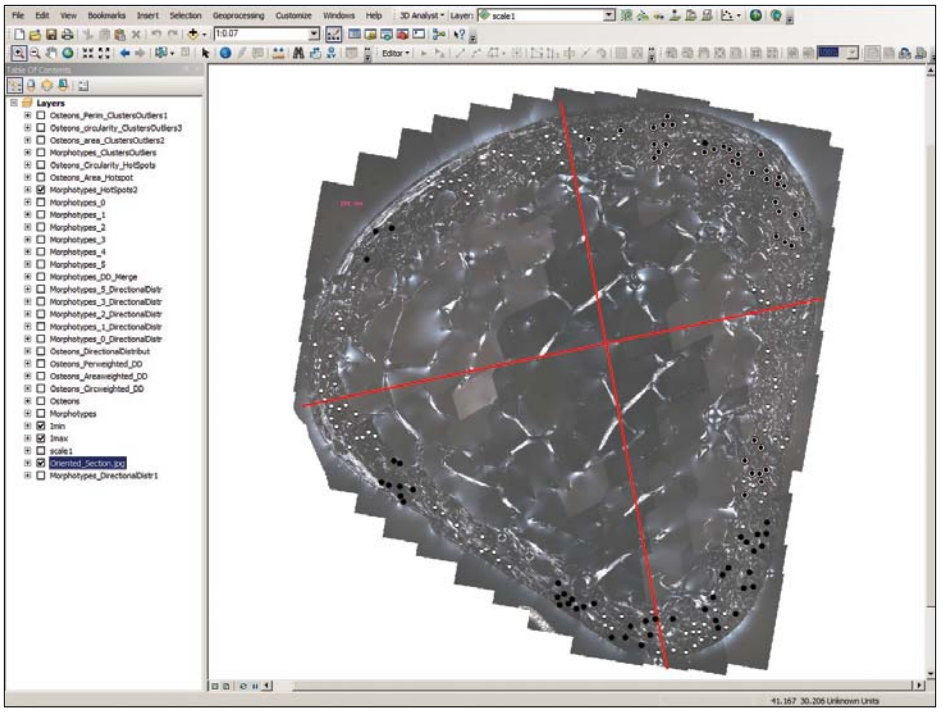
Field emphasized the need to identify important clusters of objects, such as household tools or agricultural tools, that would indicate patterns of human activity, recalls Stout. "Based on whatever scientific criteria you establish, GIS gives you a statistical measure of whether the objects you're looking at actually constitute a cluster."

According to Stout, Field saw the potential of Rose's and his use of GIS as a research tool in measuring the distribution, size, shape, and strain history of bone microstructure.

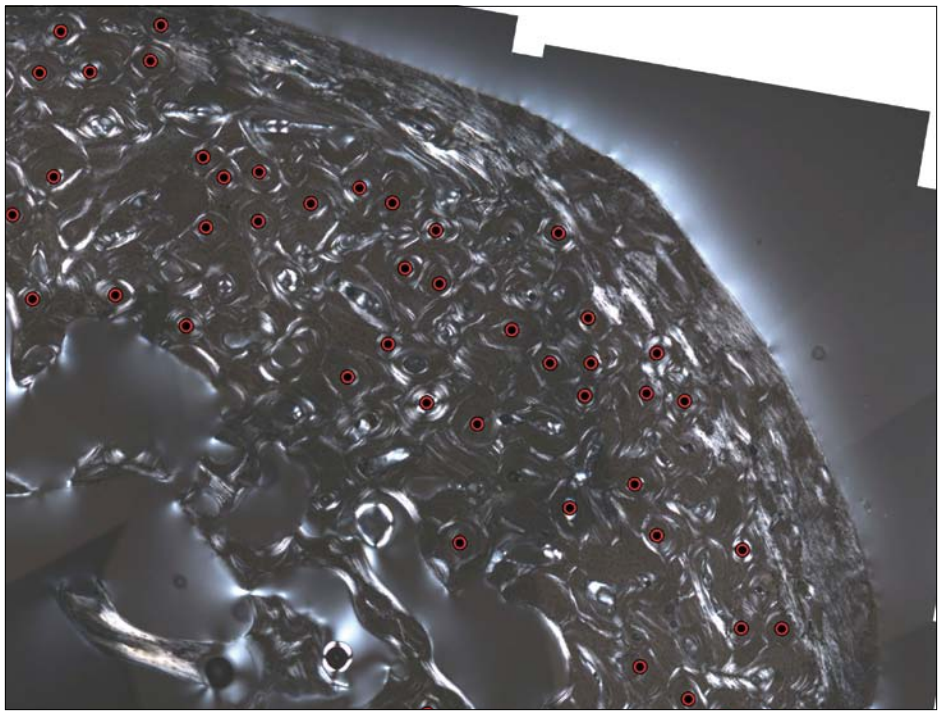
"You're trying to describe how strong a bone is for bending, tortion, and use," Stout says. "How much of a load can it experience, and how much at risk is a person for a fracture? For example, this is useful data for designing air bags in cars to minimize the chance of incurring skeletal fractures."

Small Bone Yields Big Results

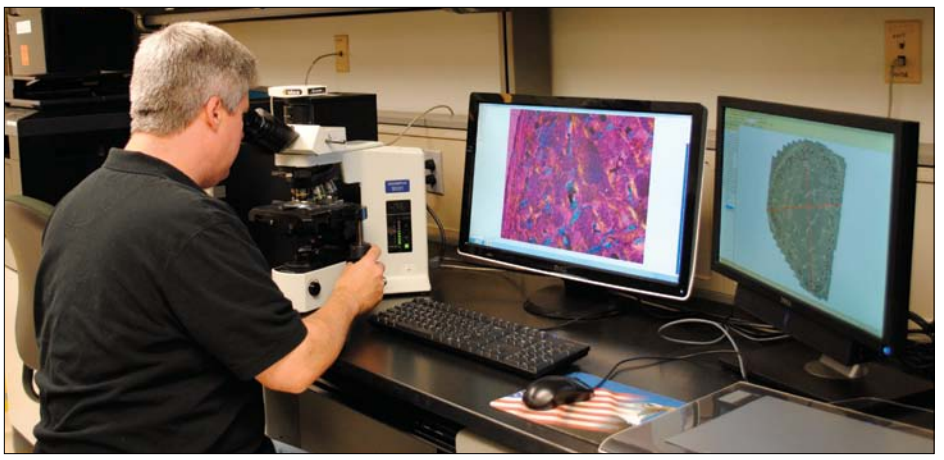
For this study, which became his master's thesis,



A full bone cross-section from the metatarsal (long bone in the foot) sample. The bone picture is assembled from images taken through a microscope using polarized light.



A close-up of the metatarsal showing marked features of interest in GIS.



The computer monitor (right) shows ArcGIS 10 running with a bone map displayed. The left image is a bone cross-section under magnification. (Photo courtesy of David Rose, pictured.)

Rose examined the cross-section of a metatarsal—a long bone in the foot—from a deceased woman who generously gave her body to the Division of Anatomy's Body Donation Program. Using this bone cross-section, the team demonstrated how the software could be used to show the loads experienced in the foot during gait, or walking.

Rose recorded an extremely high-resolution image of the bone cross-section under a microscope. He used ArcGIS to map the location of key structures called *osteons*—the fundamental functional unit of compact bone.

Osteons are roughly cylindrical structures that are typically several millimeters long and around 0.2 millimeters in diameter. They are present in many bones of most mammals and some bird species. Also called the Haversian system, the structures are created throughout life to fix small cracks or maintain mineral levels in the blood. The size and shape of osteons, along with the direction of the collagen fibers from which they are made inside bone, are influenced by the loads placed on bones during life.

In this case, says Rose, the donor's metatarsal bone showed the predicted pattern of normal bone remodeling. It had concentrations of particular types of osteons along the top and bottom of the bone that could have been formed by forces exerted as she walked.

"This was just where you would expect to see telltale signs of foot flexure and compression," he says.

Rose acknowledges that his current technique is invasive and cannot be used on a living person. "But in the future, 'nano-CT' may examine a person's bones to determine the risk of fragility and fracture," he says.

Promising Technique Needs Refinement

Both Rose and Stout caution that this study provides only a proof of concept and that many more types of bones would need to be studied before GIS software could provide meaningful insight into bone biology.

Nevertheless, foot bones today are especially useful in forensics due to the sometimes gruesome reality of unidentified remains: often only foot bones are intact, having been protected by shoes. "Other bones may be chewed up by animals, but a well-preserved foot bone can be a very useful forensic application," says Stout.

Rose added that to reliably use this tool for forensic applications calls for a better understanding of spatial distribution. "But that's still some years away," he says. "This is a new area of research, and right now only one group is working on this, and that is ours."

At OSU, under Stout's supervision, Rose is combining very basic concepts in GIS and skeletal biology. However, he foresees a tremendous opportunity for advances at the intersection of both disciplines.

"The real advantage to this method is that it offers a new scale for the study of human physical variation, offering to shed light on how we adapt to our surroundings."

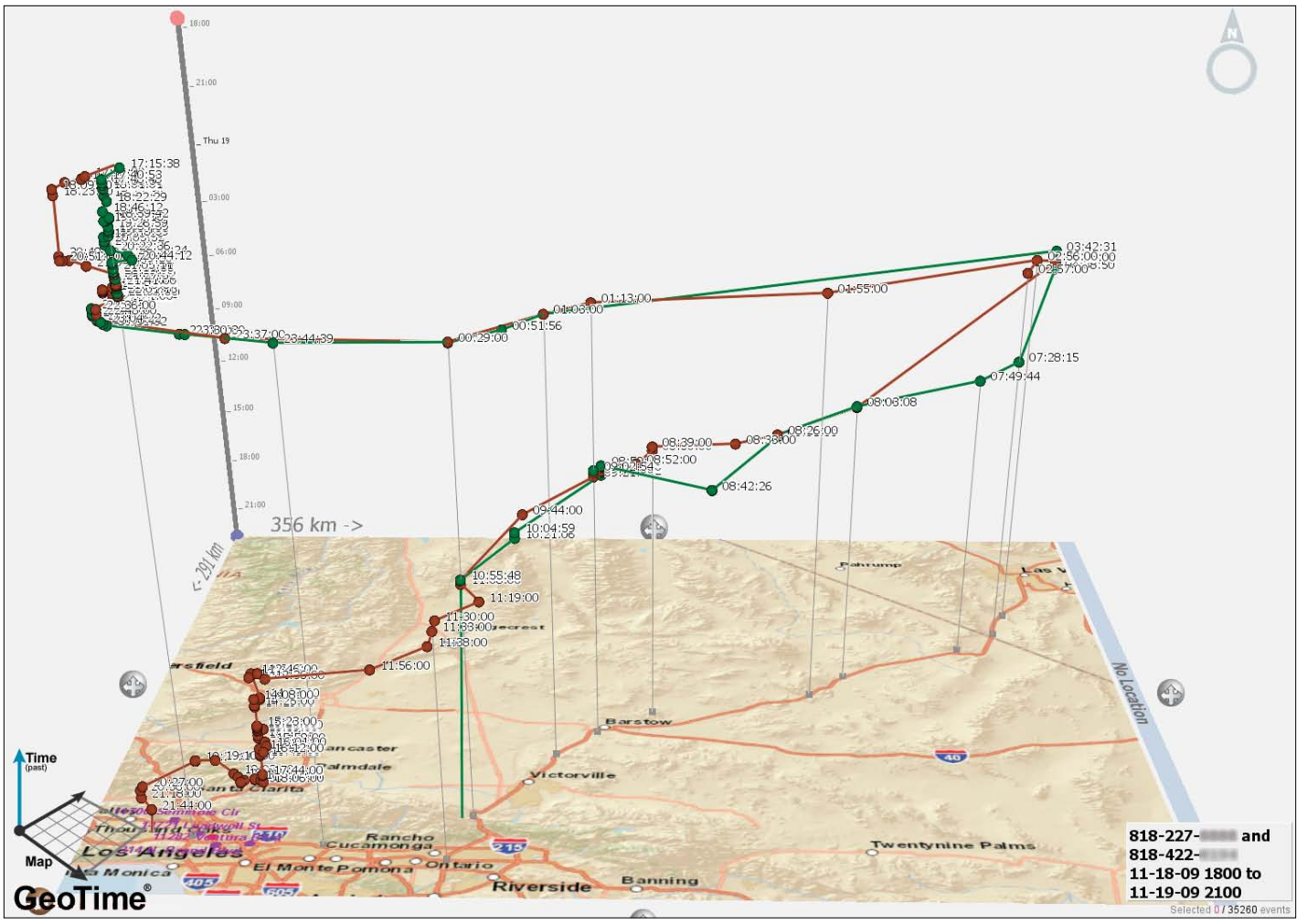
For more information, contact David Rose, captain, Police Division, Ohio State University (e-mail: rose.81@osu.edu, tel.: 614-292-6367), or visit researchnews.osu.edu.

Hardworking Crime Maps

Sophisticated Cell Tower Analysis Helps Los Angeles Law Enforcement Pinpoint Criminals

Highlights

- ArcGIS extension specializes in the display of movements and events through time and space.
- With GIS and temporal tracking software, LA CLEAR maps cell towers to assimilate and comprehend complex cell datasets.
- The district attorney's office can now demonstrate both time and space for its court presentations.



This screen shot shows a shooter's cell phone traveling with an associate's cell phone from the Los Angeles area to Las Vegas and back.

Catching criminals and enforcing the law can be arduous and time-consuming. It's a piece-by-piece, evidence-based process. And it doesn't stop at apprehension. Arming prosecutors with the evidence they need to get a conviction is just as vital.

For years, tracking cell phone usage and location information has helped law enforcement put offenders behind bars by establishing motive, placing suspects at the scene of a crime, reconstructing timelines, and connecting suspects to victims and each other. Unfortunately, the technology used in these types of investigations has been limited. Reconstructing timelines can take investigators many hours. And while hand-drawn link charts and paper maps have helped, they've lacked intuitiveness, and connections may be missed. Two-dimensional maps don't clearly show the necessary relationship between cell towers, call locations, cell phone movement, and criminal activity. Moreover, the lack of a temporal dimension—which tracks movement through time as well as space—limits the effectiveness of the map.

The Los Angeles Regional Criminal Information Clearinghouse (LA CLEAR) has implemented an innovative approach to addressing these challenges. Using a solution based on ArcGIS from Esri Partner Oculus Info Inc. (Toronto, Canada), the agency has rapidly streamlined the mapmaking process for tracking cell activity. It has overcome the time and dimension problem as well—sophisticated 3D maps can show movement and activity over time, whether it's throughout the course of a day, a week, or an entire month.

LA CLEAR and the Need to Track in Both Time and Space

Based in Los Angeles, LA CLEAR is nationally recognized and modeled after the US government executive branch's Office of National Drug Control Policy's High Intensity Drug Trafficking Area (HIDTA) Intelligence Support Center. LA CLEAR provides strategic investigative research and postseizure analysis, tactical case support analysis, electronic surveillance capabilities with accompanying operational intelligence support, and training and conference opportunities to the more than 184 LA HIDTA-specific agencies and task forces within the four counties of the LA HIDTA.

LA CLEAR is managed by sworn law enforcement executives and staffed by a fully integrated team of nonsworn law enforcement, military, and contract specialists organized into the following component units:

Mapping the use of cell phones by criminal suspects assists in making arrests and securing convictions.

- The Intelligence & Deconfliction Watch Center ("war room")
- The Analytical Unit
- The Special Operations Support Unit
- The Los Angeles HIDTA Training Initiative (hosted by LA CLEAR)
- The Information Systems Support Unit
- The Administrative Support Services Unit

For years, LA CLEAR analysts have mapped individual crimes, the locations of known criminals and suspects, and related crime activity. This has proved invaluable in assisting law enforcement.

In particular, mapping the use of cell phones by criminal suspects assists in making arrests and securing convictions. Yet it hasn't always been easy.

"We were limited to two-dimensional views of cell tower hits," says Toni Nunez, senior lead analyst, LA CLEAR. "Deputy district attorneys were asking us for something that could express both time and space for their court presentations."

For example, these first digital maps did not clearly display multiple hits in the same location over a period of time. On a two-dimensional map, one dot appears where, in fact, there are multiple calls. A three-dimensional map extrapolates this information in time to allow anyone using the map to easily visualize and understand where multiple calls and violations have occurred over time. Staff needed to find a way to include time variables within its maps to be able to see if two suspects were not only at the same place but at the same place at the same time.

After looking at different technologies, LA CLEAR staff contacted Oculus to view demonstrations of its GeoTime solution, which provides data visualization and analysis, specializing in the display of movements and events over time. It provided LA CLEAR with a unique 3D time viewer to simultaneously visualize geospatial, temporal, and link data. It was exactly what LA CLEAR needed to support its mission.

With its new capabilities, LA CLEAR was able to map cell towers, which in turn allowed it to assimilate and comprehend complex cell datasets. Officials could make faster, more accurate decisions by identifying where suspects had been and where they were headed.

After a successful evaluation and trial period, the agency implemented the solution in 2010. LA CLEAR then expanded its Esri ArcGIS license for all analysts who would be mapping cell sites, and analysts are trained in both ArcGIS and GeoTime.

Expanding the Map

Eighteen analysts use ArcGIS in the agency's war room to plot critical events, such as search warrants, surveillances, and active cases involving other agencies, onto situational maps. They also enable detectives to deconflict cases—or connect agencies that may be working the same address/location so that they are aware of each other's presence. Prosecutors can use the mapped information to help win cases.

Another nine analysts use ArcGIS and GeoTime to analyze call detail records, gang activity, or illegal drug transportation.

For analyzing call detail records, the analyst can easily map and research call patterns from all major cell phone carriers. This allows investigators to trace movement, reconstruct travel patterns, and confirm meetings and communications between suspects.

Gang member interactions and social networks can be analyzed to place gang members together and in the vicinity of crime locations.

For illegal drug transportation, data is recorded that details meeting locations between dealers and buyers. These locations can then be mapped so that drug houses can be identified and interdictions planned. Vehicles of suspects are also mapped along Los Angeles County highways and streets. This helps law enforcement officials from the 214 agencies and task forces within the six counties that make up LA CLEAR set up future traffic monitoring in high-risk areas. The GeoTime tool is also used for GPS tracking of offenders and suspect vehicles, as well as in courtroom presentations.

Prior to the use of GIS and temporal tracking software, analysts received call detail records provided by the phone company, determined the latitude and longitude of each cell tower during a specific time range of interest, and individually plotted towers into MapPoint. This was a time-intensive manual process, and it was difficult to make changes to produced maps. Analysts can now process in seconds what used to take hours or days.

The process of cell site analysis is an emerging skill and is being used more and more in support of investigations. Datasets containing phone records are subpoenaed from the cell phone companies for investigative purposes. LA CLEAR staff members easily import all subpoenaed cell site keys, which gives GeoTime unique identifiers on which to map locations, allowing analysts to batch import call records for the handsets they requested. The cell tower ID is the unique tower that is identified from the site key. The analyst can map locations by triangulating the points between cell towers. As a cell phone is "pinging" various cell towers used by a person traveling or changing locations, the analyst is able to pinpoint that phone's location by the towers it is hitting.

At different times, these various views are each invaluable at corroborating or disproving suspect statements about their locations or visualizing different theories of the progression of a crime.

Now a case involving four cell phones will typically take only 4 to 12 hours to develop a presentation that displays slides in three different views. Previously, it would have taken 20 to 30 hours to complete one to four charts for the investigators or court prosecutors.

The maps not only depict cell phone use for the hours surrounding a crime but also depict the entire date range of the cell phone records. An investigator can see if the suspect has typically been in the crime area, cased the location prior to the crime, or left the area after the crime, etc.

"We can see if multiple cell phones meet before or after a crime to, say, deliver or hand off a weapon," says Nunez. "We can also display all this movement in a video that dramatically increases viewers' understanding of what they are looking at."

For more information, contact Toni Nunez, senior lead analyst, Los Angeles Regional Criminal Information Clearinghouse (e-mail: toni.nunez@laclear.com, tel.: 323-869-2576).

Dodging Cartography's Great Nemesis

HDR Inc. Hones Its Quality Assurance and Avoids Expensive Corrections

By Bland Crowder

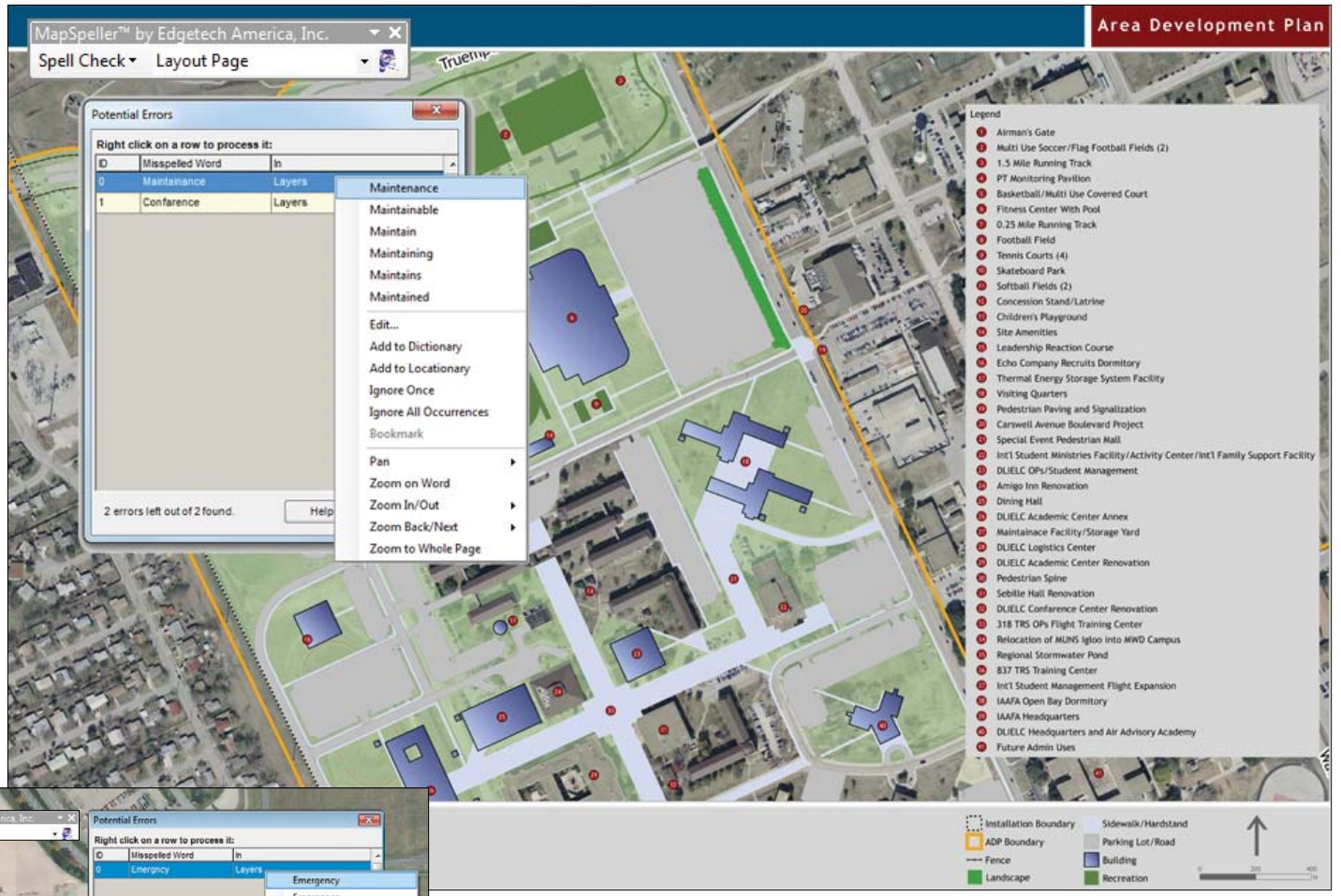
Highlights

- Misspelled words can undermine the credibility of a map.
- HDR uses Edgetech America's extension for ArcGIS to spell-check GIS objects, dynamic text, and format/XML tags.
- MapSpeller corrects all text added in-house to HDR's maps.

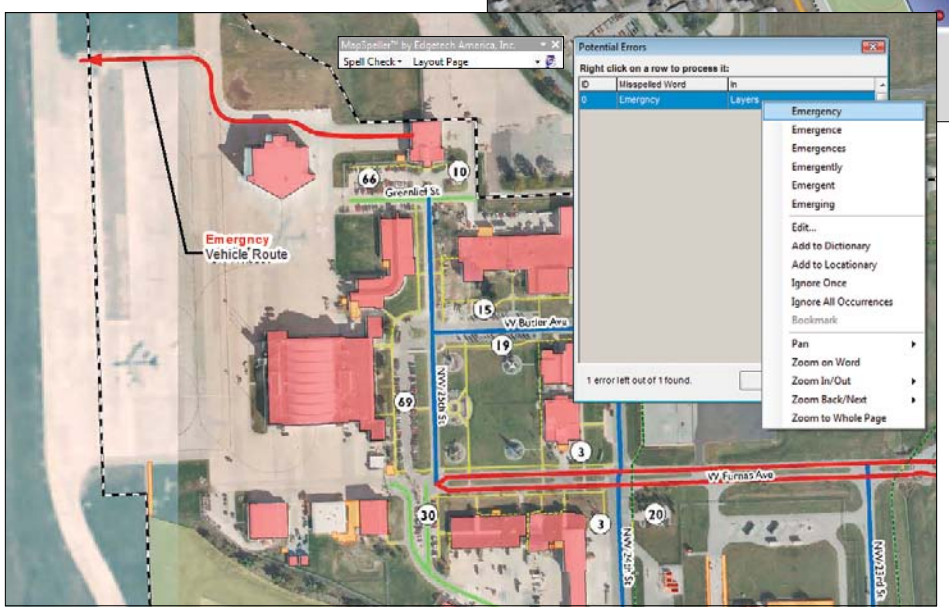
Errors in maps cast doubt on their reliability and undermine the professionalism of the mapmaker. Plus, errors can be costly. One of the most insidious types of errors that can plague maps is the common misspelled word. There are as many reasons for not catching misspellings as there are steps in the map production process.

Yet, there is no doubt that when you see the name of your city misspelled on a map, your reaction is visceral.

Some forward-thinking companies clearly understand this. One such company is Esri's Gold Tier Partner, Omaha-based HDR Inc. Founded in 1917, HDR is a top-ranked, award-winning architectural, engineering, and consulting firm that has realized projects in all the states and more than 60 countries. It serves diverse clients out of more than 185 locations with a staff of more than 8,000. Over the past quarter century, HDR has built a solid reputation for its GIS work, including defense projects serving the US Navy, Marine Corps, Army, Air Force, Coast Guard, and National Guard worldwide.



The HDR spell-checking process now reports potential errors in a dialog box, one error per row. Users can then interact with and fix errors directly from the dialog box.



Without leaving the dialog box, HDR's GIS staff can zoom and pan around a page layout to analyze the word in context and then fix, edit, ignore, or bookmark it or add it to a dictionary.

The creation of maps is an important and highly visible portion of HDR's deliverables, whether in design, environmental restoration or planning, cadastral mapping, meeting the documentation provisions of the National Environmental Protection Act (NEPA), or managing cultural or environmental resources for these military clients.

The firm does a heavy volume of GIS work and, to that end, employs approximately 80 GIS professionals. HDR has been using ArcGIS for this work for years. Once complete, maps are incorporated into books and reports destined for either print or PDF. The emphasis is on accuracy, cost-effectiveness, and a professional image, all of which are qualities of high importance to both HDR and its clients.

Misspelled words can undermine those qualities and threaten any product bearing even minimal text. If a spelling error is made in a printed map, HDR would have to produce an errata sheet or even reprint the report. For digital maps, HDR would still need to produce and distribute corrected versions, and the client would have to replace the incorrect versions. This can be very time-consuming and expensive. In addition to budget problems, deadlines may be missed, the credibility of the document is damaged, and the images of producer and client suffer.

"Most of our mapping products are integral to larger published reports that are disseminated among high-level decision makers throughout all branches of the US Department of Defense," says Joe Gunning, a senior GIS analyst with HDR Engineering, Inc., at its Colorado Springs location. "Some of our reports are also subject to congressional review. Spelling errors are simply not tolerated by our clientele, so we were obligated to spend many QA/QC hours tracking down every typo, misspelling, and transposed letter."

These were the driving forces behind HDR's search for a spell-check program that works reliably in the ArcMap application of Esri's ArcGIS. GIS managers at HDR sought a robust solution that would correct all text added in-house to maps, evolve with ArcGIS for Desktop and HDR's own needs, and be fully supported by its developer. Alyssa Martin, GIS manager with HDR Engineering, began the process of evaluating spell-check solutions and chose MapSpeller from Esri Silver Tier Partner Edgetech America, Inc., of Glen Allen, Virginia.

MapSpeller corrects text in most types of GIS objects, including map, layout, and geodatabase annotations; grouped graphics; legends; layer labels; scale objects; and tables. It understands maps and the specificity of proofing ArcGIS objects, including the behavior of dynamic text and how ArcMap format/XML tags can be used.

"Our testing proved it to be exactly what we needed," Gunning says. "Reliability and ease of use are hallmarks of the software. The ability to customize dictionaries is a powerful feature in our world of acronyms and specialized nomenclature."

Says Jason Smiley, the geospatial business class manager and federal GIS coordinator at HDR Environmental, Operations and Construction, Inc., "Map production often includes many small labels that are not always easy to review, which leads to missing spelling errors. Our old process involved having project managers review maps after a GIS team review, and there were always missed spelling errors even with multiple reviewers. Now we just run the spell-checker before sending map products to project managers so we don't require manual reviews of every label on a map."

Automated proofreading and correcting should be part of any mapmaking process, according to Smiley. "After looking at a few maps manually, they all start looking the same, which dulls the user's acuity for spotting typos." Even when they are detected early, errors may be time-consuming to fix manually. For example, they may be several levels down (in the case of grouped graphics) or stored in tables (in the case of layer labels or geodatabase annotations).

"Mapmaking can be tedious work," says Martin, "and we don't zoom in and look at every single thing we're changing. In addition to just keystroking in text, we regularly have to translate from 'GIS-speak' to normal English. We're creating aesthetically pleasing products and have to change the names all the time. The feature class name in a geodatabase might be something like STRUCTURE_EXISTING_AREA, but in the legend, you want to change it to *Building* or *Facility*." Done by hand, this tedious process invites errors.

The software comes with a variety of dictionaries but also accepts customized ones, so Martin built two and shared them with her team. One wades through many military acronyms and specialized words so they don't appear as false hits in searches; the other catches commonly mistaken word substitutes, such as "solider" for "soldier."

About the Author

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All-Island Research Observatory

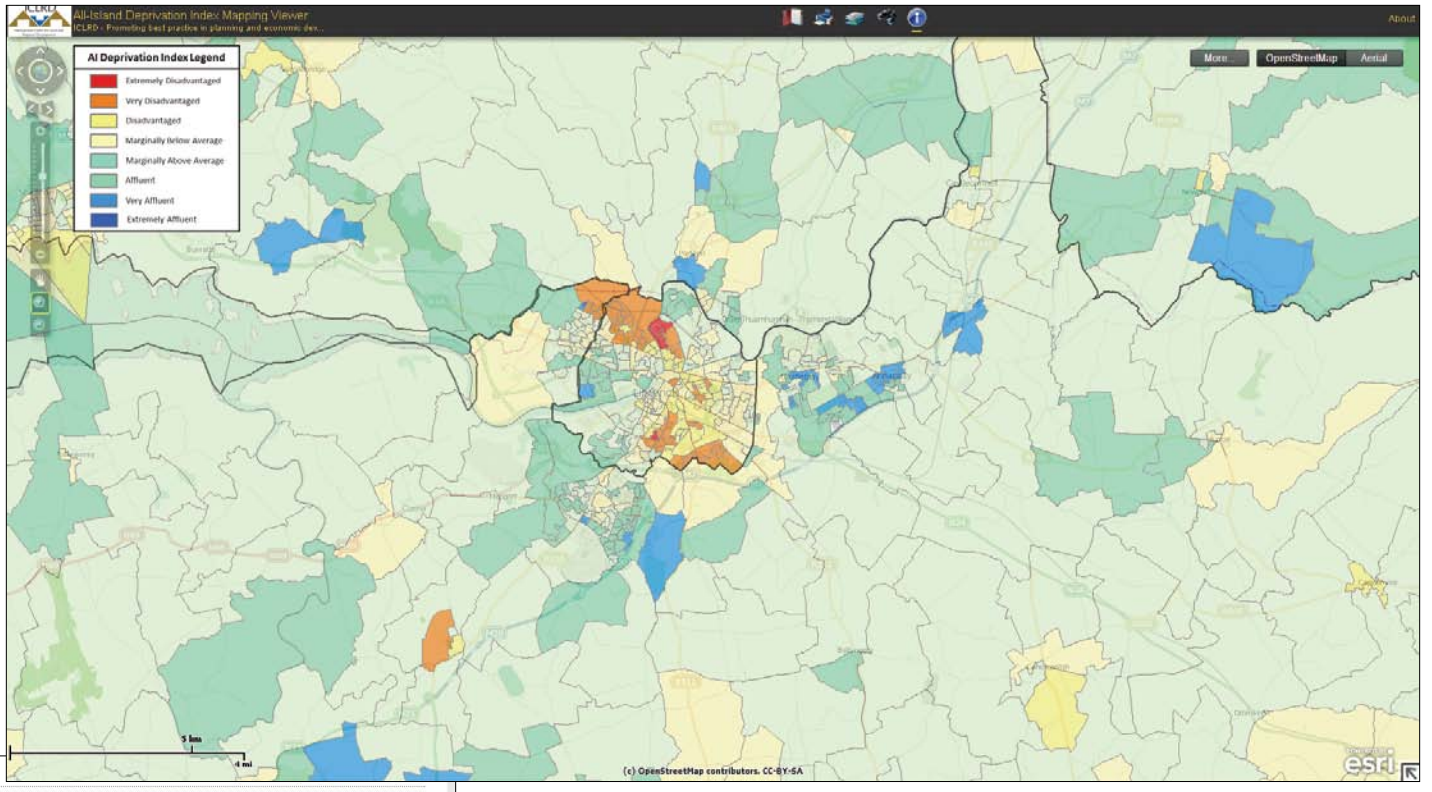
Republic of Ireland and Northern Ireland: GIS Facilitates Cross-Border Collaboration

Highlights

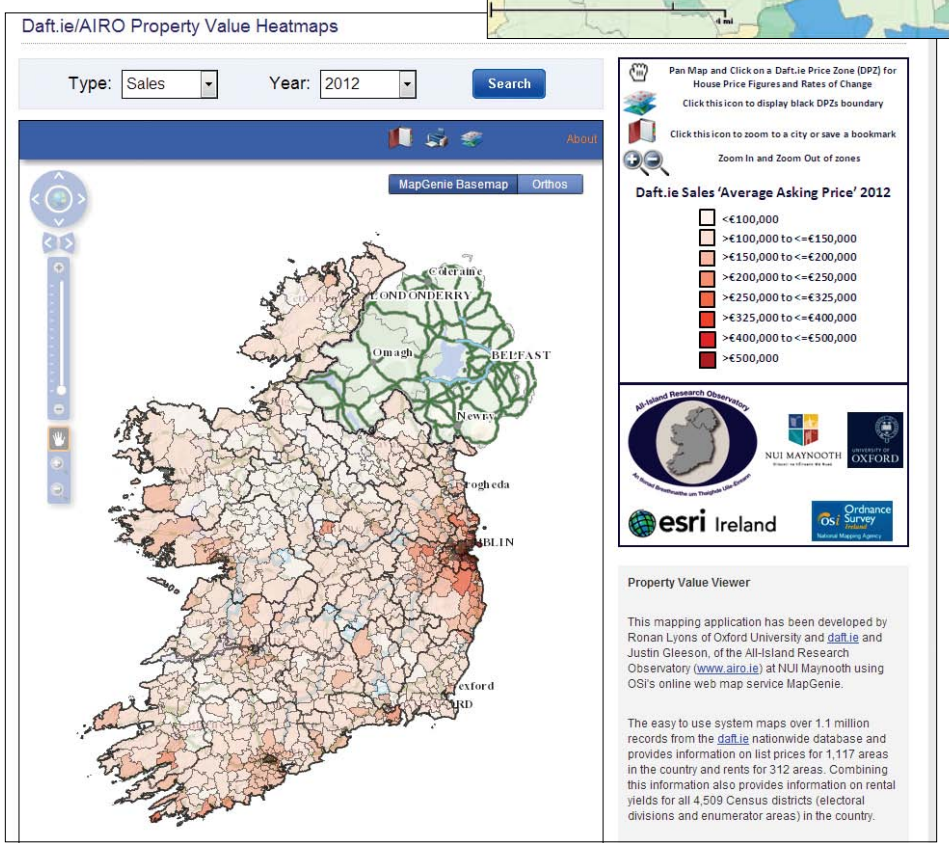
- The AIRO project team developed GIS capability using ArcGIS Viewer for Flex.
- AIRO uses ArcGIS for Server to process and interpret data from Northern Ireland and the Republic of Ireland.
- With its ArcGIS software-enabled website, the AIRO project team has created an invaluable new decision-making tool.

The All-Island Research Observatory (AIRO) is based at the National University of Ireland Maynooth (NUIM). It was set up under the guidance of the National Institute for Regional and Spatial Analysis and the National Centre for Geo-Computation.

Historically, there has been very little collaboration between planning departments with regard to the border in the regions. Plans are still generally made for the development of schools, hospitals, utilities, and transportation infrastructure without any consideration for community needs or other development initiatives just a few miles away over the border.



Ranking the island in terms of relative disadvantage and affluence, this maps details the social mix across Limerick City. Red areas represent some of the most disadvantaged areas on the island.

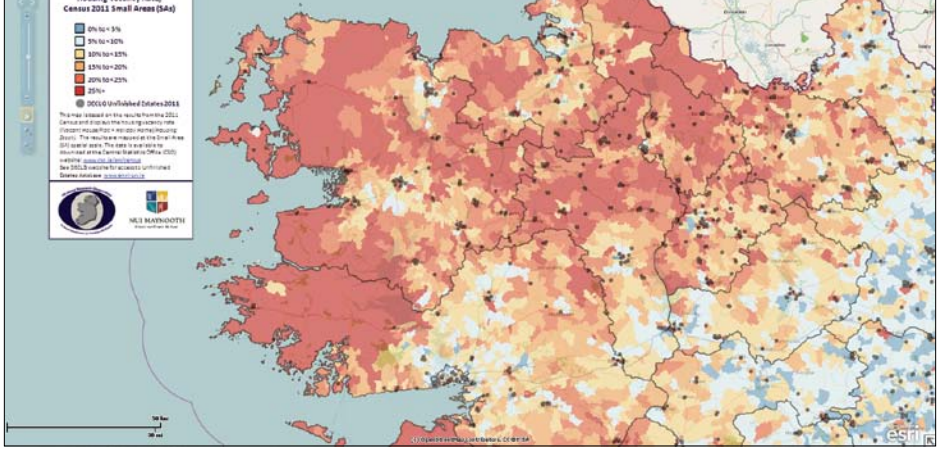


Ireland's first subcounty house price mapping toolkit tracks sales and rental changes from 2007 to 2012.

AIRO project was set up in 2008 to address this challenge and make comparable, cross-border data more readily available. The project aimed to collate and process data from both sides of the border, analyze and interpret it, and then make it accessible via the Internet.

From the outset, the AIRO team knew that GIS technology would play an essential role in the project. "The whole initiative centers on regional spatial data analysis, so GIS was key," Gleeson says. Specifically for the AIRO project, NUIM elected to use a number of solutions supplied and supported by Esri Ireland.

The AIRO project team uses ArcGIS for Server to collate, process, analyze, and interpret relevant data from Northern Ireland and the Republic of Ireland. It performs demographic analysis and uses tools such as ArcGIS Network Analyst to examine the accessibility of public services. For example, the project team has mapped the distribution of public facilities right across the island and calculated the average drive time from every residential address point to such services.



Detailing the level of housing vacancy and "Ghost Estates" across the Irish landscape with red zones representing areas with a housing vacancy rate greater than 25 percent.

All this data analysis is then made accessible on the Internet via a series of interactive maps of the whole island. This online GIS capability was developed by the AIRO project team and Esri using ArcGIS Viewer for Flex. Planners working anywhere in Ireland can access the AIRO website, view maps of their own areas of interest, and access a wealth of statistical information to support their planning. In short, the AIRO project has helped facilitate a new era of cross-border cooperation.

Although it is still early days, planners north and south of the border now have greater insight into the needs of all communities across the whole of Ireland. Consequently, they are moving toward a more collaborative approach when planning new services and facilities. "Things are going in the right direction," states Gleeson. "There is a lot of cross-border planning going on at the moment, and new joint projects are starting up all the time."

With the development of its ArcGIS software-enabled website, the AIRO project team has created an invaluable new decision-making tool. Public-sector planners can use it to make better planning decisions, which are backed up by accurate, statistical evidence. With more supporting data at their fingertips, planners can locate new services and facilities where they will benefit the most people. Gleeson says, "GIS plays a vital role in providing the hard evidence to inform cross-border plans."

The AIRO website is already widely used and has subscribers from every government department and all local authorities across the country—north and south. On average, about 200 users access the online data every day. However, it is not only the public sector that benefits from the AIRO project. Academics and developers in the private sector can also access the online data to inform their research and development plans.

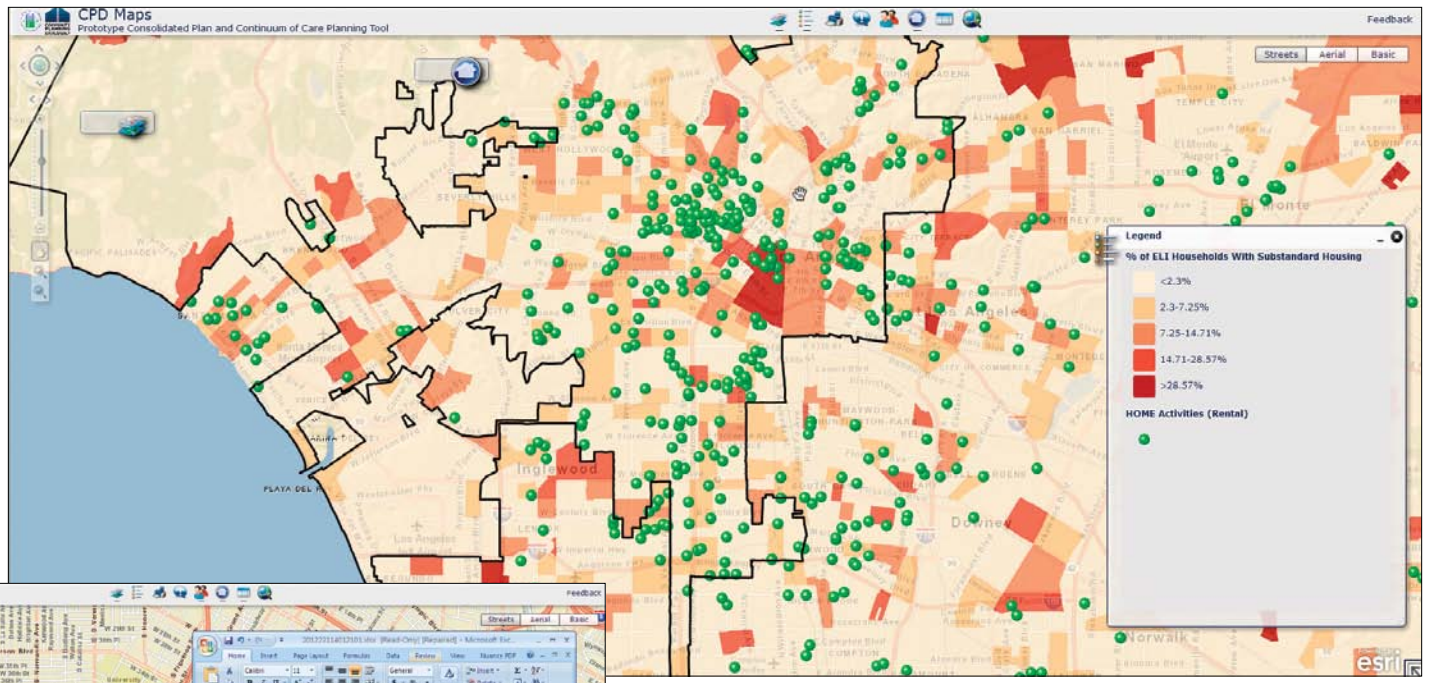
"We can set up new maps in just a couple of hours and don't need heavy programming skills," says Gleeson. "It has become so easy to deliver web mapping that we are now making much more information accessible online."

For more information, contact Justin Gleeson, data and technical manager, AIRO project, All-Ireland Research Observatory (e-mail: justin.gleeson@nuim.ie, tel.: 353-1-708-6157), and Joanne McLaughlin, Esri Ireland (e-mail: jmclaughlin@esri-ireland.ie).

HUD GIS Web Service Helps Target Aid

Highlights

- Using ArcGIS API for Flex, HUD analysts built the user-friendly CPD Maps application.
- CPD Maps helps reduce grantees' paper work.
- Built on ArcGIS for Server, CPD Maps is one of many applications hosted on HUD's enterprise GIS platform.



HUD maps areas in need of housing rehabilitation investment in Los Angeles, California.

A household that is homeless or at risk of becoming homeless will likely receive help from a local housing or service provider supported with funding from the US Department of Housing and Urban Development (HUD). HUD's Office of Community Planning and Development (CPD) grants funds to state and local governments to provide people with decent housing and economic opportunities. HUD rules describe a process called the Consolidated Plan, where funding decisions are based on an evaluation of needs and market conditions in each grantee's jurisdiction.

HUD's new eCon Planning Suite—which was rolled out to 1,200 grantees around the country in May 2012—is designed to meet the executive place-based directive by providing tools and data that all HUD grantees can use to make affordable housing and community development planning decisions. Among these tools is CPD Maps, a geospatial application that provides data and maps to help grantees understand how to target aid based on where needs are greatest. By providing tools that allow users to identify census tracts with particular conditions, grantees can find neighborhoods with the greatest needs. For example, grantees can now see concentrated poverty on the map.

HUD secretary Shaun Donovan says, "We know that in a time of huge budget cuts at the state and local level, it's harder and harder to have the resources to bring that information together. This technology that we're providing is going to be really revolutionary in helping all our grantees work smarter."

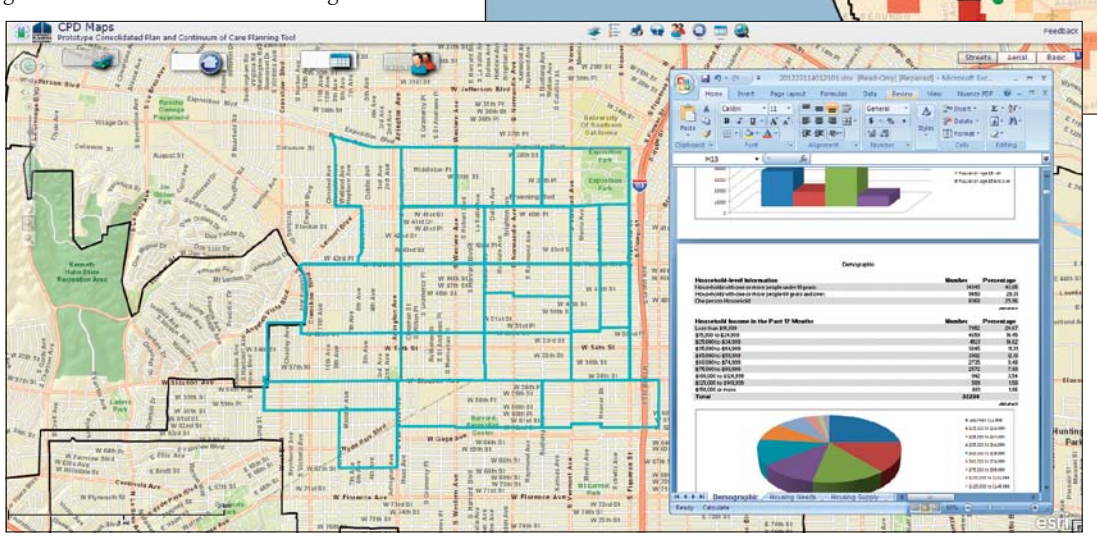
CPD Maps is one of many applications hosted on HUD's enterprise GIS platform, which is built on ArcGIS for Server and which is a component of CPD's eCon Planning Suite.

The eCon Planning Suite provides an online Consolidated Plan template to guide grantees through an intuitive planning process. The template instantly imports information from CPD Maps about housing needs and market conditions into plans that can now be submitted electronically to HUD for review. This reduces grantees' paper work burden, saves time and money, and creates a strategic road map for targeting federal funds where they can do the most good.

HUD's GIS analysts used application tools in ArcGIS for Server to create CPD Maps, then used ArcGIS API for Flex to build a user-friendly web application to help grantees and the public use GIS technology to make planning decisions. CPD Maps users can perform queries of multiple variables, create thematic maps, and generate detailed reports. This functionality is supported by shared REST services, so CPD Maps applications can interface with other web services.

Anyone can use CPD Maps to map funded projects, neighborhood rents, economic need, and more. Grantees and the public alike can access CPD Maps from the HUD website, see where federal dollars are being spent, and identify neighborhoods with the greatest need. This information empowers the public to more effectively join the discussion about where federal investments ought to be made.

HUD's CPD Maps is a perfect example of how organizations can use modern GIS software to customize routines and work processes that help users perform analysis and complete specific planning tasks within the template interface.



Users locate areas of need and access demographic data within the mapping environment.

At the federal level, CPD Maps uses HUD's enterprise GIS platform to analyze a national geodatabase, collate information from many resources, and create GIS tools that help grantees make decisions. CPD Maps can also be used to create a view of project locations throughout the nation. In addition, the platform provides a portal for sharing GIS information with other federal agencies, such as the US Department of Transportation and the US Environmental Protection Agency.

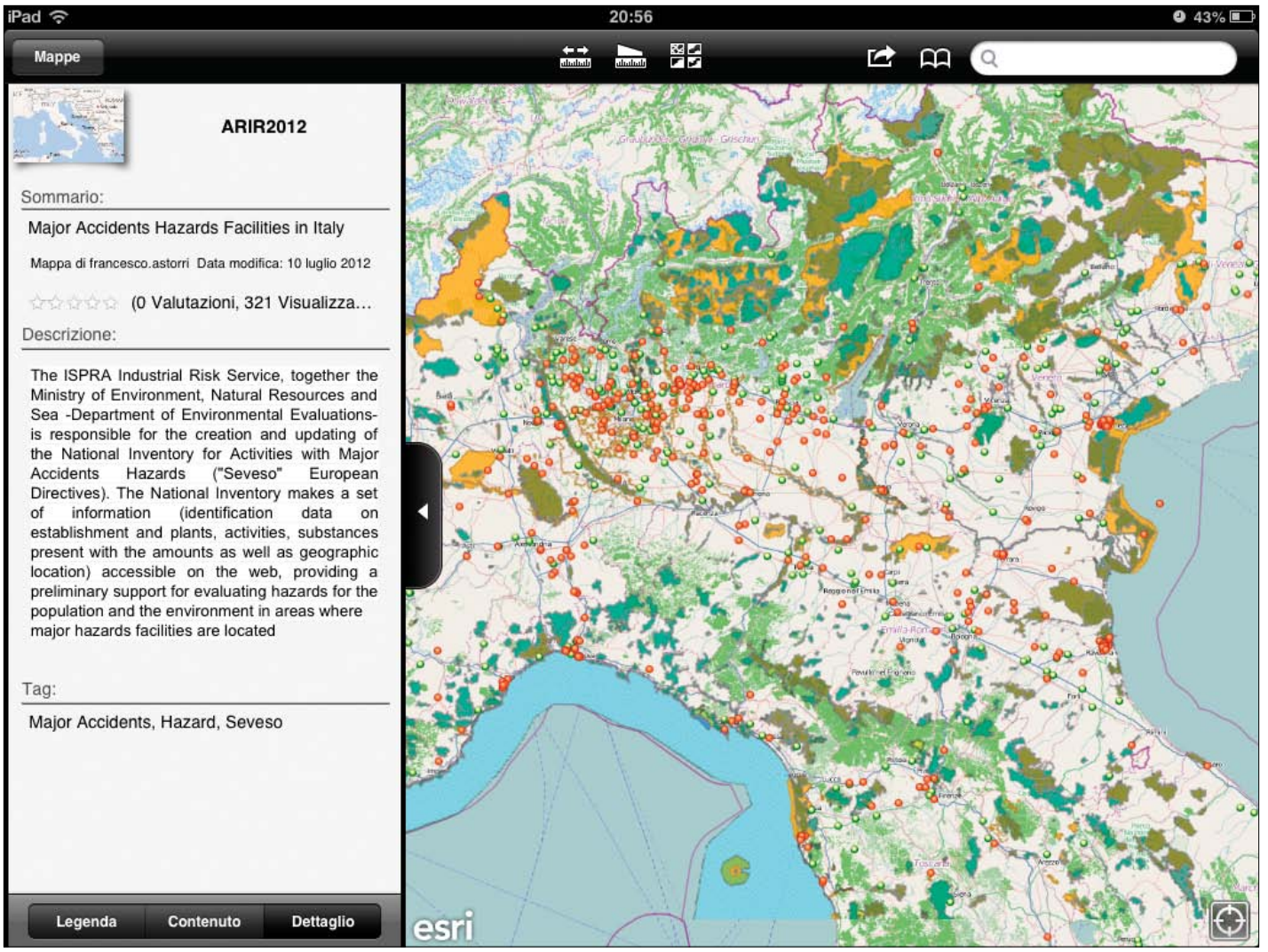
Experience CPD Maps yourself at **egis.hud.gov/cpdmaps**. To learn more about Esri GIS solutions for federal government, visit **esri.com/federal**.

Geoviewer Simplifies Italian Hazardous Incident Response

By Francesco Astorri and Alberto Ricchiuti, ISPRA

Highlights

- The Italian government monitors hazardous materials with a geoviewer built on ArcGIS Online technology.
- ArcGIS Online easily supports inspectors, emergency responders, and decision makers anywhere they are connected to the Internet.
- Using the geoviewer, members of the Industrial Risk Division can prioritize damage site selection for teams of technicians on-site.



A simple but powerful geoviewer using ArcGIS Online hosts and shares information on the geographic distribution of perimeters of industrial plants.

In May 2012, the ancient cities of Modena and Ferrara in northern Italy were struck by a devastating earthquake. While the loss of life, property, and emblematic heritage structures was severe, the Italian National Institute for Environmental Protection and Research (ISPRA) provided support to the Italy Department of Civil Protection for emergency response activities by helping prevent or manage any potential loss of containment of dangerous substances from industrial plants in the area hit by the earthquake.

Through a simple web application based on GIS, ISPRA monitored high-risk establishments in the area by sharing information on types of activity, hazardous substances, geographic distribution in relation to the epicenter of the earthquake and nature conservation areas, and any damage suffered.

The Seveso Directive II

The GIS web application was built to help ISPRA comply with the 1996 European Union (EU) Seveso Directive II (named for an Italian town that suffered exposure to an accidental release of dioxin in 1976). The Seveso Directive II introduced important changes and new concepts in the prevention and mitigation of major incidents. The directive focuses on protection of the environment and covers substances considered dangerous for the environment. It introduced requirements relating to safety management systems, emergency plans, and land-use planning and tightened up the standards on inspections and public information. The requirements are applicable to any establishment where dangerous substances are present or likely to be produced, as a result of an accident, in quantities equal to or in excess of the quantities listed in the directive.

The Geoviewer That Could

The web application—currently only for use by the division inspectors—that has proved so useful is a simple but powerful geoviewer, using ArcGIS Online, that hosts and shares information on the geographic distribution of perimeters of industrial plants. It references Esri basemaps and the web map services relating to, respectively, the geographic distribution of Italy's nature conservation areas hosted by SINAnet (the network of the environmental geographic information systems of ISPRA) and the geographic distribution of points representing epicenters of seismic activity in the national territory, updated in near real time and hosted by the National Institute of Geophysics and Volcanology working group LabGIS.

Bookmarks have been created for industrial sites with high concentrations of high-risk establishments (industrial parks). This is useful because it allows users to quickly navigate over areas with major environmental problems in the national territory.

In this framework, ArcGIS Online provides an easy way to support inspectors, emergency responders, and decision makers anywhere they are connected to the Internet, including through mobile devices (iOS, Android, Windows Mobile), giving a picture of potential interactions among high-risk companies present in Italy and the locations of historical and/or registered seismic events with reference to the map of seismic hazards in the national territory.

The application has proved particularly useful in the context of the critical support provided by technicians of Industrial Risk Division, as illustrated during the management of the seismic emergency—which occurred May 2012 in the Emilia Romagna region—at the Sala Situazioni Italia, the permanent crisis center set up in Rome by the Department of Civil Protection. Here, all national institutions, both public and private, involved in the civil protection system provide support, each based on its skills, during widespread natural disasters. Using the ArcGIS Online geoviewer, members of the Industrial Risk Division were provided with a real-time picture of companies potentially affected by the earthquake and were able to advise the teams of technicians on-site in the selection of priority sites on which to focus activities monitoring potential damage.

The National Inventory

Also in compliance with the Seveso Directive II, ISPRA's Industrial Risk Division is responsible for the management and updating of the web-based National Inventory for major incidents involving hazardous chemicals, which it uses in conjunction with the geoserver. The National Inventory makes accessible on the web a set of data on establishments submitted by operators, including types of activities, amounts and types of stored substances, and damage scenarios and their impact outside plants, providing preliminary support for on-site inspection activities and hazards evaluation for the environment and population around major industrial sites. Operators also provide information about the geographic location of establishments that is successively processed, validated, and updated by ISPRA and the Ministry of Environment, Natural Resources and Sea to build the layer of perimeters for the more than 1,000 industrial plants in Italy.

What the Future Holds

At present, the application is used as a simple geoviewer. Soon, a buffer layer of damage areas with impacts outside the boundary of each industrial plant (derived from emergency plans) will be loaded to get a scenario of potentially impacted areas or targets due to a loss of containment of hazardous substances caused by the rupture or collapse of a unit following, for example, a seismic shock.

About the Authors

Francesco Astorri, geologist, graduated in 1994 and gained experience in the field of GIS by applying spatial analysis techniques to environmental risk assessment related to industrial activities. He has been working since 2000 at ISPRA (formerly the National Environmental Protection Agency), supporting the Ministry of Environment on major accident prevention and mitigation activities (EU Seveso Directives). Alberto Ricchiuti, chemical engineer, graduated in 1983 and has been working for 25 years at ISPRA in the field of hazard prevention and control. He has been with the Industrial Risk Division since 1997. He is a member of the Italian Association of Chemical Engineering, the European Federation of Chemical Engineering, and the American Association of Chemical Engineers.

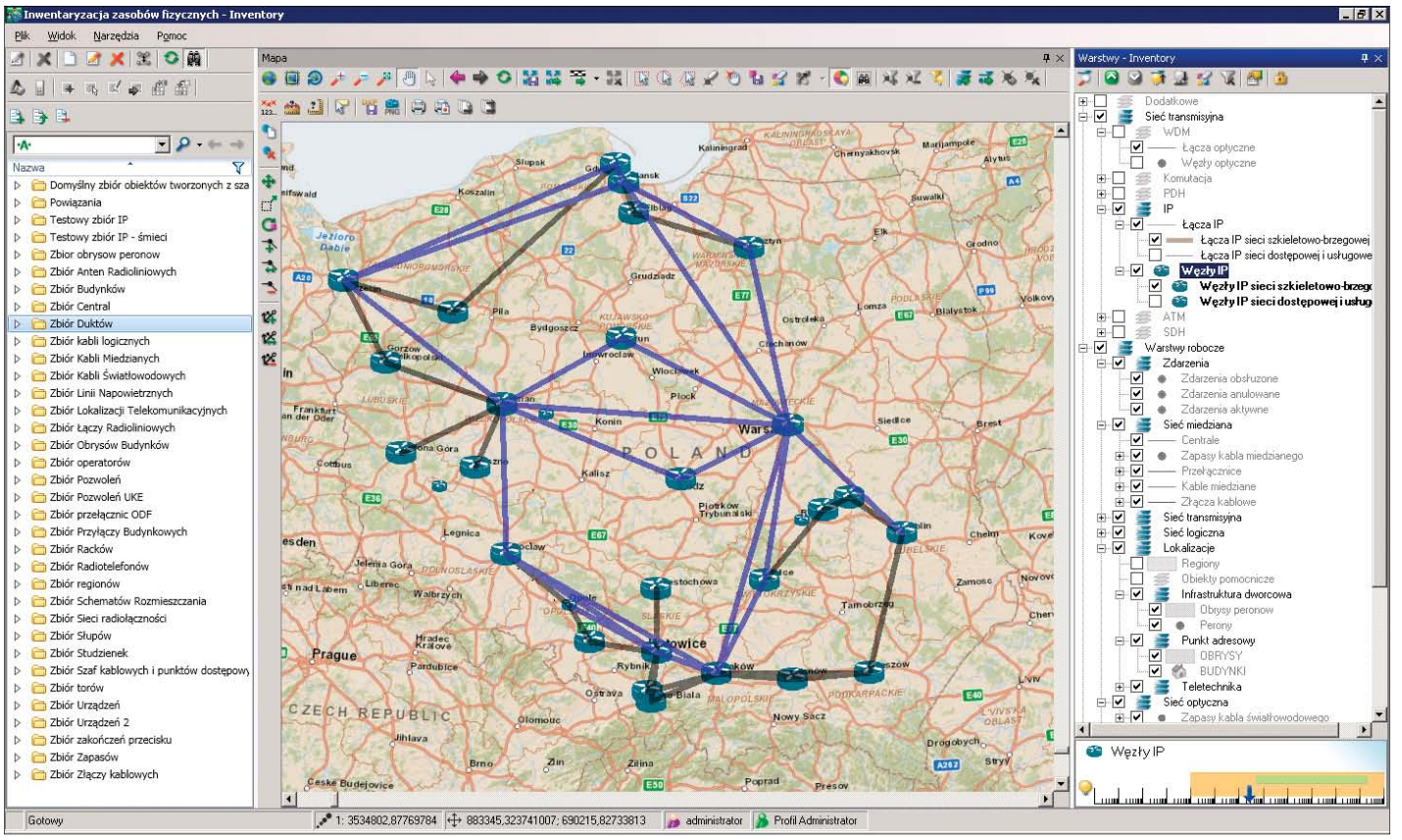
For more information, contact Francesco Astorri, ISPRA, GIS specialist and SMS inspector for Seveso industrial plants (e-mail: francesco.astorri@isprambiente.it), or Alberto Ricchiuti, head of Industrial Risk Division, ISPRA (e-mail: alberto.ricchiuti@isprambiente.it).

Facilitating and Improving Telecom Network Management

Implementation of a Seamless Network Inventory at Poland's TK Telekom

Highlights

- The seamless network inventory solution is based on an ArcGIS for Server and Microsoft SQL Server platform.
- With GIS, operators' network resources are visible against the background of digital vector and raster maps.
- The ArcGIS for Server inventory system quickly identifies potential failure locations and helps implementation of precise remedies.



The SunVizion Network Inventory, based on ArcGIS for Server and Microsoft SQL Server platforms, visualizes this IP network.

Dynamic growth of the present-day telecommunications market makes operators keep looking for new and creative ways to beat increasing competition. The times when that competitive struggle was won by an operator with the largest network are gone for good. What counts today is efficient network management and fast launch of new services rather than having kilometers of cables and hundreds of staff. The battle is not won by those who possess the most but by those who know how to manage their infrastructure more effectively. Thanks to a network inventory system, today TK Telekom (Warsaw, Poland) is able to efficiently manage one of the largest telecommunications networks in Poland.

TK Telekom is a dynamically developing telecommunications operator. The company provides Internet services, telephone services, data transmission, and line lease for telecommunications operators, public administration, and business customers. The network of TK Telekom comprises nearly 30,000 kilometers of lines, making the company one of the major players in Poland's telecommunications market. More importantly, that network is both modern and safe. More than 90 percent of the company-owned cables are located underground, which minimizes their failure rates. The network size and safety are important factors for the value of a telecommunications operator, but—in the face of huge competition and extremely dynamic growth of new technologies—they do not determine competitive advantage. To confront that competition successfully, TK Telekom has had to set itself two main goals: shorten the time to launch new services, and keep improving customer satisfaction. Efficient network management acts as a necessary tool in attaining these goals. This, however, is not possible without a powerful network inventory system.

Until recently, one had to collect network structure information from various functions to check whether it was possible to provide a given service at a specific location. This required both time and people. Therefore, it became clear that, without a seamless inventory system, one could not think seriously about any process automation, which is key to long-term profitability of any operator. "We needed a system that allows efficient operational level management," says Grzegorz Brodecki, manager of the Network Resources Inventory Team at TK Telekom. "Without fully understanding the entire network infrastructure, we were unable to think seriously about successful management."

The Tender

In 2010, TK Telekom invited tenders, or bids, for the supply of a telecommunications network inventory system. Out of a few providers that submitted bids, the company selected Esri Partner Suntech S.A. of Warsaw, Poland, together with PKP Informatyka, also of Warsaw, Poland. Suntech had the necessary know-how and required experience supported by numerous inventory system implementations at telecommunications operators. What also came as a very important selection criterion was the fact that the system offered by Suntech was based on an Esri-developed GIS platform.

"The client was really determined to have a possibility to transfer data from different environments, availability of advanced GIS tools, openness of the environment, and the related integration possibilities," says Piotr Saczuk, president of the Suntech Management Board. Suntech was able to satisfy all these expectations thanks to its cooperation with Esri.

The implementation of SunVizion Network Inventory (the Suntech system) was completed in March 2012. The solution is based on ArcGIS for Server and Microsoft SQL Server platforms. SunVizion Network Inventory comprises the following three main modules:

- **Resource Inventory** (for managing the network physical and logical resources)—This module is responsible for the network resources and collects, processes, and makes available information regarding the telecommunications infrastructure (cables, buildings, manholes, etc.) and its physical usage (e.g., distribution of cards on shelves, amount of manhole space taken up by cables). Thanks to the powerful ArcGIS solution, operators' network resources are visible against the background of digital vector and raster maps. Additionally, the module facilitates gathering of information about failures and their consequences and allows analysts to manage any failures and identify their geographic location.
- **Service Inventory** (supporting management of services)—The Service Inventory module allows modeling of new services, modification of service parameters, and checking the availability of a given service in a given location. Quick access to such information distinctly shortens the time of launching new services for clients.
- **Logistics Management** (responsible for managing warehouse logistics)—The third module, Logistics Management, provides information about where a given network element is situated and what characteristics it has. It also allows an inventory of physical resources and supplies data for periodic reports on the warehouse's current status (opening balance). Together with the SunVizion Network Inventory system implementation, a pilot inventory of TK Telekom resources from the Lower Silesia voivodship (that is, province)—optical fibers, copper cables, telecom equipment and infrastructure—was also completed in a joint effort with PKP Informatyka.

The Next Step

Under the next step, data from across Poland will be fed into the system.

Thanks to the network mapping under the SunVizion Network Inventory system, TK Telekom will be able to improve its sales and network operation processes. Precise information about the network structure will translate directly into a reduction of the company's operating costs in a few dimensions. Immediate access to information about the network and its elements will dramatically cut the time needed to register new customers, provide them with access to individual services, and introduce new services. "The new service planning time has decreased a few times thanks to our new network inventory system," says Brodecki. "At the moment, an employee who plans a service knows exactly what elements are included in the network in a given location; books available resources; plans expansion, if any; and—thanks to the new inventory system—knows how to price a service and can see whether or not that service is going to yield a profit. The whole operation takes a few minutes."

The inventory system will also allow the company to optimize the management of emergency situations, both in a technical sense and in terms of customer service. Exhaustive information about the cause, extent, and consequences of a failure is very valuable to customers. Equally important is quick failure recovery enabled by the ArcGIS for Server inventory system, which allows fast identification of potential failure locations and implementation of precise remedies. Additionally, Network Inventory will optimize the network development planning process by empowering planners to analyze the factual use of the potential of the present network. The system will largely simplify the process of verification and allocation of telecommunications network resources to individual fixed assets. The system-collected data on equipment failure frequency will also allow sensible planning of the purchasing policy and eliminate purchases of the most failure-prone products.

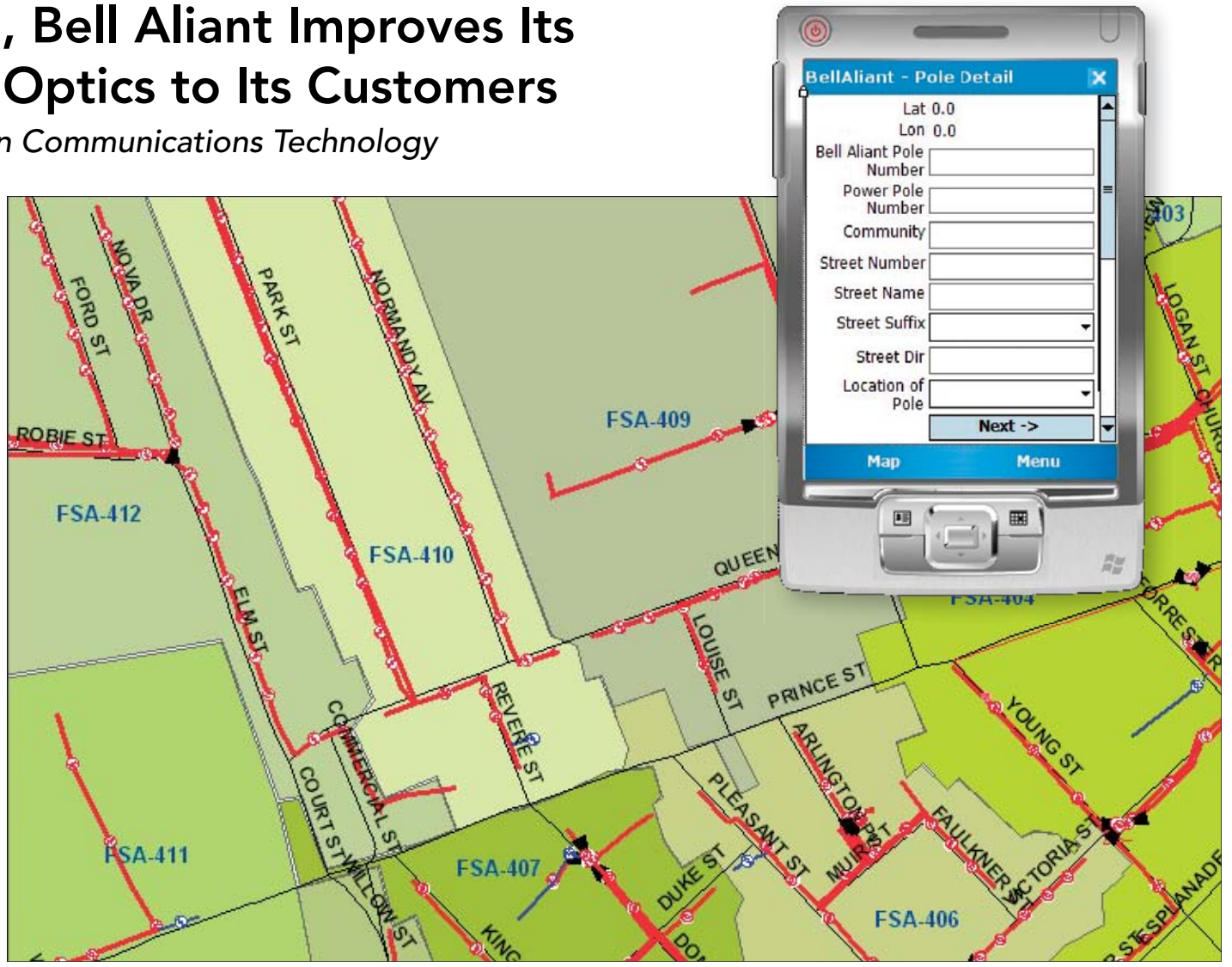
For more information, contact Grzegorz Brodecki, manager, Network Resources Inventory Team, TK Telekom (e-mail: Grzegorz.Brodecki@tktelekom.pl), or Magdalena Jablonska, marketing manager, Suntech S.A. (e-mail: magdalena.jablonska@suntech.pl).

Using Mobile GIS, Bell Aliant Improves Its Delivery of Fiber Optics to Its Customers

Rolling Out Next-Generation Communications Technology

Highlights

- An ArcGIS software-based plan-to-provision solution enables the development of customized design wizards.
- Location data is collected on mobile devices and automatically updated to the ArcGIS for Server geodatabase.
- Multitechnology infrastructure spatial data can be centrally stored and accessed with GIS.



Up-to-date network views provide a snapshot of equipment, capacity, available bandwidth, demographics, and customer information. **Top Inset:** Data is collected using ArcGIS for Windows Mobile on Trimble devices, quality checked, and automatically updated to the ArcGIS for Server geodatabase.

Bell Aliant, one of North America's largest regional telecommunication service providers and the leading fiber-optic service provider in Canada, has set a goal to offer Fiber to the Premises (FTTP) technology to more than 650,000 customers by the end of 2012.

Known as "the future of connectivity," FTTP technology sends signals from a broadcast distributor or Internet service provider directly to the home using fiber-optic cable. This technology is superior to traditional telephone and cable wires because it uses light to carry Internet transmissions and television signals at rates that are simply not achievable through legacy transmission media. Congestion is alleviated, enabling transmission speeds of more than 200 megabytes per second, so that customers can enjoy some of the fastest download and upload speeds available.

One of the greatest obstacles to delivering FTTP technology is that it can be cost prohibitive and take years to install. In some cases, telecommunication service providers have spent more than $1,000 per subscriber to make the service available.

When Bell Aliant first began to roll out its FTTP service—FiberOP—in 2009, the company was restricted by time-consuming data collection processes that required information to pass through multiple entry points. By the time surveys were completed and manual measurements were performed, it could take five employees up to two weeks to prepare field data for the verification stage.

With a goal to accelerate the rollout and cost-effectively expand its FiberOP digital services over the next three years, Bell Aliant quickly recognized the need to automate the design and data collection processes.

"Reaching 650,000 premises requires the design of approximately 2,400 fiber-serving areas [FSAs]," says Shelley Scott, GIS team lead, Bell Aliant. "The existing process was not scalable to meet our three-year build schedule, yet cost-containment initiatives meant that taking on additional staff was not an option. We needed to develop and implement a tool that could automate tasks, with a goal to reduce manual design efforts by 25 percent."

Accelerating FTTP Rollout Through Automation

After an initial trial period, Bell Aliant selected Network Engineer from Telcordia Technologies, Inc. (Telcordia is now part of Esri Partner Ericsson of Stockholm, Sweden), along with Design Assistant, a GIS-based plan-to-provision solution that enables customized design wizards to be developed in accordance with an organization's unique engineering rules.

Built on the ArcGIS platform, Network Engineer utilizes a sophisticated database so that spatial information pertaining to a multitechnology infrastructure can be centrally stored and accessed. It also provides real-time, accurate network views so that users get a snapshot of equipment, capacity, available bandwidth, demographics, and customer information in a single view. These up-to-date network views are available to not only engineers but also other stakeholders throughout the organization, such as field crews, management, marketing, customer service, and finance. Built with open APIs, the solution can be configured and integrated into almost any environment so that users can get up and running quickly.

Since this was the first time that Bell Aliant had worked with a GIS-based solution, the company joined forces with Telcordia and Esri Canada Limited's professional services team to identify requirements, undergo training on the new technology, and create custom design wizards. Bell Aliant also decided to use an advanced fiber-optic cable system with factory-terminated network access points along the length of the cable, which reduced installation time by 50 percent.

However, the use of this cable meant that the engineering design had to be extremely accurate. In response, Bell Aliant customized Telcordia's Design Assistant Wizard module, which automated the design of the FSAs including cable and connection counts.

"The widespread rollout of FiberOP represents a key component to future-proofing our business because it allows us to offer the fastest triple-play broadband service to a wider customer base," says Scott. "By automating manual design processes, we've been able to reduce costs, expand design capacity, and deliver our services to an increased number of residents in a significantly shorter time frame."

Making It Mobile

To further contain costs, Bell Aliant collaborated with municipal governments and regional electric utilities to leverage existing GIS data layers, such as land parcels, civil infrastructure, streets, and utility rights-of-way, that were migrated into Network Engineer. Working with Esri Canada, customized web-based forms were developed that make it easy to access and edit this data remotely. Data is collected using ArcGIS for Windows Mobile on Trimble devices and then quality checked and automatically updated to the ArcGIS for Server geodatabase.

Network Engineer and Design Assistant are used for everything from planning to designing and building the FTTP network. Since implemented, data quality has improved overall by 25 percent. The company has also been able to transition residential data from more than 500 separate databases into a single, unified common operational picture that provides access to equipment, network components, customer information, and service locations for the FiberOP network.

Now, when a customer calls to inquire about service, a single database can be referenced immediately to verify the customer's service area. Since the data can be accessed remotely, engineers located in different provinces throughout Atlantic Canada can easily share data.

The solution proved so successful that FiberOP was made available to 156,000 additional premises in the first six months of 2011 alone, and FSA design times were reduced by 40 percent.

Investment in Mobile GIS Continues to Pay Dividends

In 2011, Bell Aliant conducted an audit of some 305,000 poles located across Nova Scotia, New Brunswick, and Prince Edward Island. Using Trimble devices equipped with ArcGIS for Windows Mobile, Bell Aliant was able to document attachments belonging to various service providers and sync the information back to the database for instant updates. Customized web forms ensured that the data collection process was consistent among the 75 field crew members dispatched across three provinces. They were also able to easily share data with one another regardless of geographic location.

"Our data collection process used to be paper driven, and the collected information would be transcribed three separate times," says Scott. "Through mobile technology, we've eliminated the margin for error, and our data integrity has improved 25 percent. This not only ensures that we bill the right customer but also provides us with a more accurate snapshot of our assets across Atlantic Canada."

In addition to pole attributes, field crews leveraged built-in GPS functionality to capture the distance between poles and the length of various transmedia networks. Collectors identify the ownership and, using web forms, record this information to ensure that the correct organization is billed.

Collected data is also used to track the number of poles that are placed each year and to monitor asset investments. Asset information that used to take days to search can now be accessed in a matter of seconds.

"Storing data in a central repository delivers a marked improvement in the availability, quality, and use of information across the enterprise, from engineering to customer qualification to service assurance," says Scott. "Over the next few years, we will continue to adapt our operational model to further increase the value of our information resources."

For more information, contact Shelley Scott, GIS team lead, Access Support Systems, Bell Aliant (e-mail: Shelley.Scott@BellAliant.ca).

Esri Regional User Conferences Spread ArcGIS Know-How Around the Globe

More than 4,700 regional Esri software users, partners, and exhibitors converged on Abu Dhabi, Buenos Aires, Oslo, and Auckland last fall for several days of training, inspiration, and networking focused on ArcGIS.

"We are storytelling through an environment based on maps," said Esri founder and president Jack Dangermond of the current role GIS plays in people's lives. "GIS now is moving to a new level. It is moving into a different age that is characterized by science and design."

It was again time for Esri's annual regional gatherings—the Middle East and Africa User Conference (MEAUC), the Latin America User Conference (LAUC), the European User Conference (EUC), and the Asia Pacific User Conference (APUC)—all with a single goal: raise the bar on professional GIS skills and on community awareness of the technology's vast potential.

Esri Middle East and Africa User Conference

The 2012 MEAUC was held in December in Abu Dhabi, United Arab Emirates. More than 2,000 registered attendees converged on the Abu Dhabi National Exhibitions Company for the regional forum, while 24 exhibitors showcased their services at the GIS EXPO.

Dangermond and the Abu Dhabi government welcomed the region's GIS community at the Monday morning Plenary Session with a demonstration of how GIS opens up the world. They encouraged attendees to explore the evolving role of geography as a platform, which will support the advancement of their organizations, communities, and nations.

After the ceremonial opening of the EXPO, attendees rejoined the session for technical demonstrations highlighting the enhanced capabilities of ArcGIS 10.1.

For the plenary finale, speakers from public and private organizations from Abu Dhabi, Kuwait, and Saudi Arabia presented vignettes of GIS success that ignited and inspired passion for the technology. The speakers described how the power of GIS has transformed their regions' municipal management, education, oil production, urban planning, utilities, and environmental planning.

On days two and three, approximately 100 workshops focused on the use of GIS in government, education, business, utilities, petroleum, and other industries. Presentations were designed for a wide array of attendees, from teachers and students to government leaders, and featured local and regional presenters. Additionally, there were more than 20 technical workshops, including "What's New in ArcGIS 10.1 for Server," "ArcGIS Online—An Introduction," and "Planning Enterprise Geodatabase Solutions."

Attendees had an opportunity to network at Monday's GIS EXPO welcome reception and Tuesday evening's event social at Ferrari World in Abu Dhabi.

Heralded by preconference seminars on Sunday, December 9, MEAUC was hosted by Esri in partnership with the Abu Dhabi Systems & Information Centre (ADSIC), which managed the preparation and coordination of contributions from various governmental bodies representing the Abu Dhabi Spatial Data Infrastructure program.

"All over the world, we can observe how GIS and other geospatial tools have become an integral part of municipal planning, resource management, and other vital government activities," said H. E. Rashed Lahej Al Mansoori, director general of ADSIC. "The Abu Dhabi government's partnership with Esri, courtesy of ADSIC, represents a major step in modernizing government services in keeping with global trends and the region-wide focus on creating genuinely digital societies. Esri's MEAUC is an important platform for affirming Abu Dhabi's commitment to spatially enabled development and for encouraging other governments across the region to follow suit."

The 2012 European User Conference in Oslo, Norway.

In 2013, MEAUC will be combined with the European User Conference (EUC) to create a superregional user conference—the Esri Europe, Middle East, and Africa User Conference (EMEAUC). Esri Deutschland GmbH will host users from across the two regions October 23–25 in Munich, Germany. For more information about the 2013 EMEAUC, visit esri.com/emeauc.

Esri Latin America User Conference

The 2012 Esri Latin America User Conference was held in Buenos Aires, Argentina, October 4–5 at the Catholic University of Argentina Convention Centre. More than 1,000 attendees from 13 countries attended the event, with 14 exhibitors from 3 nations exhibiting at the GIS EXPO.

Hosted by Aeroterra S.A., Esri's official distributor in Argentina and Uruguay, the LAUC was preceded by three days of preconference seminars. The two-day conference agenda kicked off

GIS Day 2012: Changing the World, One Event at a Time

Around the earth on GIS Day—November 14, 2012—and adjacent days, more than 950 organizations hosted events for thousands of participants, who celebrated GIS and the ability of the technology to make the world a better place.

Though separated by thousands of miles, the following three GIS Day festivities had a common cause: to change the world, one event at a time.

Rwanda, East Africa

Esri Rwanda Ltd. celebrated GIS Day with presenters from numerous government organizations at Telecom House in Kigali, Rwanda's capital city. The main objective was to share and discuss GIS work experiences with 70 guests—most already familiar with GIS—from various Rwandan institutions, nongovernmental organizations, universities, and colleges.

The event in Kigali was organized by Carnegie Mellon University in collaboration with kLab, which provides an opportunity at Telecom House for IT entrepreneurs and developers to collaborate and pursue their interests.

Esri Rwanda opened the event with a status report on what's new for the tech-savvy east Africa nation regarding ArcGIS Online, ArcGIS 10.1, and various public services that employ GIS. Later, GIS professionals from 13 institutions discussed how they teach GIS and remote sensing in civil engineering and related programs. Presentations by public agencies showed that GIS is used in a broad range of projects and services, including construction permitting; energy, water, and sanitation planning; rural settlement planning; urban planning and management; and land registration.

GIS Day in Rwanda, east Africa.

Attendees found that GIS Day showed a broad picture of the technology in Rwanda. One important outcome was an agreement between participants to meet four times a year to share experiences, challenges, solutions, and successes and to discuss strategies to make accessing geodata easier.

Florence County, South Carolina

The Florence County GIS Department and Tax Assessor's Office celebrated Geography Awareness Week and GIS Day on November 13 and 14 at Wilson High School in Florence, South Carolina. Organizers also sponsored a GIS Day drop-in on November 15 at Florence County Library.

More than 200 eager students participated in two action-packed days of interactive presentations.

Presenters used detailed GIS maps to depict how GIS relates to daily activities. The students learned how data that's collected simply by using their cell phones can be processed to visually show location-based information—that GIS is everywhere.

To support the event, Wilson's geography and social studies teachers rearranged the class curricula to lead up to planned GIS Day activities. Parents were encouraged to attend an evening open house, which also celebrated American Education Week that same week. Students eagerly told their parents what they had learned in the classroom about GIS. The open house also was an excellent opportunity for parents to ask questions about geospatial technology.

The GIS Day drop-in was open to the public, attracting local residents and others interested in learning more about services, products, data, and GIS solutions in the county. Also invited were all county and city departments, along with elected and appointed officials.

The drop-in included demonstrations of web, mobile, and GPS data collection. Land record boundary adjustments were demonstrated with ArcGIS, and visitors also reviewed county council districts and other information on ArcGIS Online web maps.

The demonstrations were well received. Attendees said they were now ready to use their computer and mobile devices to access web and mobile solutions. A map gallery displayed award-winning posters, along with digital photography equipment. Pictometry Online made a popular debut, demonstrating the value of oblique (angled) aerial imagery. Numerous visitors from other county departments took time to view the displays, which added to the overall success of the day.

EXPO display at the 2012 Latin America User Conference in Buenos Aires, Argentina.

with a plenary welcome and vision presentation by Eduardo Viola, CEO of Aeroterra.

Keynote speaker Sergio Massa, mayor of the city of Tigre in the province of Buenos Aires, talked about implementation of a new technology platform as a basis for municipal management. Experts from Esri and Aeroterra then discussed the present and future of spatial technology, such as ArcGIS as a platform.

During the Plenary Session, the 2012 Latin America Special Achievement Awards in GIS were presented to AngloGold Ashanti (Colombia), Ciampagna y Asociados (GDSIG) (Argentina), ESSBIO S.A. (Chile), Ministerio de Ganadería Agricultura y Pesca (Uruguay), and Sancor Seguros (Argentina).

Much of the conference's focus was on ArcGIS 10.1 and ArcGIS Online. The LAUC provided a forum for attendees to nurture ideas, collaborate, connect, and inspire each other with their GIS skills.

"Thanks to the organizers for allowing me to learn important tools and make contacts for working on sustainable development in our local region," said Jorge Romero, a geographer in the province of La Rioja, northwestern Argentina.

At the close of the conference, Viola observed that the LAUC remains the most successful event his company has hosted in its 40 years of existence.

"This was because of support from Esri and regional distributors, but especially because of everyone who encouraged and helped us achieve success," Viola said.

The 2013 LAUC will be held October 16–18 in Lima, Peru, and will be hosted by Esri's distributor in Peru, TELEMATICA. More information will be available soon at **esri.com/lauc**.

Esri European User Conference

The 2012 Esri European User Conference was held October 15–17 in Oslo, Norway. The event attracted 940 GIS users, educators, researchers, and businesspeople from 34 countries to the Kongressenter in central Oslo and showcased 27 exhibitors from nine nations.

Geir Hansen, CEO of Geodata AS, Esri's official distributor in Norway, opened the event by welcoming guests from the host country and other European nations, as well as attendees from outside the region. A packed plenary audience heard Dangermond deliver the Keynote Address, "GIS—Opening Our World."

The EUC offered 24 technical workshops and 85 breakout sessions in 15 industry areas ranging from environment and forestry to utilities, energy, telecom, and water/wastewater.

Tobias Litherland, University of Oslo, and Kristin Madsen Klokkeide, University of Bergen, Norway, won the Student Awards and a trip to the 2013 Esri International User Conference in San Diego, California.

Bård Hansen of Statskog, a state-owned forest and mountain real estate agency, won the Norwegian Lighthouse Award for his contribution to GIS and impact on his organization and society. At the event's conclusion, Hansen told attendees, "I would like to thank everyone in the GIS community for a fantastic EUC 2012. The conference has been a great success with respect to participation, content, as well as atmosphere."

Jens Knudsk Jensen, from Geodata Denmark, echoed Hansen's comments, saying, "The conference was very well organized, with valuable content and excellent presentations. Thank you to Geodata Norway for a well-prepared event."

Esri Deutschland GmbH will host the 2013 Europe, Middle East, and Africa User Conference, October 23–25, in Munich, Germany. Visit **esri.com/emeauc** for more information about the event.

Esri Asia Pacific User Conference

The SKYCITY Convention Centre in scenic Auckland, New Zealand, was the site of the 2012 Asia Pacific User Conference, held November 5–7 and hosted by Esri official distributor Eagle Technology Group, Ltd. More than 220 organizations and 530 attendees from 20 countries were on hand for the city's first APUC.

From day one, when Dangermond invited members of the audience to introduce themselves to their neighbor, the enthusiasm of the plenary assembly carried the conference forward. Dangermond and the large Esri team excited attendees when each spoke to the region, with many personally introducing themselves during social events.

Tonkin & Taylor (Kate Burns, James Lyth, and Kate Williams) won the Eagle Technology Excellence in GIS Award for its application, Canterbury Earthquake Residential Land Damage. Honorable mentions included Afaf Abbas, Opus International Consultants, for the Auckland-Manukau Eastern Transport Initiative, and Manas Chakraborty, Horizons Regional Council, for an integrated spatial dataset representing significant freshwater values (ecological, social, and economic) across the region. In addition, Ryan Clements of the Queenstown Lakes District Council won the WebMap Award.

Delegate Norm Thornley, geospatial services manager for information systems and services, Department of Conservation, New Zealand, observed that the APUC had "a good mix" of technical and business-applied GIS. "It was good to see that Esri's direction is well aligned with where the Department of Conservation wants to go with facilitating more community-based conservation activities," Thornley said.

"This was a fantastic conference," said sponsor Andrew Fox, New Zealand's Global Technology Services (GTS) executive for IBM. "It was great to see everyone collaborating and sharing their best practices."

Gary Langford, CEO of Eagle Technology Group, termed the event "the culmination of a year of planning and collaboration" between his team and Esri. "As hosts, we are delighted with a very successful outcome," he said. "Our feedback from sponsors and exhibitors has been that it was one of the most vibrant events they have attended."

The 2013 Asia Pacific User Conference will be held in Singapore. More information is forthcoming at **esri.com/apuc**.

Esri hosted its first GIS Day celebration in Redlands, California.

Redlands, California

Esri hosted its first GIS Day celebration in Redlands on November 14 in a three-hour event at the downtown A. K. Smiley Library. Local residents—including students, teens, seniors, and young children—came to see how GIS works and is employed to improve the community.

Presenting organizations included the City of Redlands, Colton-Redlands-Yucaipa Regional Occupational Program (ROP), the Inland Valley Newspaper Group, the University of Redlands, and Esri. A geography story time for young children was hosted in the children's library.

Examples of how GIS is used and who GIS professionals are—from White House advisers, city planners, conservationists, and scientists to public works employees, search and rescue specialists, county assessors, and teachers—were presented, giving the audience a better understanding of the broad application of GIS.

Tom Resh, from the City of Redlands, discussed the many ways the city has incorporated GIS into its services and demonstrated how local residents can access and use various municipal map services.

"So far, I've learned that mapping is used in every single part of our lives—everywhere, for everyone," said Kim Scolieri of Redlands, explaining how GIS fits into society. "I can't think of anything it wouldn't apply to."

Irvine resident Roxanne Brooks came to the event after attending her daughter Amber's public presentation of her master of science in GIS project at the University of Redlands several hours earlier.

"I'm here this evening so I can keep up with her," Brooks said, laughing. "I find it very interesting. . . . It's a wave, definitely an important part of the future here. And Amber is always talking about it. GIS may be widespread, but I'm not that familiar with it."

Yui Shin, a teacher at the Colton-Redlands-Yucaipa ROP, introduced three Redlands High School students from his computer repair class.

"We originally started [the class] by teaching students how to become certified repair technicians," said Shin. "Then we found that when circuit boards were dying and burning out, . . . mapping could actually be used even on circuit boards."

David Smith, a computer and mapping support specialist with the University of Redlands, said the university teaches students to think spatially in three ways: *in* space via navigating, wayfinding, and even sports and dance; *about* space by thinking about the physical world, such as modeling ocean currents; and *with* space, or using space to look at patterns or making concept maps.

Gina Dvorak, multimedia editor for the Inland Valley Newspaper Group, gave a glimpse into how a newspaper employs GIS to augment news coverage. "We learned a long time ago that location matters to our readers," Dvorak said.

For more information on GIS Day, visit **gisday.com**.

Esri Partner Solutions

Petroleum

WebMapSolutions
www.webmapsolutions.com
GeoMobile for ArcGIS Online
GeoMobile for ArcGIS Online is an extensible mobile framework for working with ArcGIS Online—Load your own ArcGIS Online web maps on your tablet using GeoMobile for ArcGIS Online. The application extends the functionality of the Esri mobile application. Not only does this application help showcase ArcGIS Online, WebMapSolutions is actively extending it for clients to provide specific mobile GIS workflows.

Emergency Management

The Gartrell Group Inc.
www.gartrellgroup.com
Performance Atlas for Emergency Management
The Performance Atlas for Emergency Management is a situational awareness solution that may be deployed on client infrastructure or delivered in a Software as a Service (SaaS) format. It is based on ArcGIS for Server with options for integration of mobile capabilities that include the ability to do gaming and what-if scenarios; time-based event filtering for retrospective analysis; cross-agency real-time collaboration tools; automated vehicle location (AVL) integration for viewing mobile assets; mobile data updating and assessment tools; role-based data sharing; and powerful and efficient search, visualization, and reporting tools.

Land Records

GEO-Jobe GIS Consulting
www.geo-jobe.com
Property Search Application
The Property Search Application is a complete public access web mapping application. Because of the broad target audience for the solution, it was developed using ArcGIS API for JavaScript, which ensures a seamless user experience regardless of Internet browser or client-side plug-ins. Key functionality includes (1) property search by owner, address, etc.; (2) back-end overlay analysis to expose additional information (school districts, political districts, zoning, etc.) on the subject parcel based on its geographic location within the county; (3) service mashups that bring the best geospatial content into a single application (custom client basemaps, Esri ArcGIS Online basemaps, Bing basemaps, Bing Bird's Eye, and more); (4) high-quality printing via the ArcGIS 10.1 for Server PrintingTools geoprocessing service; and (5) e-commerce integration through an online GIS storefront that meets the needs of users who not only want to view data but also want to acquire it.

Utilities

PelicanCorp Pty Ltd
www.pelicancorp.com
AIRS for DBYD
AIRS for DBYD is a full life-cycle management and response system for the automated processing of Before You Dig (DBYD) requests. AIRS is an acronym for Asset Information Request System. AIRS provides a workflow-based centralized reporting and management mechanism for asset queries from DBYD. The AIRS solution provides fully automated responses for DBYD requests, as well as semiautomated tools for dealing with incomplete, erroneous, or invalid requests. AIRS for DBYD decreases manual workload on clearance officers, provides cost savings to the business through automated responses, and helps businesses meet their KPIs related to DBYD responses.

URISA's 2012 Successes . . . Roll into a Busy 2013

Indeed, 2012 was a milestone year for URISA.

Members developed a Geospatial Management Competency Model, which was accepted by the US Department of Labor. URISA announced a GIS Management Institute (GMI) to develop resources and services that focus on promoting the advancement of professional best practices and standards for the management of GIS operations. The organization's 50th Annual Conference took place in Portland, Oregon, with the highest attendance numbers seen in many years (in fact, all URISA conferences exceeded expectations in 2012). Dozens of industry luminaries collaborated on the publication *Foundations of Urban and Regional Information Systems and Geographic Information Systems and Science*, a commemorative book documenting the research, education, training, and applications that URISA and its members have contributed during the past five decades. Two new URISA chapters were approved for organizing status (Texas and a Cumberland Chapter serving Kentucky and Tennessee), URISA's GISCorps surpassed 100 volunteer missions, and URISA's Vanguard Cabinet continues to make great strides for young GIS professionals.

No doubt, 2013 will be even more productive, with working groups and committees actively working on GMI, international outreach, and a full calendar of URISA conferences and events:

- 17th Annual GIS/CAMA Technologies Conference (March 4–7 in Albuquerque, New Mexico)
- URISA Leadership Academy (May 13–17 in San Antonio, Texas)
- GIS in Public Health Conference (June 17–20 in Miami, Florida)
- GIS-Pro 2013: URISA's 51st Annual Conference for GIS Professionals (September 16–19 in Providence, Rhode Island)
- GIS in Public Transit Conference (October 16–18 in Washington, DC)

URISA invites all GIS professionals to join the organization and get involved, share ideas to advance the profession, and make an impact.

For more information, visit www.urisa.org.

New Training and Certification Offerings from Esri

Training

ArcGIS Online Training Options
Organizations can use ArcGIS Online to efficiently disseminate rich GIS content whenever and wherever it is needed. Learn how to get the most out of ArcGIS Online with these courses below. You can find the full list of self-paced and instructor-led training options for ArcGIS Online at esri.com/agolcourses.

Self-Paced Training
- Creating Hosted Map Services with ArcGIS Online
- Configuring and Administering an ArcGIS Online Subscription
- Authoring Web Maps Using ArcGIS Online

Learn GIS Fundamentals in Our Newest Web Courses
Designed for those completely new to GIS—be they students, knowledge workers, developers, or managers—the courses below provide a friendly introduction to essential concepts of what a GIS is, how GIS maps are constructed, and what makes GIS analysis such a powerful approach to exploring all types of real-world problems. View the complete catalog of Esri web courses at esri.com/coursecatalog.

- Getting Started with GIS (for ArcGIS 10.1)
- Authoring Web Maps Using ArcGIS Online
- Referencing Data to Real-World Locations Using ArcGIS 10.1
- Finding Geographic Data in ArcGIS 10.1
- Solving Spatial Problems Using ArcGIS 10.1
- Python for Everyone Using ArcGIS 10.1

Certification

New Esri Training Pass Redemption Option
The Esri Training Pass is a convenient, one-stop method to purchase and manage GIS training. Organizations with an Esri Training Pass can now use it to acquire Esri technical certification exam vouchers. The voucher redemption value is 0.45 training days. To learn more, visit esri.com/trainingpass.

Desktop 10.1 Exams and Desktop 10.0 Exams Grandfather Policy
The ArcGIS Desktop Associate and ArcGIS Desktop Professional certification exams for ArcGIS 10.1 have been released, and registration for both exams is now open to the public.

Please note: Candidates who achieved an ArcGIS Desktop Associate or ArcGIS Desktop Professional certification for version 10.0 or any candidates who take and pass an ArcGIS Desktop version 10.0 certification exam in the future can submit a request to receive the equivalent version 10.1 certification if they choose. E-mail communication was sent to all current Desktop certification holders with information about how to submit this request. For more information about this grandfather policy, contact the Esri Technical Certification team at certification@esri.com.

Current Beta Exams
Esri Partners and distributors were recently invited to participate in beta testing for the Enterprise Geodatabase Management Associate (10.1) and Web Application Developer Associate version 10.1 exams.

The beta testing took place in November and December, and the exams will be available to the public in early 2013 after the completion of the beta analysis.

Upcoming Beta Exams
Four additional version 10.1 exams will be available for beta testing soon. Esri distributors and partners will receive invitations to beta test the following exams in December and January:

- Enterprise System Design Associate (10.1)
- ArcGIS Desktop Developer Associate (10.1)
- Enterprise Geodatabase Management Professional (10.1)
- Enterprise Administration Associate (10.1)

Follow Esri training on Twitter at twitter.com/Esritraining to receive the latest news and announcements when the exams are released.

For More Information

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Esri Technical Certification prep resources:	esri.com/skillsreview

"Managing GIS"

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

URISA
The Association For GIS Professionals
www.URISA.org

The Geo-Jargon Guide to GIS Leadership

By Rachel Kornak, GISP, URISA's Vanguard Cabinet

What does it mean to be a leader in the GIS profession? It depends on who you ask. There are many ways to lead. One can lead in a tangible manner by overseeing a company, a project, or a team. Such leaders typically have positions with "manager" or "director" in their job title. To become this type of leader, you need to achieve a particular set of milestones related to education and experience.

Thought leadership is a harder concept to define. My favorite descriptions of thought leaders: "individuals with the ability to aggregate followers around ideas to educate, influence, and inspire" (Jeanine Moss) and "the go-to person [who] journalists want to quote and companies want to hire" (Social Strand Media).

Thought leadership has more to do with attitude than the number of years of experience, making it much more accessible for individuals at the beginning of their careers. You can be a thought leader if you are a student or intern, an entry-level employee, or a seasoned professional. There will always be people both ahead of and behind you. The key is to learn how to inspire others no matter where you are on the career ladder.

My own role models range from professionals with decades of experience to students taking their first GIS class. They may seem different on the surface, but they have quite a bit in common. They have a vision for the future and passionately pursue it. They generously commit their time, energy, and resources. They actively participate in knowledge exchanges. They go the extra mile to both identify and fill in gaps. Lastly, they both challenge others to think big and empower them to follow through.

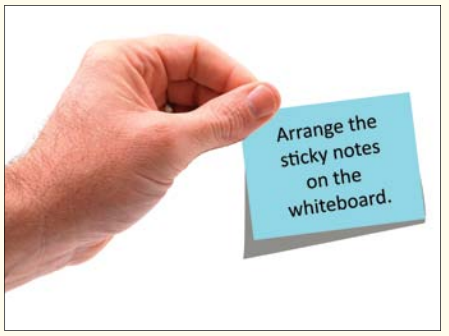
How You Can Get Started

The pathway to becoming a GIS thought leader is cyclical. At the beginning, you may not consider yourself a member of the GIS community. For example, you may describe yourself as an environmental scientist instead of a GIS professional. Our field is complex in that many GIS professionals apply their technical knowledge in fields like energy production or health care. Once you identify yourself as a member of the GIS community, you need to recognize that you have an obligation to contribute to it. Next, you need to educate yourself about the existing "infrastructure," like major players, best practices, professional organizations, and professional development resources. Then you can apply your own talent and skills to fill in gaps. You complete the cycle by inspiring others who don't currently participate to begin the cycle themselves.

The Geo-Jargon Guide

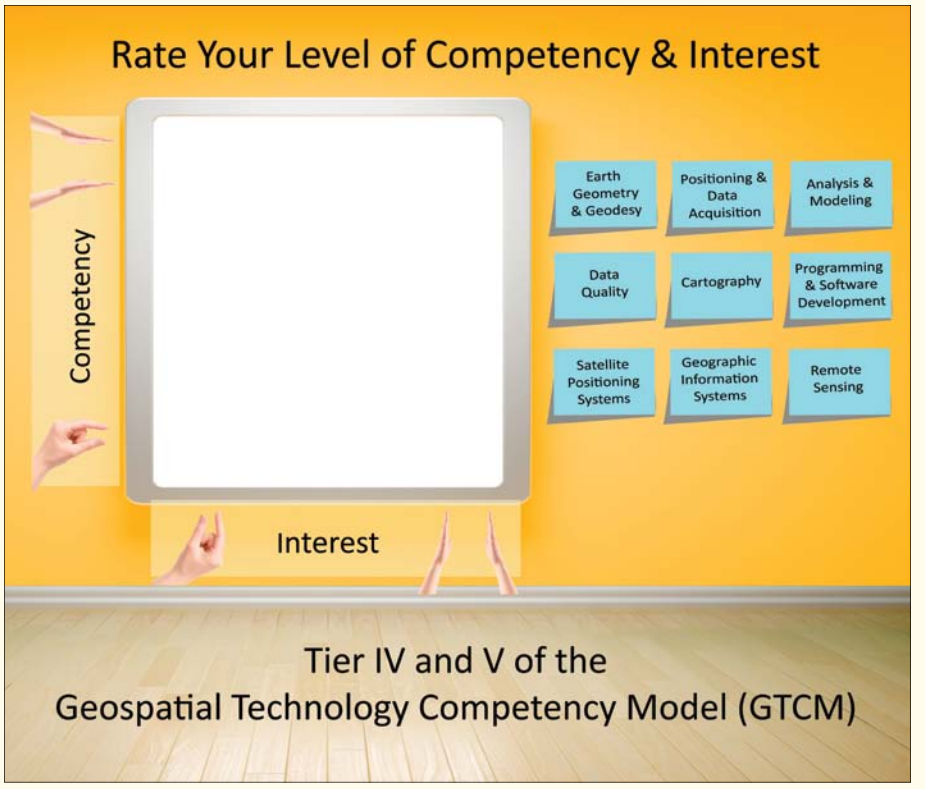
Here are some tips to approaching geo-jargon:

- **Build Topology—**Topology represents connections and relationships between features. Successful leaders build meaningful connections in the GIS community. Your network will provide access to advice, information, and opportunities, as well as a shoulder to cry on when you get the generic, dreaded, and



inexplicable "999999—Error executing function" message in ArcMap. Based on LinkedIn, most GIS professionals are related by only two degrees of separation. It's not that difficult to expand your relationships exponentially by focusing on a few strategic connections.

- **Spatial Join—**The spatial join tool uses location to bring together many pieces of information. Joining a local, regional, or national GIS organization is one of the best ways to rub shoulders with peers and leaders, access professional development materials, and learn about specific ways you can help build the community. The GIS Certification Institute website lists a wide range of GIS professional groups at www.gisci.org/events_groups.aspx. Esri supports a variety of user groups at esri.com/events/usergroups. You can also participate in virtual GIS communities using social media sites like LinkedIn and Facebook.
- **3D Viewshed Analysis—**Viewsheds describe the extent visible on the landscape from a given location. As an individual, it's difficult to see the big picture on your own. You can expand your perspective by linking up with people higher up the proverbial mountain or career ladder. The importance of having a mentor cannot be overemphasized. Choose a few different people who can challenge and inspire you in multiple dimensions. For example, someone with great technical skills will provide value in a different way than someone with great interpersonal skills.
- **Service Pack—**Service packs contain the latest code to constantly improve the performance of Esri software. GIS leaders need to be lifelong learners to keep up with constantly evolving technology. There has never been a better time to educate yourself from the comfort of your couch or office chair by enrolling in online continuing education classes or attending webinars. You can also attend live workshops at conferences or courses on a campus near you.
- **Least-Cost Path—**The least-cost path tool calculates the cheapest route between two points based on cost surfaces. Effective leaders don't typically follow the least-cost path. Leadership demands time, creativity, energy, and money. You may have to pay membership dues, take vacation time to attend a conference, or work nights and weekends to organize an event. I like to consider these expenses as investments in the future—both mine and that of our profession.
- **Geoprocessing Tools—**Geoprocessing tools transform an input into something more useful for a particular application. In this case,



Easily rate your level of achievement and interest against GIS industry standards using the tools at EmergingGISLeaders.org.

the inputs are GIS events, resources, best practices, policies, and news. The outputs are your opinions, suggestions, or contributions that add value in some way. Are you good at programming and creating applications, designing graphics, writing, building relationships, organizing logistics, creating buzz, etc.? Find a way to apply these skills to help build the GIS profession and community.

My contribution is EmergingGISLeaders.org, a grassroots effort to intersect, empower, and engage aspiring GIS professionals. The website provides links to professional development resources, tips to get connected, a platform for young and new professionals to share ideas, and tools to help you get started. The latest tool helps you assess your achievement and interests against the GISP Certification requirements; the Geospatial Technology Competency Model; and resumé, portfolio, and networking advice from experts in the field. It also helps you prioritize action items and create a follow-up plan. Like Esri's ModelBuilder, you can create a visual plan that can be easily updated and shared with others. Create a vision for your future and track your progress at www.EmergingGISLeaders.org/get-started. What will you contribute to the GIS community?

About the Author

Rachel Kornak is a certified GIS professional and has been a member of URISA's Vanguard Cabinet since January 2011. She created Emerging GIS Leaders to help aspiring GIS professionals find a path to success. Kornak is the lead instructor of Environmental Applications of GIS, an elective in Penn State University's online MGIS and GIS certificate programs.

Acknowledgments

Special thanks go to Joy Adams (AAG), Greg Babinski (URISA), Ryan Bowe (URISA Vanguard Cabinet), Betsy Breyer (Portland State), Phil Davis (GeoTech Center), David DiBiase (Esri), Carrie Drake (USGIF), James Fee (WeoGeo), Jean McKendry (AAG), Anthony Robinson (Penn State), and Carlos Silva (URISA Vanguard Cabinet) and to Rich Serby (GeoSearch).

For more information, contact Rachel Kornak, GISP (e-mail: rnk114@psu.edu).

"Crossing Borders"

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

New Online Geography and GIS Resources

The Association of American Geographers (AAG) has decided to make many new and existing publications and important reference resources freely available on the AAG website. A small sampling of these online geography and GIS resources is summarized below.

Jobs in Geography and GIS
An extensive collection of career resources is now online for students interested in pursuing a career in geography or GIScience, or for seasoned educators or GIS professionals seeking to further develop their careers or find a new position anywhere in the world. The AAG Careers site includes information about the types of jobs available to those who study geography and GIS; information about typical employers; the most current salary data; career preparation tips; and links to working geographers who can offer advice, and much more.

Another valuable employment resource, AAG's Jobs in Geography (JIG), is now available as a feature-rich, searchable online jobs listing system. This new system, which will be publicly available on the AAG website, will make it easier for employers to reach qualified candidates and for job seekers to connect with employers in all sectors.

The AAG Guide to Programs in Geography
The *Guide to Geography Programs in the Americas and AAG Handbook and Directory of Geographers* has long been a useful tool for students, faculty, and geographers throughout the world. This year we are pleased to announce that it will be more widely available to students and others, as it will be offered as a free online publication.

The new *Guide* describes in detail nearly all academic institutions throughout the Americas, including faculty specialties, financial assistance, and degree requirements. It also provides information on government agencies and private firms that employ geographers.

AAG Newsletter
The AAG has also transitioned its *AAG Newsletter* content to a set of interactive online communication channels. Geography and GIS news, op-eds, job listings, grant information, and event calendars are now updated and available on a more timely and in-depth basis than before. An index on the AAG home page will make it easy to quickly find the information you want.

Additionally, AAG news and information are conveyed regularly online via the *AAG SmartBrief,* AAG *Geograms*, our website home page news section, AAG's online Jobs in Geography listings, AAG Specialty Group Knowledge Communities websites, and other similar outreach means.

The GIS&T Body of Knowledge
With support from Esri and UCGIS, the AAG is making a key reference work, *Geographic Information Science and Technology Body of Knowledge*, available online as a free, downloadable PDF and, for a small shipping fee, as a print edition. Organized thematically by GIS *knowledge areas*, the book presents a comprehensive survey of Geographic Information Science and Technology (GIS&T) topics, ranging from analytical methods and data modeling to GIS&T in society. It is an important reference work for GIS&T professionals and classroom teachers and students.

AAG Journals
There are no plans to discontinue the hard-copy versions of the AAG's flagship journals, *Annals of the AAG* and *The Professional Geographer.* Currently, all AAG members automatically receive both a hard copy of and online access to these leading AAG journals. However, members who wish to receive their AAG journal subscriptions online only may do so on an individual basis. Many AAG members have now chosen this option, either for personal convenience or due to concerns about the environmental impact of printing and mailing the hard-copy issues.

The *AAG Review of Books*
The new online *AAG Review of Books* publishes scholarly book reviews as formerly published in the *Annals of the AAG* and *The Professional Geographer*, along with reviews of significant current popular books related more broadly to geography, public policy, and international affairs. As an online publication, it will be able to include many more worthy geography books for review and to publish these reviews in a more timely manner. In addition, it is also hoped that the new *AAG Review of Books* will reach a much broader interdisciplinary readership, as well as make important geographic contributions to policy and international affairs.

GIS Master's Degree Programs Online
The AAG has created a unique clearinghouse for GIS and GIScience training and educational programs. A special focus of the clearinghouse is a compilation of all GIScience and GIS professional master's degree programs, including both traditional and online programs.

AAG Annual Meeting Programs
The AAG will begin offering online electronic versions of our *Annual Meeting Program* book, for use on handheld devices and laptops, beginning at our upcoming April 9–13, 2013, conference in Los Angeles, California. The program will also still be available in printed program books for those attendees who wish to have the hard-copy version in Los Angeles or to access it as an archival reference source following the meeting.

I look forward to your feedback as we continue to transition AAG publications and resources online for your quick and easy access, and hope you will benefit from and enjoy these newly available resources online at **www.aag.org**.

Doug Richardson
drichardson@aag.org

ArcGIS for Server Disseminates Geospatial 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 an ArcGIS for Server site address and view other websites powered by ArcGIS for Server, visit **esri.com/serversites**.

Orange County Property Appraiser Interactive Map
maps.ocpafl.org/webmap
Featuring advanced geospatial tools, the Orange County Property Appraiser Interactive Map allows Orange County, Florida, residents and real estate professionals to conduct detailed property appraisal searches.

Red River Basin Lidar Viewer
gis.rrbdin.org/lidarviewer
The Red River Basin Lidar Viewer was created to provide easy access to lidar elevation products created from the Red River Basin Mapping Initiative. Users can create custom maps with elevation products using a variety of aerial imagery and other geospatial products.

Collin County Interactive Maps
maps.collincountytx.gov
Collin County, Texas, Election Info is a JavaScript application that shows polling locations, voting precincts, commissioners, constables, and more, for Collin County, Texas.

ArcGIS 10.1, Python, Spatial Analysis, Map Projections Discussed

Advance Your Skills with New Esri Press Books

Python Scripting for ArcGIS
By Paul A. Zandbergen
Python is the recommended programming language for working with and automating tasks in ArcGIS; therefore, *Python Scripting for ArcGIS* will get experienced ArcGIS for Desktop users started quickly with Python scripting—no programming background required. The book includes 14 chapters with corresponding exercises that cover Python and ArcGIS for Desktop geoprocessing fundamentals; how to write scripts that work with spatial data; specialized tasks, such as creating Python functions and classes; and how to create tools out of scripts and share them with others. A 180-day trial of ArcGIS 10.1 for Desktop Advanced is included. January 2013. ISBN: 978-1-58948-282-1, 368 pp., US$79.95.

***Getting to Know ArcGIS for Desktop*, Third Edition**
By Michael Law and Amy Collins
New edition, new exercises. Known for its broad scope, clarity, and reliability in introducing the principles of GIS, *Getting to Know ArcGIS for Desktop* is well suited for classroom use and independent study and as a reference. The third edition includes new topics, such as exploring online resources and raster data. A data DVD for working through the exercises is included with the book, and access to a 180-day trial of ArcGIS 10.1 for Desktop Advanced is provided. February 2013. ISBN: 978-1-58948-308-8, 640 pp., US$84.95.

***Lining Up Data in ArcGIS: A Guide to Map Projections*, Second Edition**
By Margaret M. Maher
Lining Up Data in ArcGIS: A Guide to Map Projections is an easy-to-navigate troubleshooting reference for any GIS user with the common problem of data misalignment. Complete with full-color maps and diagrams, this book presents practical techniques on how to identify data projections, create custom projections to align data, and solve common data alignment problems. The second edition is compatible with ArcGIS 10.1 and includes new sections on aligning CAD data and appropriate use of the web Mercator projection. February 2013. ISBN: 978-1-58948-343-9, 200 pp., US$24.95.

***GIS Tutorial 2: Spatial Analysis Workbook*, 10.1 Edition**
By David W. Allen
GIS Tutorial 2: Spatial Analysis Workbook, 10.1 Edition, provides hands-on exercises to help GIS users at the intermediate level build problem-solving and analysis skills. The book offers experience with various spatial analysis methods, including location analysis; change over time, location, and value comparisons; geographic distribution; pattern analysis; and cluster identification. A 180-day trial of ArcGIS 10.1 for Desktop Advanced software and a DVD with data for working through the exercises are provided. Additional resources are available for instructors. January 2013. ISBN: 978-1-58948-337-8, 342 pp., US$79.95.

For more information or to order Esri Press books, visit **esri.com/esripress**.

France and South Africa—Can You See the Signs?

After attending his first Esri International User Conference, Alfred Drenth, GIS specialist, Waterschap Noorderzijlvest, took his family, bike, and T-shirt to the south of France to go camping. He went up Mount Ventoux by bike, and at the top, he showed the world his new MapMan T-shirt.

Kathryn Scott and Brian Hall, GIS analysts for Washington State, posed with their Esri T-shirts at a penguin crossing on Robben Island, off the coast of South Africa. They were volunteers for a research project conducted at the penguin breeding colony on the island.

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 (tmiller@esri.com). Digital images are preferred, but prints or slides can be sent to *ArcNews* T-shirt Feature, Esri, 380 New York Street, Redlands, California 92373-8100 USA. See *ArcNews Online* at **esri.com/arcnews**.

Alfred Drenth


Kathryn Scott and Brian Hall

Online-Only Articles

More *ArcNews*

The Winter 2012/2013 issue of *ArcNews Online* (**esri.com/arcnews**) presents the following special online-only articles:

- Turning Red Fields into Green Fields in Los Angeles
- Residents of the US Capital Manage Storm Water Projects with Green Up DC
- Discovering and Mapping Natural Hazards with Lidar
- Keeping Electric Vehicles Alive

ArcNews

Submit Your Story to *ArcNews*

Many of the user success stories in *ArcNews* are written by our users and partners. We look forward to receiving yours.

If you would like your article to be considered for publication, please follow the article submission guidelines at

esri.com/ansubmission

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Who is GIS?

Roland Martin is.

A GIS engineer, Martin analyzes terrain data. “Ever since I was a little kid, I would design maps rather than drawing pictures of people or flowers or landscapes. Even my doodles from my university years, I’d randomly draw a freeway intersection.”

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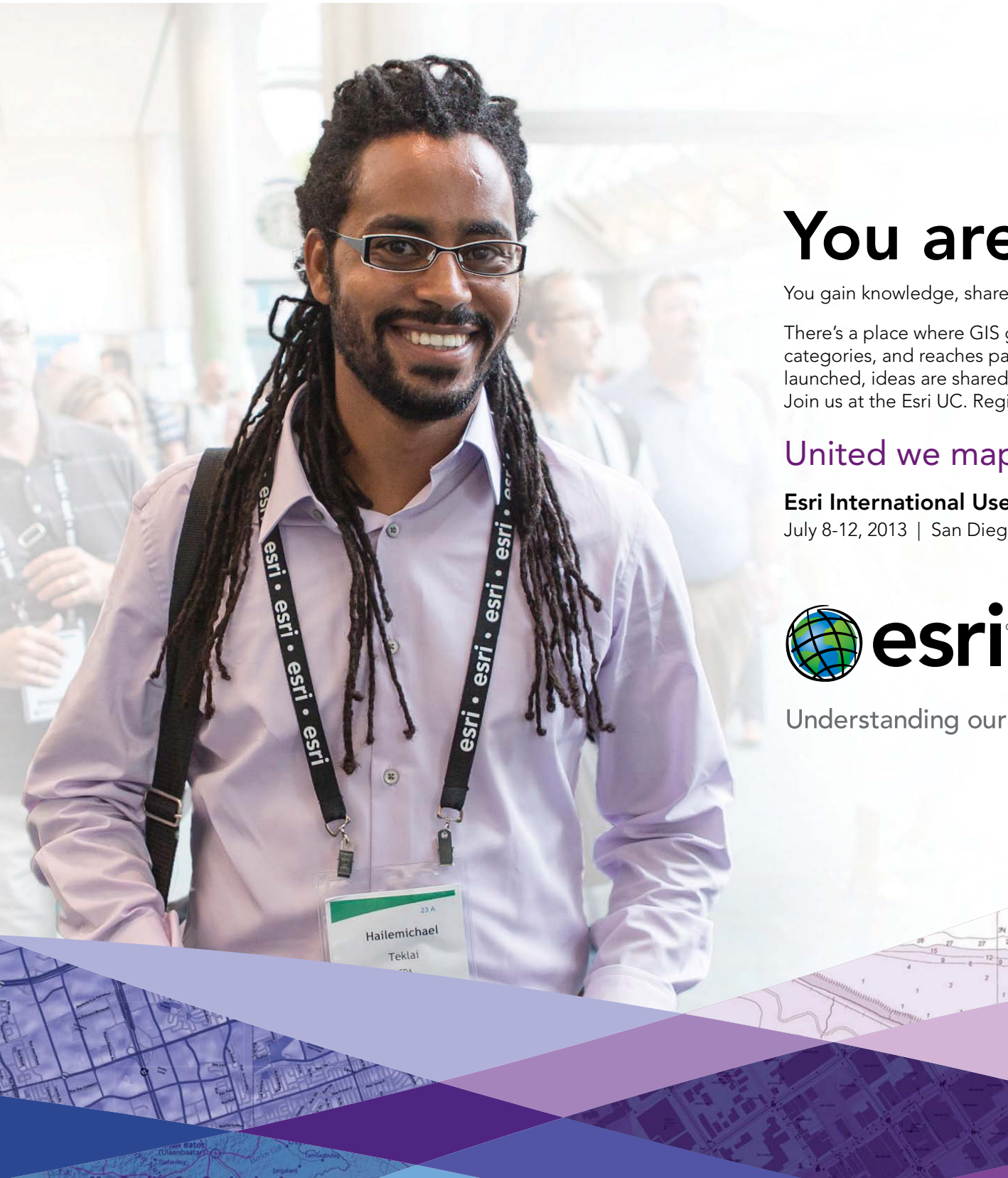

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