

Briefly Noted

Register for Esri UC Summits

At the 2025 Esri User Conference (Esri UC), several special summits will run concurrently that focus on science, AI, spatial analytics, imagery, developer technology, and Native nations. The Science Summit @ Esri UC, for example, aims to build camaraderie among Esri UC attendees who are interested in science, how science informs the pressing issues of the day, and how it intersects with the evolution of GIS. These events are included with Esri UC registration, though reservations are required to attend them. Get more information at links.esri.com/uc-summits.

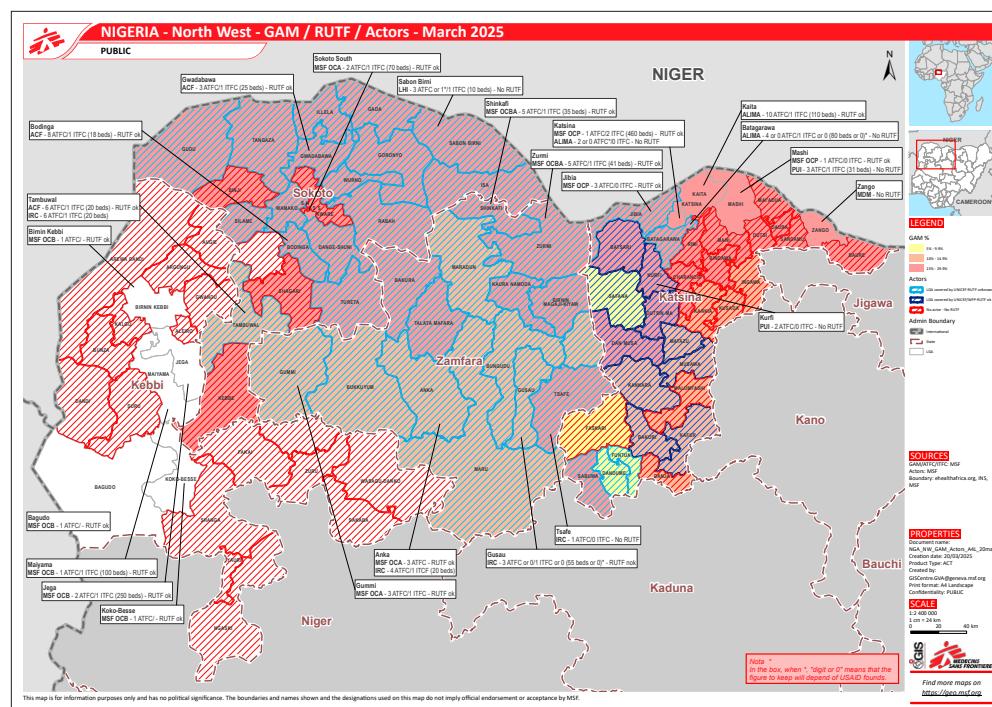
Communicating the State of US Infrastructure

The American Society of Civil Engineers (ASCE) partnered with Esri to present the findings of its 2025 Report Card for America's Infrastructure, using ArcGIS StoryMaps. Published every four years, the report card serves as a comprehensive evaluation of US infrastructure, using the familiar A through F school grading scale to indicate how well each sector operates for the public. Beyond the grades, the report provides key information on opportunities, challenges, and performance. Go to infrastructurereportcard.org/story-map to view the story.

Better Awareness of Wildfires and Other Disasters

The University of California, San Diego's ALERTCalifornia program and Esri have launched a new map layer in ArcGIS Living Atlas of the World that provides instant access to live camera feeds across California. This collaboration comes at a critical time, as the state faces increasingly frequent and severe natural hazards, particularly wildfires, that threaten public safety, environmental health, and economic stability.

For Doctors Without Borders, GIS Is Invaluable



↑ GIS helps Médecins Sans Frontières (MSF)—also known as Doctors Without Borders—keep field personnel safe, with maps displaying details of conflicts and nearby risks.

At any given moment in 70 countries around the world, tens of thousands of doctors—*independent of any given side in a dispute or government conflict*—are helping people suffering through wars; natural disasters; or events that, without medical care, would otherwise prove life-threatening. That's in addition to the vast number of supplies traveling in thousands of different directions to support these doctors' missions, as well as the enormous amounts of data that come with tracking every mission's progress and equipment.

For the organization that manages all this—Médecins Sans Frontières (MSF), translated to Doctors Without Borders—GIS is not just a mapping tool; it is the key to supporting knowledge management. With the organization's people and operations dotting the globe, decision-makers rely on ArcGIS technology deployed across the enterprise to better understand what resources and assets MSF has and where they're located, as well as what operations staff may encounter in the field and how MSF can help.

In Mozambique, for instance, teams quickly distributed water door-to-door in a densely populated urban area and repaired damaged water lines after Cyclone Idai in 2019. In Bangladesh, the organization planned and managed health services

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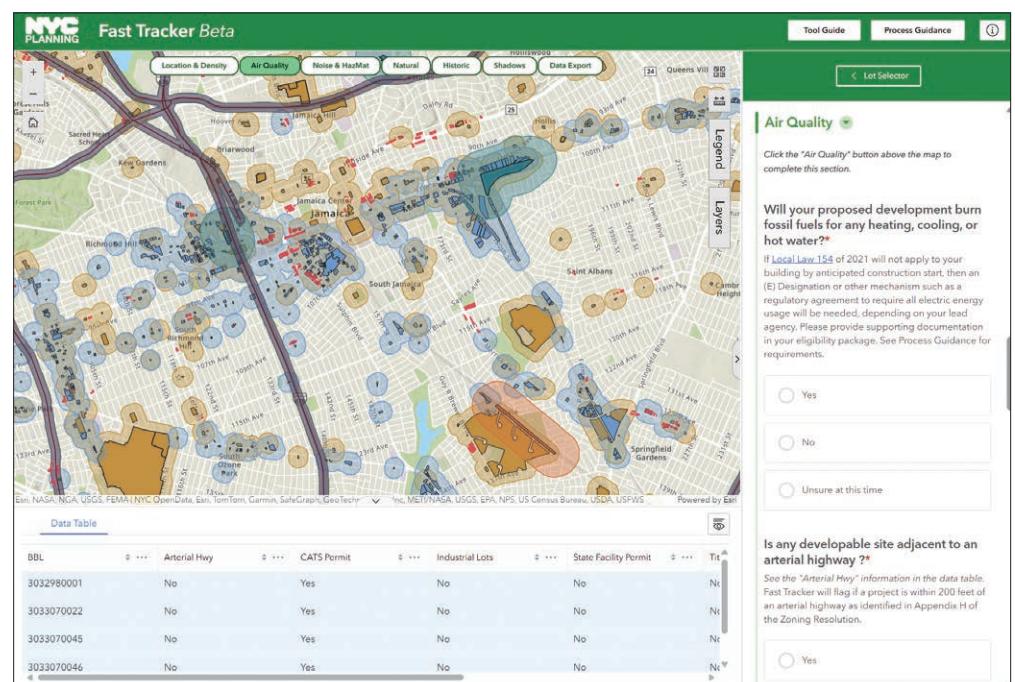
Geospatial App Helps Fast-Track Housing Development in New York City

By Alex Moscovitz and Jack Rosacker, New York City Department of City Planning

New York City, like so many other municipalities across the United States, is facing a severe housing crisis. This is leading to high rents, gentrification, segregation, poor housing quality, tenant harassment, homelessness, and other issues that affect a market where residents have scarce housing options.

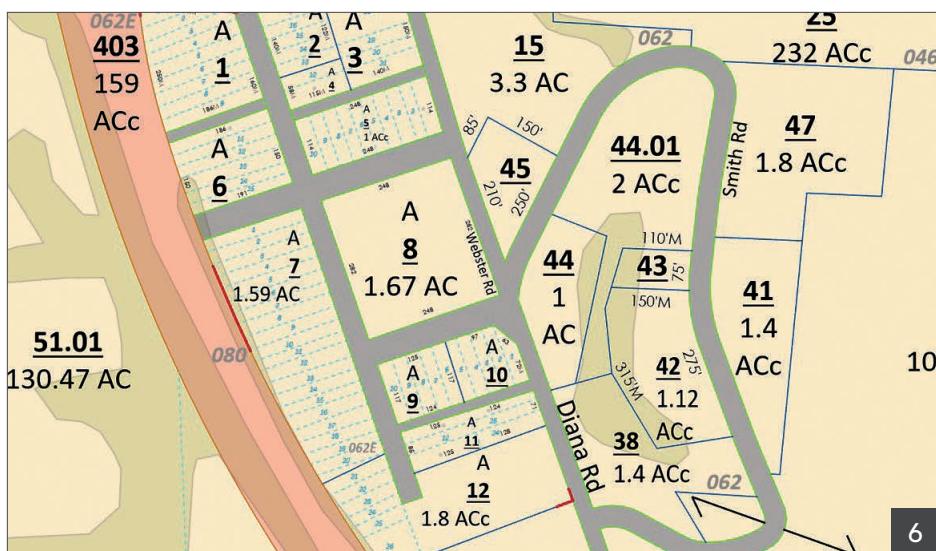
To help combat housing scarcity, the New York City Department of City Planning (NYC Planning) developed a geospatial survey app to determine whether planned housing projects are eligible for the new citywide Green Fast Track for Housing rule. The rule streamlines housing production by allowing projects that fit specific criteria to access a simplified environmental review process while still satisfying state and city environmental standards.

The app—which integrates ArcGIS Experience Builder with ArcGIS Survey123 and Microsoft Power Automate—enables users to identify tax lots relevant to a proposed housing project and enter project criteria, such as unit count, building height, and distance from sensitive areas. The resultant



↑ When taking the survey (shown on the right), users can see a map of their selected tax lots that corresponds to the survey section they're filling out. (Image courtesy of NYC Planning.)

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Over the last few years, the Tennessee Comptroller of the Treasury (TNCOT) has helped 72 county assessor's offices throughout the state transition from ArcMap to ArcGIS Pro. "I would not go back to ArcMap if you told me to," said Johnny Stephens, the sole GIS analyst for Maury County, Tennessee, who was initially skeptical of the change.

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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.

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A New Way for Architects and Engineers to Create Contextually Rich Designs

Before the rise of computers and digital design software, architects and engineers hand-drew their designs and technical schematics. It was common to enter a design firm and see numerous architects and engineers diligently working on plans that spanned the length of the room. Their tools included T-squares, triangles, compasses, stencils, and other precision instruments—all of which were essential for bringing their visions to life.

As the digital era progressed, the tools for drafting and design evolved as well. In the 1980s, Autodesk introduced a revolutionary drafting and design software called AutoCAD, which let architects and engineers use computers to aid their design processes. Over time, additional building information modeling (BIM) design tools, such as Autodesk Revit, were also introduced, providing data-centric 3D parametric models.

Today, drafting and design software is most effective when it is grounded in spatial context. Understanding the real-world environment and its impact on design is crucial for the success of any project.

Recognizing this, Esri and Autodesk have partnered to integrate authoritative ArcGIS data into Autodesk Forma—cloud software with easy-to-use AI-powered tools that architects and designers can employ for predesign tasks and schematic design. This integration, called ArcGIS for Autodesk Forma, ensures that projects are both data driven and contextually rich.

Enhance Design Accuracy by Incorporating Spatial Context Early

Site designs for infrastructure, housing, and transportation projects that fail to consider their surroundings—including local ecosystems, spatial factors, and environmental impacts—are inherently limited. Incorporating GIS data early on in a project significantly enhances the design experience and outcomes. By leveraging the spatial context provided by GIS data from the beginning, designers can avoid having to backtrack or make substantial corrections later in the process. This means that designs can be accurate and up-to-date right from the start, ultimately saving both time and money during the latter stages of a project.

ArcGIS for Autodesk Forma is an integration tool that enables architects, GIS managers, and civil engineers to seamlessly incorporate their organizations' authoritative ArcGIS data into their Autodesk Forma designs. For example, they can bring in drone imagery, utility networks, or existing site conditions shared by collaborating organizations. They can also bring in imported layers from ArcGIS Living Atlas of the World, including environmental features like soils and hydrology, infrastructure data, imagery, and live feeds from various authoritative datasets.

This integration provides essential spatial context, allowing users to perform environmental

impact assessments and real-world visualizations while improving the overall quality and maintaining the fidelity of their work. Additional benefits of using ArcGIS for Autodesk Forma include the following:

- Streamlined access to ArcGIS data:** The direct integration allows users to transfer their ArcGIS data into Autodesk Forma quickly and efficiently, without compromising accuracy or integrity. This enables users to work within their Autodesk Forma design environment without switching between systems.
- Reliable and accurate designs:** When a user's ArcGIS data gets updated, these changes are automatically reflected in Autodesk Forma when the screen refreshes. This ensures that users always have the most up-to-date data available, enhancing the accuracy and efficiency of their designs.
- ArcGIS data integration extends beyond Autodesk Forma:** Users can share their spatially enhanced designs across Autodesk's software, including Revit, maintaining spatial context throughout the entire design process. This seamless integration allows for consistent and accurate data usage, from initial concept to final construction, improving collaboration and project efficiency.
- Identify challenges before they occur:** ArcGIS data provides designers with critical information, such as zoning and land-use regulations, parcel sizes, and other environmental factors. With ArcGIS for Autodesk Forma, users have spatial context from the outset of a project, making it less likely that they'll have to make important modifications to their designs later.

Building a More Resilient Future, Together

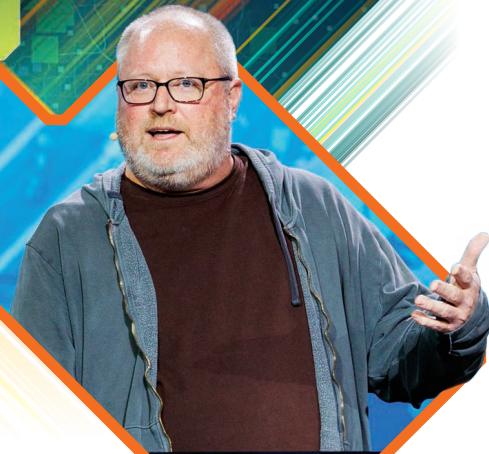
The strategic alliance between Esri and Autodesk is designed to empower designers, engineers, and architects with spatial context upfront. This collaboration enhances the accuracy and relevance of design and engineering processes, providing detailed and context-rich visualizations that support more sustainable and resilient predesign workflows. Whether users then move to schematic design or design development, this integration ensures that every step thereafter is also informed by comprehensive spatial data.

Esri and Autodesk are dedicated to offering a more robust and integrated approach to design, engineering, construction, and urban development. This commitment includes the continuous development of new features and services to further improve the user experience.

To learn more about the benefits of spatially enhanced designs and ArcGIS for Autodesk Forma, visit go.esri.com/arcgis-for-forma or contact your Esri representative.



Esri Developer & Technology Summit Impresses with Cutting-Edge Innovations



→ Jeremy Bartley went over recent updates made to ArcGIS Online.

Over

the past 20 years, the Esri Developer & Technology Summit has evolved significantly to support Esri's growing user community of developers, system architects and administrators, development operations (DevOps) and security engineers, and builders. What started in 2006 as an event that Esri's developers put on for about 400 other developers has transformed into one that is still for developers, by developers—but that now serves thousands of attendees who work in different facets of technology, reflecting the evolution of GIS.

"Many of you are developers, but also many of you are working in the back-office building [and] supporting the systems that are actually making geospatial [technology] and GIS really work in your organizations," Esri president Jack Dangermond told the Plenary Session audience on the first day of the conference. He said

that the purpose of the Developer & Technology Summit remains unchanged: It is for Esri developers to share their "back office" with attendees, and for Esri staff to listen to—and implement—ideas from the summit's tech-savvy community.

The 3,300 in-person and virtual attendees of this year's event, held March 11–13, 2025, in Palm Springs, California, were treated to an expanded range of technical content covering the latest developer tools and IT implementations. Through technical sessions and demonstrations, user presentations, hands-on training, and conversations with Esri development staff, summit participants learned how to

- Use the latest Esri software development kits (SDKs), open-source libraries, and data services to build innovative spatial solutions.
- Architect and manage enterprise GIS to be scalable, performant, and secure.
- Configure custom solutions and extend and automate systems using ArcGIS Maps SDKs, scripting, APIs, and ArcGIS Location Services.
- Integrate ArcGIS with other technologies, such as AI, across the enterprise.

Many exciting and crucial updates to Esri's GIS technology were covered during the Developer & Technology Summit, including the following highlights from the Plenary Session. To view all presentations from the Plenary Session, go to links.esri.com/devtech2025.

Web Maps Continue to Evolve

Web maps are powerful tools. They enable organizations to reduce development costs and get to production faster. And within web maps, both the data and the map experience—such as pop-ups and tables—flow between apps. For developers, this means spending less time writing code. Instead of constructing map symbols and renderers, for example, they can select a symbol and pick a map style and move on. Then geographers can make the maps, and app builders can insert those maps into their apps.

"We've introduced a lot of powerful capabilities over the last 14 years of the web map, including things like feature layers, feature

effects, rich and customizable pop-ups with dozens of map styles, [and] the ability to do client-side aggregation," said Jeremy Bartley, Esri's chief technology officer for web mapping and geospatial web app technology. "It's constantly evolving."

Recent updates to ArcGIS Online include the ability to create and automate data preparation workflows—without writing code—using ArcGIS Data Pipelines; the ability to use display filters on a single layer, which allows users to decide what type of information is appropriate to display at specified scale ranges; and the ability to aggregate not just point layers but also lines and polygons. Through ArcGIS REST API, users also have many ways to work with the feature layers that power their web maps, from creating different views of these layers to exporting them in various formats.

"You can add new features, update existing features, or do both at the same time—or, in some cases, overwrite the entire layer," said Bartley. "These feature layers are a very powerful part of the system. They're open [and] updatable. You can create powerful, data-driven visualizations, and they're highly performant, powered by these dynamic vector tiles with updatable data."

JavaScript Maps SDK Web Components in Action

GIS on the web really comes alive with ArcGIS Maps SDK for JavaScript, which lets developers build powerful, interactive 2D

→ Julie Powell and her team went over how ArcGIS Maps SDK for JavaScript has evolved to provide the best user and developer experience.



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→ Attendees hailed from technology jobs ranging from developers and system architects to security engineers and builders.

and 3D web apps by writing just a few lines of code. As browsers evolve with new standards and more capabilities, so does ArcGIS Maps SDK for JavaScript—"so that it can provide the best user experience and the best developer experience," according to Julie Powell, Esri's principal product manager for web development technologies.

When JavaScript Maps SDK was first created, standards for web components—which allow users to generate reusable custom HTML elements for web apps—were still maturing and didn't have broad browser adoption. So JavaScript Maps SDK was developed with a widget architecture that, over time, included more than 60 widgets for developers to use in their web apps. Now, web component standards are supported across all major browsers, so JavaScript Maps SDK is fully transitioning from a widget-based architecture to one based on web components.

← Omar Kawach demonstrated how developers can use the embedded map component in JavaScript Maps SDK.

To show the components in action, Esri senior product engineer Omar Kawach demonstrated how developers can use the embedded map component—which is composed of a series of other web components, such as the legend, zoom, home, and search, as well as some minimal styling—to display a web map within a web app.

He also leveraged JavaScript Maps SDK along with Esri's Calcite Design System to customize the styling and user experience, making use of a demo page that's included with web components to preview code before inserting it in an app.

Another member of the team, Kristian Ekenes, principal product engineer for data visualization and cartography, demonstrated how the same process can be used with a link chart component to enhance data visualizations. Using ArcGIS Knowledge Studio, he looked at knowledge graphs of patient locations and their various health-care needs within a health-care network to see where more facilities may be needed.

Additionally, the team showed the audience how web editing has evolved over the years, particularly through the editor component of JavaScript Maps SDK, as well as how far 3D visualizations have come.

Although the team focused heavily on web components, Powell pointed out that the core of JavaScript Maps SDK is evolving as well, with better performance and new ways for developers to interact with, edit, and visualize their data. This helps streamline the development process as well.

"I hope from what you've seen... you have the same feeling as me: that it's a really great time to be a geospatial web developer," Powell said. "And it's only going to get better."

GeoAI and AI Assistants Enhance ArcGIS

ArcGIS technology is being enhanced with AI, and Esri is focusing on two aspects of it: Esri's GeoAI—the geospatial artificial intelligence that's used with Esri technology—and AI assistants.

Vinay Viswambharan, Esri's principal product manager for imagery and AI, explained how users can employ GeoAI to perform feature extraction on overhead imagery, 3D scenes, 3D point clouds, video, and street-view images. GeoAI can help users detect change, develop super-resolution maps, create 3D point cloud classifications, detect

objects from 3D data, and even train models and label data. All this can be done in ArcGIS Pro, ArcGIS Enterprise, and ArcGIS Online.

Esri's director of products and technology, Dr. Sud Menon, said, "GeoAI is about bringing the power of machine learning and deep learning into GIS to help with the extraction of information from sensor data [and] with the extraction of information from text." It also gives users "the ability to use machine learning and deep learning for analytics," Menon added.

Esri has developed AI assistants as well that can help with mapping, analysis, coding, and app creation. Ismael Chivite, Esri's senior principal product manager for AI, demonstrated how a new ArcGIS Arcade coding assistant can help users get started with—and write better—Arcade expressions to aid with creating labels, doing field calculations, and creating attractive pop-ups.

Using a map of national parks across the United States, Chivite asked the assistant to help him write code that would remove the repetitive "National Park" phrase from all his national park labels. He also used it to do a more complicated task: calculating the total number of visitors to these parks between 2014 and 2024 and only displaying the labels for parks that had more than 30 million visitors.

"This, on paper, looks good to me," he said. "Now, on the map, it looks even better."

New Ways to Extend ArcGIS and Its AI Platform

This year, Esri developers are introducing new ways to extend ArcGIS and connect the technology to other systems.

"We are introducing enterprise interceptors," said Jay Theodore, Esri's chief technology officer for ArcGIS Enterprise and AI. This technology, he explained, "can intercept any kind of service within ArcGIS Enterprise. And you can use it for various workflows."

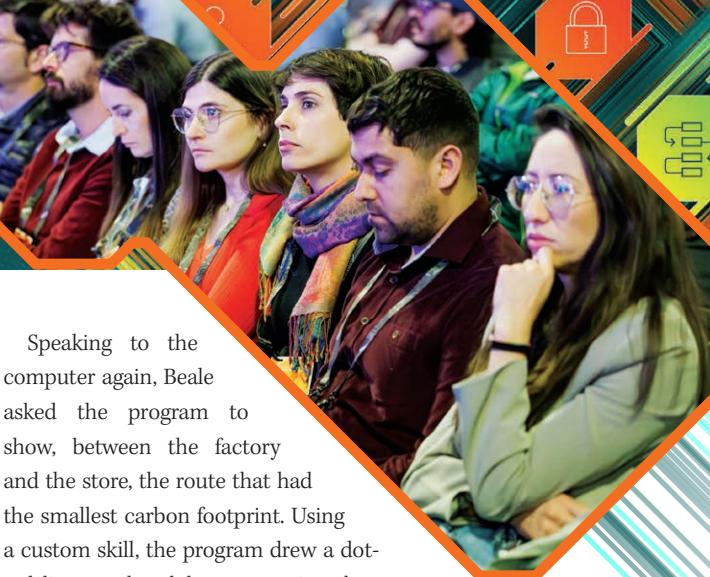
Esri is also ensuring that its AI platform—including GeoAI and AI assistants—is extensible. An upcoming release will add support for an AI skills framework.

"You will be able to build custom chat applications... where you can insert your own custom skill and deploy it alongside the skills that you have," said Theodore.

Dr. Linda Beale, Esri's program manager for geospatial analytics and AI, demonstrated a captivating custom app that uses AI to report supply chain risks for a car manufacturer in Germany. To begin, she clicked a microphone on her computer screen and told the program to find the car manufacturer's factory near Berlin, Germany, and one of its stores near Palm Springs. The program typed out Beale's question and put markers on a globe at both locations.

"First, it calls ArcGIS services in order to find data access and also permissions to access that data," Beale told the audience.

→ Dr. Linda Beale showed the audience a captivating custom app that uses AI to report supply chain risks.



Speaking to the computer again, Beale asked the program to show, between the factory and the store, the route that had the smallest carbon footprint. Using a custom skill, the program drew a dotted line on the globe, connecting the two locations via a suggested route. It also brought up three information boxes that showed how many miles would be traveled along the route by truck, rail, and sea, as well as how many hours each mode of transportation would take, how much money each segment would cost, and how much carbon dioxide would be expended on each part of the route.

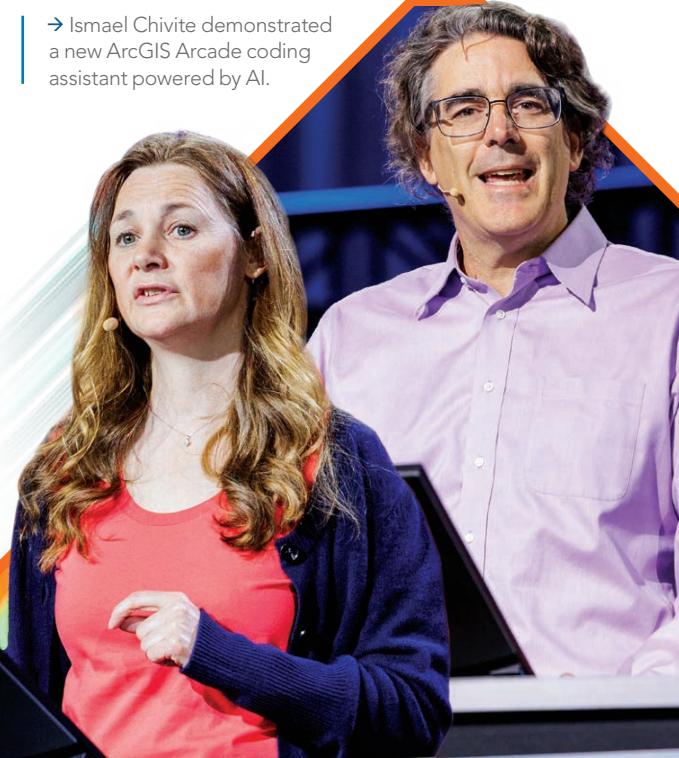
Beale then asked, "Who supplies parts to this factory?" Using an AI skill in ArcGIS, the program called in to a knowledge graph service and returned all the suppliers for the car manufacturer's parts. The globe on the screen rotated and then showed the suppliers' locations across Asia, with dotted lines linking each supplier to the factory.

Next, Beale asked to show risks in the supply chain. The program encircled two of the factories in red; a voice read out, "There are two assets with impending issues that pose risks to the supply chain," and cited potential labor strikes and delays that could "severely disrupt supply chain operations, leading to delays in production and potentially significant financial losses."

To demonstrate how AI is language agnostic, Beale then asked the program, in French, to show her the supply chain risks. It repeated the same process in French.

"The framework provides... all the abstractions and connections that you need to run your custom AI code," Beale said. She concluded that AI assistants "will allow you to broaden the reach of geospatial workflows in your organizations and beyond."

→ Ismael Chivite demonstrated a new ArcGIS Arcade coding assistant powered by AI.



→ Vinay Viswambharan explained how Esri's GeoAI extracts features from imagery.

Tennessee Migrates 72 Counties from ArcMap to ArcGIS Pro

Counties Can Efficiently Edit Property Parcel Information in a Central Database

In Maury County, Tennessee—home to more than 100,000 people—Johnny Stephens has spent 22 years as the sole GIS analyst mapping parcels for the county assessor's office.

He had been using ArcGIS Desktop (ArcMap) for most of his career when he first heard that the Tennessee Comptroller of the Treasury (TNCOT) wanted every county it worked with, including Maury County, to switch to ArcGIS Pro.

"Well, that'd be about time for me to retire," Stephens, who is now 72 years old, told a colleague. He knew ArcMap inside and out.

Exactly two days after he made the switch to ArcGIS Pro in late 2023, he told the same colleague that he had changed his mind.

"I would not go back to ArcMap if you told me to," he said.

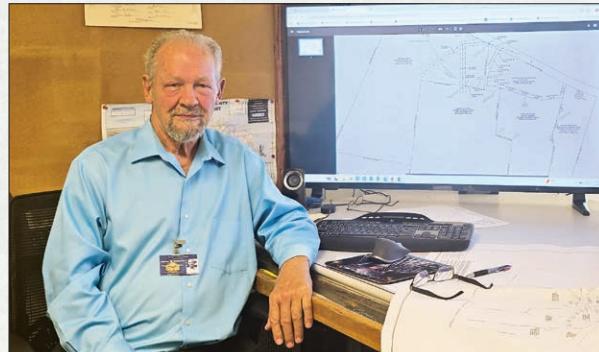
Time for an Update

TNCOT staff have proactively worked with 72 county assessor's offices—which have relied on ArcMap for more than two decades—to help them transition to the next chapter of trusted GIS technology.

The counties had been using ArcMap to update and edit GIS data in local databases, saved on their desktop computers. Each night, those databases were replicated through a geodata service, updating a version kept by the state. If there was an issue, the TNCOT GIS team usually had to peer inside the county's local database. Often, that meant spending hours on the phone or driving as much as three hours from TNCOT's Nashville office to troubleshoot in person. While it was possible to remotely access someone's computer to help them through an issue, virtual troubleshooting could take more time than an in-person visit, depending on the issue and the authorizations needed.

ArcMap served TNCOT and all these counties well for many years, but it was time for an update. TNCOT needed a modern geospatial platform that would allow for better collaboration, communication, and productivity. Plus, the TNCOT team knew that GIS technology had evolved and that Esri support for ArcMap would come to an end by March 2026.

Years ahead of that date, TNCOT was well on its way to proactively developing a strategy for migrating its ArcMap users to ArcGIS Pro. Knowing that not everyone would be ready for the change, TNCOT's GIS leadership got to work.



↑ After initially being resistant to switching to ArcGIS Pro, Johnny Stephens, the GIS analyst for Maury County, Tennessee, said he would not go back to using ArcMap.

→ A dashboard shows which county assessor's offices have converted from ArcGIS Desktop (ArcMap) to ArcGIS Pro.

Learn more about how you and your organization can migrate from ArcMap to ArcGIS Pro at esri.com/desktopmigration.

A Phased Approach to Migration

Property tax revenue is essential to local and state operations in Tennessee, which doesn't collect income taxes. State comptroller offices like Tennessee's keep track of where a state's money is coming from and going to, conducting audits when necessary and working closely with county assessors to ensure that they have accurate property information.

While some of Tennessee's 95 counties have their own robust GIS departments that manage their mapping and spatial data analyses, 72 counties rely on support from TNCOT. That means TNCOT's GIS team manages the assessment data for some 2.1 million property parcels where 4.2 million people live.

"We spent a lot of time just making things work," said Michael Mixon, TNCOT's enterprise GIS administrator. "Often, you're just maintaining, you're treading water."

Using ArcMap, counties maintained their databases locally on their physical desktop computers and replicated them daily to send to TNCOT. That meant that if there was ever an issue with a database, it had to be fixed directly on the county's computers. TNCOT needed more control over a central database that counties could still access to provide edits and updates.

ArcGIS Enterprise offered that control with secure access by user types, as well as branch versioning capabilities. It also made it easy to update to the latest versions of the software.

TNCOT's first step was to work with an Esri adviser through the Esri Advantage Program. That person helped connect the organization to an Esri technical consultant to conduct a study of TNCOT's IT architecture resources to understand how to redesign its infrastructure and workflows around ArcGIS Enterprise. In that thorough study, TNCOT GIS staff determined how many processors and how much RAM they would need, in addition to how many users and editors they would be able to support at any given time.

The next step was developing a strategy with an adoption consultant from Esri to get counties on board with the replacement of ArcMap with ArcGIS Pro.

"The biggest challenge was the adversity of change," Mixon said. "A lot of these counties were very happy with how their system worked."

Mixon and others knew it would just take time and hands-on experience to get them to use ArcGIS Pro.

TNCOT started communicating with its counties early, as far back as 2022, giving presentations and providing demonstrations of ArcGIS Pro at assessor retreats.

"There was no surprise," Mixon said. "We've been talking about it for years."

For the actual migration, TNCOT spread it out over three phases, beginning by spending the first year migrating the technology and initially converting the data the department managed internally from its own office. This allowed Mixon and his team to encounter any issues first and then develop an understanding of them.

"We spent that year making big changes," he said.

The second phase involved recruiting early adopters, who received extra support as they identified issues and suggested improvements.

"We let them know up front, 'We have most of this figured out, but as long as you're patient with us, we'll provide you a lot of support.' And so, we got buy-in that way," Mixon recalled. "We promised them a lot of support, and they did a really good job at being gracious and allowing us to troubleshoot the problems with them."

By the time TNCOT began the third phase—introducing ArcGIS Pro to everyone else—the counties "weren't met with any problems," Mixon said.

Throughout the process, TNCOT developed and offered its own manuals and training, hosting more than 20 in-person sessions across the state.

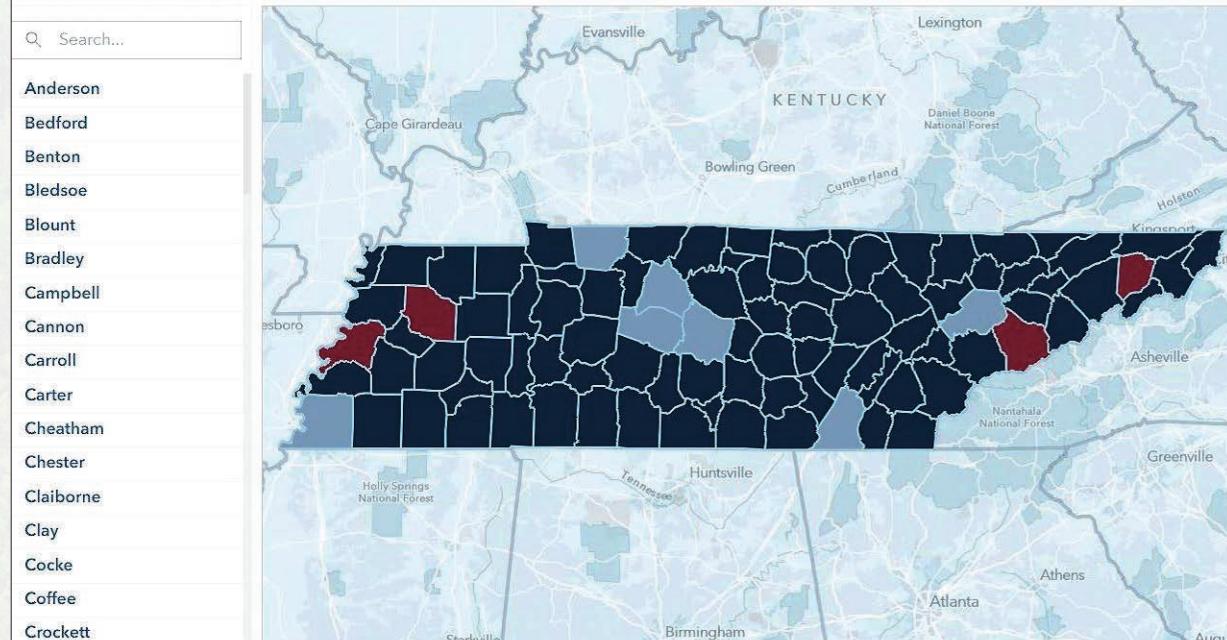
"A lot of time and resources were spent on educating the new users," Mixon said. "That's really the key to success for us."

Now, less than a year before ArcMap is expected to no longer be supported by Esri, every county in Tennessee that had been reliant on the software is already using ArcGIS Pro. Each county editor who does advanced data editing now signs in to TNCOT's ArcGIS Enterprise portal to make those changes.

Getting On Board with ArcGIS Pro

Stephens, the lone GIS analyst for the Maury County assessor's office, began his career with paper maps 26 years ago. He's driven by the goal of finding better ways to do his work.

ArcGIS Pro Conversion



For Doctors Without Borders, GIS Is Invaluable

as hundreds of thousands of Rohingya refugees from Myanmar streamed into the country in recent years. In Burundi, a team traveled from house to house to spray mosquito repellent in 2020 to keep malaria from spreading, using a GIS app to organize and monitor the team's efforts from the very first to the very last residence. And in just 10 days in 2016, MSF vaccinated 710,000 people for yellow fever in Kinshasa, the densely populated capital of the Democratic Republic of the Congo.

These are just a few examples of MSF's life-saving work in which the organization's GIS specialists offered key support.

Proving the Value of GIS

Within MSF, it wasn't always assumed that GIS added value to a mission. It took convincing internal decision-makers, plus time.

And it was especially challenging in an organization that relies exclusively on funding from private donors, when many of those funds are dedicated to specific uses such as logistics, medical activities, or relief operations at large.

"In the past, we had to demonstrate our added value. This is done. It's not an issue anymore," said Mathieu Soupart, director of the MSF GIS Centre and formerly the organization's logistics director. Soupart has 30 years of experience with MSF.

The questions now revolve around how—and how much—GIS will grow within the organization in pursuit of helping its overall mission, and how GIS should evolve to respond in an agile way to the organization's changing operational needs. MSF has been unique in the world of global health because it has strategically adapted its organization and operations to GIS as the technology has evolved.

Founded in 1971 in Paris, MSF has grown to a team of more than 69,000 people who go wherever and whenever needed to assist millions with medical care regardless of their gender, race, religion, creed, or political affiliation. Helping MSF fulfill that mission are about 30 contributors in its GIS Centre, and another 30 or so GIS staff members in the field.

The organization has 749 Creator user type licenses in ArcGIS Enterprise so that users can edit content, create maps and apps, and more. They can also add the MSF presence layer to their maps to show the locations of all the organization's projects at any given time.

In addition, the organization has 3,613 people authorized to view private content within the portal. There, they can access MSF's central repository, which contains basemaps, data, apps, and satellite imagery—some of which have been gathered or created for previous missions—that are searchable by country or keyword.

The portal also provides access to data and basemaps in Esri's ArcGIS Living Atlas of the World, including available land-use and population maps, drought monitors, and imagery for situational awareness and historical assessment. Through the portal, MSF staff can request GIS support for a mission.

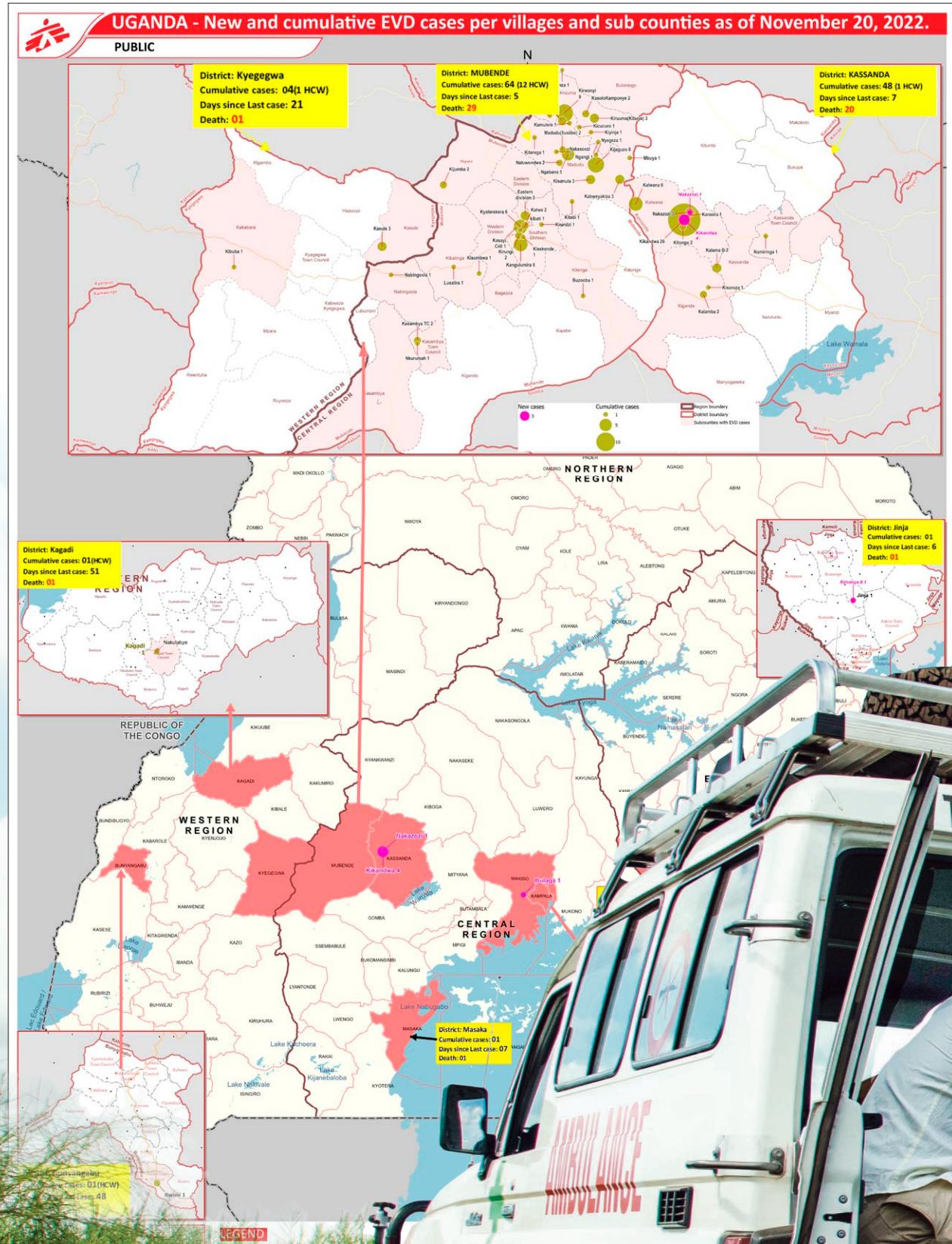
Additionally, MSF has 242 advanced users of ArcGIS Pro, which has been crucial for those working in remote areas because of its offline mapping capabilities.

In the beginning of MSF's GIS journey in 2013, the organization lacked GIS expertise of its own, so it turned to another humanitarian group—French nongovernmental organization and ArcGIS technology user CartONG—to help implement the technology and produce GIS work. A close collaborator with MSF ever since, CartONG has helped make maps, work in the field, conduct trainings, and strategize with MSF on GIS operations within the organization, including map sharing. MSF has since spent more than 10 years growing its own GIS acumen and resources.

The organization restructured its GIS Centre in 2021 and keeps pace with ArcGIS technological advancements. ArcGIS offered MSF a proven and mature suite of integrated, well-documented

◀ For its ongoing response to Ebola, GIS has been the information integrator that helps MSF synthesize essential information across western Africa.

▼ The offline mapping capabilities of ArcGIS Pro make it key for those working in remote areas.



→ The GIS Centre's Earth Observation unit uses imagery to give MSF a different perspective on its operations, whether in urban settings or in refugee camps like the internally displaced persons camp in Ngala, Nigeria.

products to achieve its objectives, as well as a community of users and use cases to learn from.

The technology also gives MSF the level of security that an organization of its size and role requires. Medical confidentiality, for one, is paramount. If any information is shared publicly, such as to support a local health authority, it is shared via controlled channels. Only those who are authorized internally can access MSF's secure GIS portal.

Becoming a GIS Believer

Soupart first encountered GIS when he served as MSF's point of contact for the European Union's Copernicus program—called Services and Applications for Emergency Response (SAFER)—which used satellite imagery to monitor crises and humanitarian needs. He began wondering how the technology might better support MSF's operations.

"That is how I became one of the first believers in GIS" at MSF, he said.

The humanitarian logistics community was already employing loads of maps, but MSF staff were using existing maps, not making their own.

"It was very clear that we needed maps," he said, noting the many planes, helicopters, trucks, and other vehicles delivering goods, plus the organization's need to know how to reach the populations those deliveries were for. "But more than that, we needed to be able to cross-reference layers of information to provide a powerful tool for understanding contexts through appropriate visualizations."

Soupart envisioned infusing GIS into MSF much in the same way a military equips each of its soldiers with cartographic skills and tools. He wanted to demonstrate, in the field, how valuable GIS could be in supporting MSF's mission.

In 2012, MSF conducted a study on the potential for GIS to add value to the organization, and in 2013, it created a small GIS unit supported by CartONG, which produced maps for various missions. Not long after, an Ebola outbreak would become one of the first proving grounds for the technology. This accelerated the use of GIS within MSF.

"One super quality of MSF is agility," said Soupart.

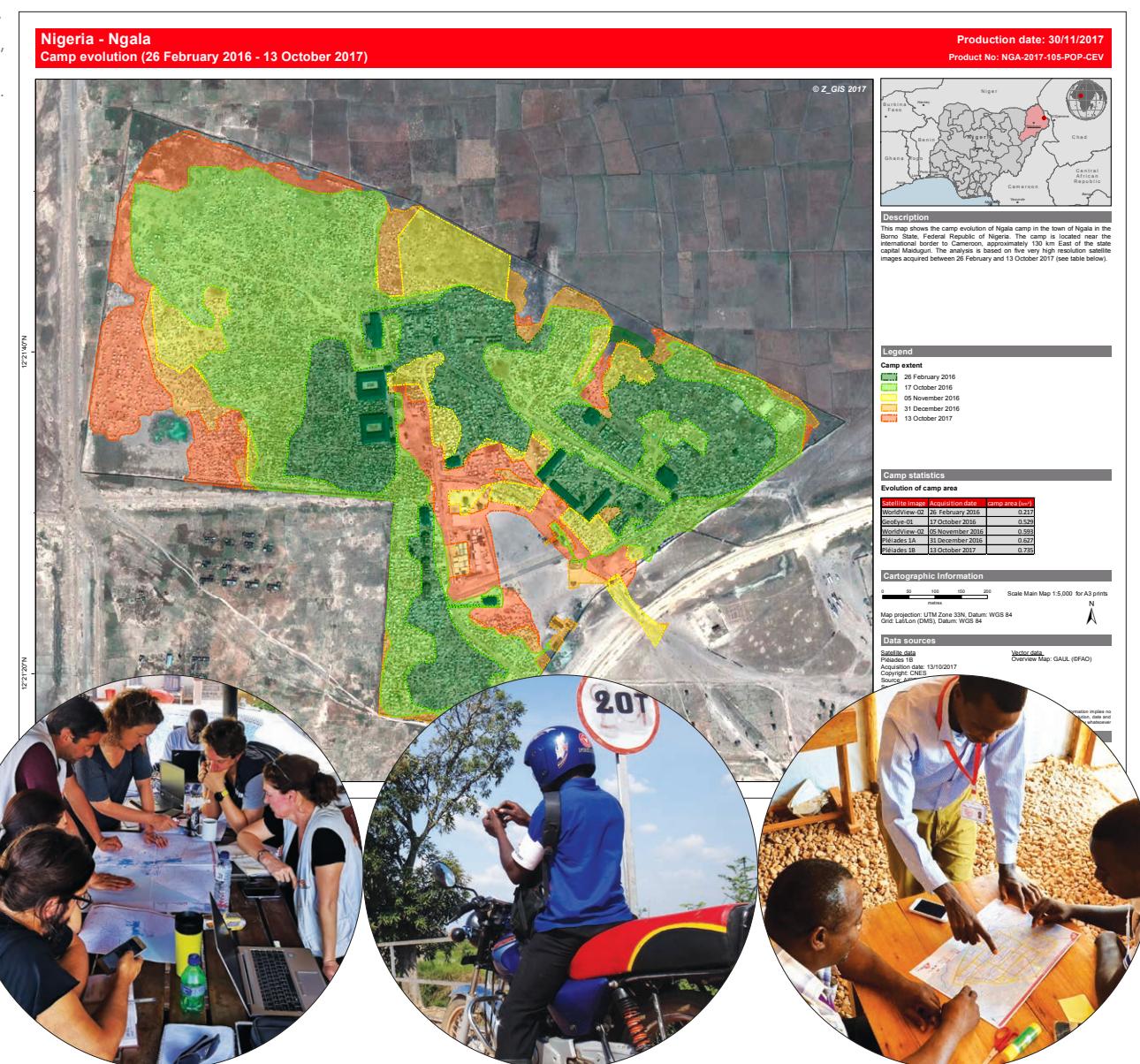
Much of the organization was involved in the Ebola response, including operations, medical care, and logistics—all of which had their own data structures. Trying to grasp and synthesize essential information spread across so many people located in multiple countries in western Africa was a challenge, to say the least. GIS became the information integrator, Soupart said.

It was during this crisis that epidemiologists were paired with GIS specialists. It is now common for a GIS specialist to be partnered with an epidemiologist and be among the first deployed to the field for outbreaks such as Ebola.

The Ebola crisis became the moment that GIS went from being used in demonstrations at MSF to being sought out for missions.

"It was this switchover that confirmed to us that our initial intuition was right," Soupart said: GIS could be a tangible support to the organization's operations.

The reliance on GIS at MSF grew. As one person was supported by a GIS specialist in one mission, they would ask for a specialist on their next mission. That demand has justified GIS becoming a permanent, systemized service within MSF, which now offers internal training, products, and services to those who would benefit from them.



↑ MSF teams go wherever people need assistance with medical care, regardless of their gender, race, religion, creed, or political affiliation.

For GIS specialists in the field and at headquarters, ArcGIS Field Maps and ArcGIS Survey123 have been essential when working alongside epidemiologists to collect information. These apps have also allowed teams to independently assess needs such as the proximity of populations to health facilities for better access to health care.

In addition, MSF's GIS teams have created other apps with Esri technology, including the organization's Epimap, which dynamically visualizes multiple regional epidemics for better monitoring. ArcGIS Dashboards helps GIS specialists manage and visualize the gathered information, including where MSF activities are taking place, where there are safe supply routes and readily available radio networks along those routes, and where there are needs in a community for clean water and sanitation.

A Geospatial Strategy for Delivering Health Care

MSF has approached the use of GIS strategically, aligning it with the organization's operations-focused DNA. Soupart, with his logistics and operations background, is keen on there being relevance to involving GIS in a mission.

"It is not in our strategy, and not in our interest, that GIS become obligatory for every mission," he said. There must be a need.

For GIS specialists on missions in the field, the expectation, more than anything, is that they understand the needs of the operations specialists they're working with and know which map, app, imagery, or data product is necessary to the mission.

GIS support also helps keep MSF staff in the field safe. In-house web apps display deconflicted zones, where humanitarian organizations such as MSF share the locations of their activities

with the belligerents to avoid being accidentally fired upon. Other web apps can help make staff aware of nearby risks, such as reports of gunshots and the locations of incidents.

As demand has grown for the GIS Centre's services, its specialists are being pulled into assisting with data analytics and producing more dynamic geographic products.

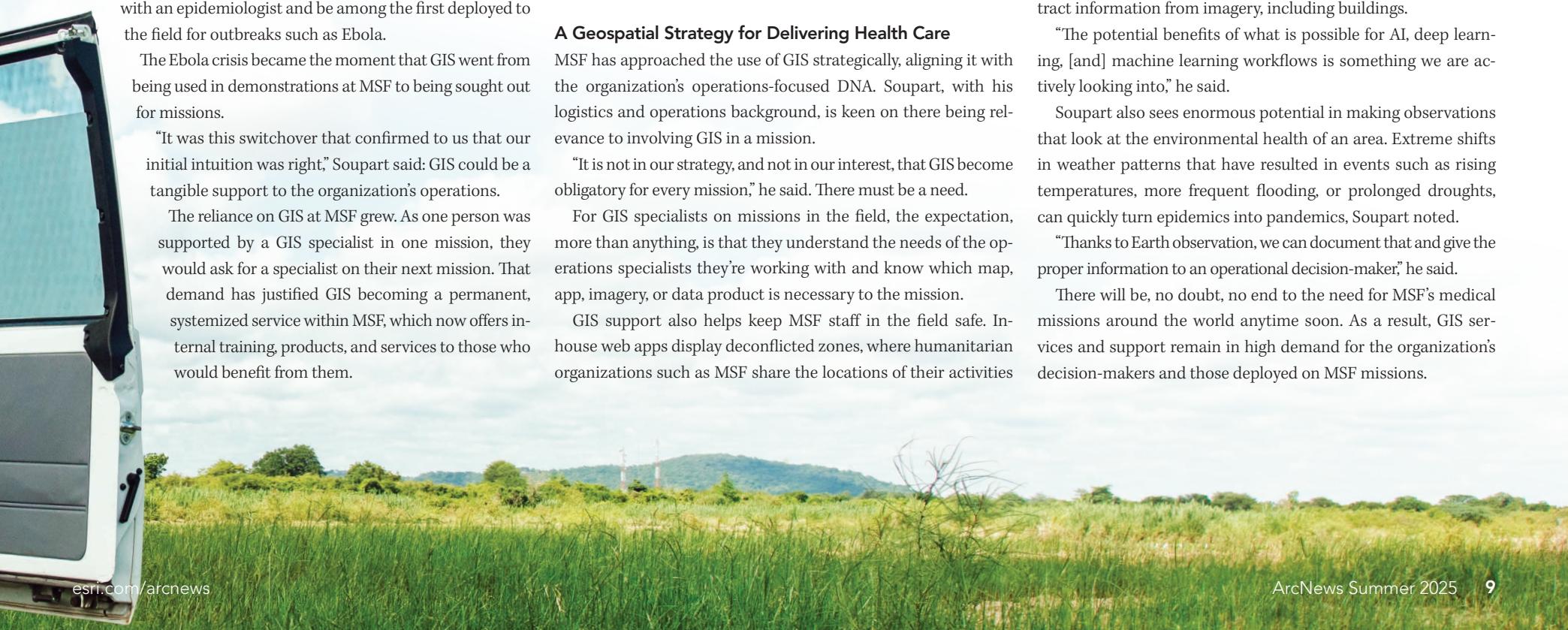
The GIS Centre has its own Earth Observation unit, giving the organization a global perspective on where it is operating, whether that's an urban setting or a refugee camp. Through it, MSF acquired more than 205 images of the earth in 2014 covering 21 countries. The images are being used for flood analysis, damage assessments, population estimates, and overall visual analysis. MSF has also been using deep learning models that extract information from imagery, including buildings.

"The potential benefits of what is possible for AI, deep learning, [and] machine learning workflows is something we are actively looking into," he said.

Soupart also sees enormous potential in making observations that look at the environmental health of an area. Extreme shifts in weather patterns that have resulted in events such as rising temperatures, more frequent flooding, or prolonged droughts, can quickly turn epidemics into pandemics, Soupart noted.

"Thanks to Earth observation, we can document that and give the proper information to an operational decision-maker," he said.

There will be, no doubt, no end to the need for MSF's medical missions around the world anytime soon. As a result, GIS services and support remain in high demand for the organization's decision-makers and those deployed on MSF missions.



Geospatial App Helps Fast-Track Housing Development in New York City

data can be used to determine whether a project is eligible to be fast-tracked under the new rule.

Among the factors contributing to the high cost of housing in New York City is the lengthy approval process required before construction can begin.

Most housing projects that are subject to land-use approvals or are eligible for public financing must conduct an environmental review that can take as long as two years and cost hundreds of thousands of dollars to complete. Yet, according to an NYC Planning analysis of more than 1,100 projects reviewed from January 2013 to May 2023, modest projects that met certain criteria had no impact on their surrounding environments.

Seeing the opportunity in these results, city agencies adopted a new environmental review rule, referred to as the Green Fast Track for Housing. The rule exempts housing developments up to a certain size that meet certain environmental and location criteria from further environmental review, since analysis has shown that they will not cause environmental impacts. This decreases the overall costs for the projects, increases opportunities for small housing developers, and shortens the time needed to complete the approval process. The goal is faster delivery of new homes to residents who need housing.

To help developers, planners, and city staff evaluate whether projects may be eligible for fast-tracking under this new rule, NYC Planning developed the Fast Tracker app, available at fasttracker.nyc. The goals for the app were as follows:

- Provide a map- and survey-based interface.
- Present data specific to each project, to be used as part of a project application.
- Allow users to independently enter project information to determine eligibility at different stages of the design and approval process.
- Store minimal project data on NYC Planning infrastructure.
- Coordinate the app's release to coincide with approval of the rule itself.

NYC Planning has a full-stack development team, but choosing commercial off-the-shelf (COTS) technology allowed the agency to satisfy project objectives while sticking to a tight timeline. Esri's ArcGIS Experience Builder and ArcGIS Survey123, plus Microsoft's Power Automate, were chosen as the front-end, data entry, and back-end components of the app.

Fast Tracker is divided into a few primary Experience Builder and Survey123 pages, and users

are guided by a sidebar containing a list widget with explanatory information.

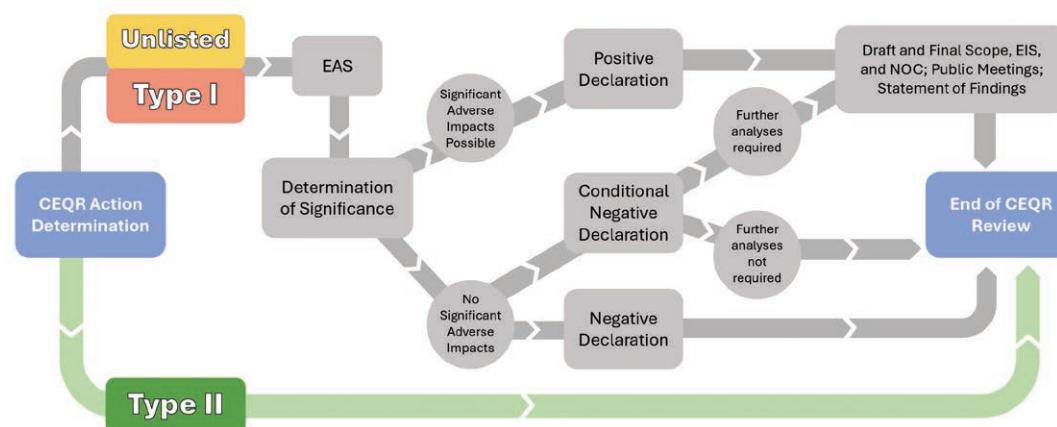
Initially, users are directed to use the Select widget to choose all tax lots that will be affected by their projects, either directly through construction or through associated zoning actions. Users can find tax lots by inputting their Borough-Block-Lot (BBL) identifiers or addresses or by manually navigating to them on a map. They can then select or deselect tax lots on the map. After choosing the appropriate tax lots, users click Begin Survey and navigate to the survey page, which contains another map.

The survey page retains any tax lot selections made on the previous page. The map takes up the majority of the screen, with a table below and an embedded Survey123 form to the right. The survey is broken up into sections—including Air Quality, Noise, Natural Resources, and Shadows—that pertain to the various eligibility criteria under the Green Fast Track rule. Near the top of the app,



▲ More buildings like this one in Brooklyn will likely be built under the Green Fast Track for Housing rule. (Photo courtesy of Alex Moscovitz.)

◀ Projects that are eligible under the Green Fast Track rule would be classified as Type II, which require fewer environmental review steps than the other classifications. (Graphic courtesy of NYC Planning.)



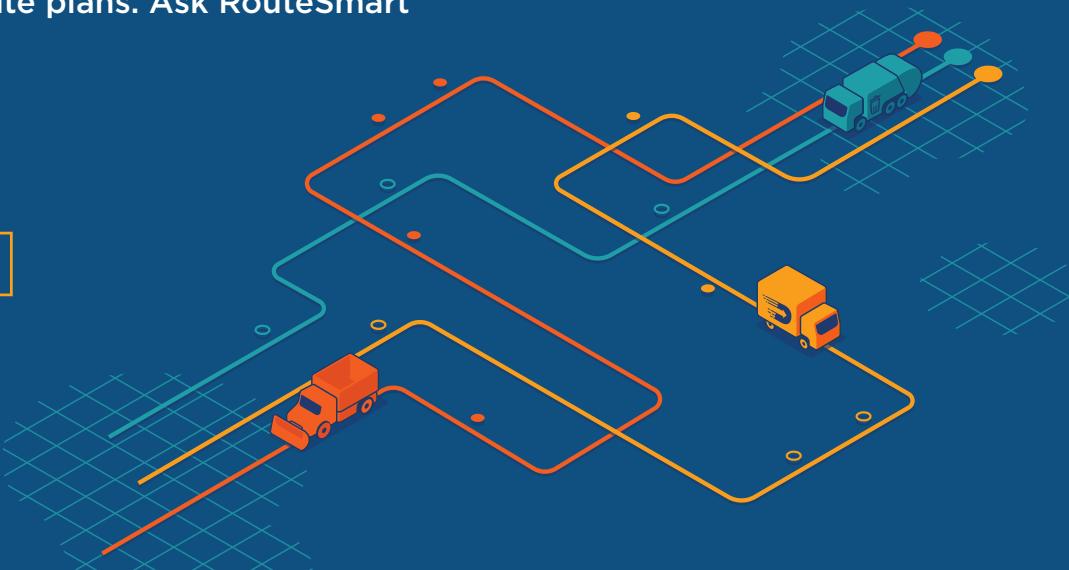
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→ The Fast Tracker app relies on about 50 datasets that show historical landmarks, highways, zoning districts, and more. (Image courtesy of NYC Planning.)

there are tabs that navigate to different maps related to each survey section. The table below the map displays information about each tax lot relevant to whichever tab is selected.

The sidebar directs users to work through the survey, entering information such as BBLs, building height, and the number of proposed residential units into the survey fields. As they reach the end of each section, they select the next tab on the map, which provides them with the relevant lot information for that map and survey section.

The survey responds dynamically to user input and provides immediate eligibility feedback based on the data that's entered. For example, if a user indicates that their project will burn fossil fuels for heating, text appears that says this criterion makes their project ineligible for fast-tracking under the new rule. If a user indicates that their project may cast shadows on an open space, they must submit additional information to determine eligibility.

At the end of the survey, users are prompted to export a comma-separated value (CSV) summary of the relevant tax lot information and to generate a PDF report of the survey results. A Power Automate webhook triggers an automation function to generate a PDF report of the survey results and send it to the email address provided in the survey. The automation also performs basic error handling, such as sending an error report if any failures are detected.

The report is a reiteration of the survey combined with any eligibility messages triggered by survey responses. Users can submit the reports as part of their development applications.

To work, the Fast Tracker app requires around 50 datasets, all taken from federal, state, and city sources, as well as organizations such as the Port Authority of New York and New Jersey. The datasets indicate wetlands, historical landmarks, airports, highways, tunnel vents, zoning districts, and more.

Staff from NYC Planning sourced, vetted, and engineered the data and published it to ArcGIS Online for ingestion into the app. They also simplified the datasets to facilitate symbolization within the app and used them to precalculate proximity values for every city tax lot. These datasets are used to populate the maps and attribute tables in the app, as well as the associated CSV exports.

<img alt="Screenshot of the NYC Planning Fast Tracker Beta application. The map shows a residential area in Brooklyn with various overlays: a large yellow circle, a purple shaded area, and a brown shaded area. The map includes street names like 3rd Ave, 4th Ave, 5th Ave, 6th Ave, 7th Ave, 8th Ave, 9th Ave, 10th Ave, 11th Ave, 12th Ave, 13th Ave, 14th Ave, 15th Ave, 16th Ave, 17th Ave, 18th Ave, 19th Ave, 20th Ave, 21st Ave, 22nd St, 23rd St, 24th St, 25th St, 26th St, 27th St, 28th St, 29th St, 30th St, 31st St, 32nd St, 33rd St, 34th St, 35th St, 36th St, 37th St, 38th St, 39th St, 40th St, 41st St, 42nd St, 43rd St, 44th St, 45th St, 46th St, 47th St, 48th St, 49th St, 50th St, 51st St, 52nd St, 53rd St, 54th St, 55th St, 56th St, 57th St, 58th St, 59th St, 60th St, 61st St, 62nd St, 63rd St, 64th St, 65th St, 66th St, 67th St, 68th St, 69th St, 70th St, 71st St, 72nd St, 73rd St, 74th St, 75th St, 76th St, 77th St, 78th St, 79th St, 80th St, 81st St, 82nd St, 83rd St, 84th St, 85th St, 86th St, 87th St, 88th St, 89th St, 90th St, 91st St, 92nd St, 93rd St, 94th St, 95th St, 96th St, 97th St, 98th St, 99th St, 100th St, 101st St, 102nd St, 103rd St, 104th St, 105th St, 106th St, 107th St, 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Geospatial AI Helps Map 64 Remote Communities in Alaska

Communities across Alaska depend on maps of infrastructure and cultural data for everything from engineering and emergency response to resilience planning and grant applications. However, keeping these maps up-to-date can be challenging for some communities. And the maps are not always readily available in GIS formats.

In 2023, Esri partner Dewberry, a privately held professional services firm, worked directly with the National Oceanic

and Atmospheric Administration (NOAA) Office of Coastal Management to scope out a large pilot project that would update community maps for 64 underresourced Alaskan communities. When bad weather heads for Alaska, NOAA frequently quantifies the storm systems' predicted impact on the state's remote coastal and riverine communities. Thus, resilience planning and emergency response largely drove the requirements for this project.

A year into it, the team from Dewberry reached out to Esri with an opportunity to collaborate. The team was interested in using content from ArcGIS Living Atlas of the World—including ready-to-use content and geospatial AI capabilities that automatically extract information from imagery—to build an updated GIS database and maps for the 64 communities. Maps would include information such as utilities, infrastructure, landownership, cultural resources, and harvest areas.

"In Alaska, we're often working to bridge a significant data gap, especially in remote and underserved communities," said Hillary Palmer, program manager for Dewberry. "This project provided an opportunity to build a strong foundation of infrastructure while combining local knowledge, emerging technology, and thoughtful cartography."

A Wide-Ranging Project Steeped in Collaboration

The 64 communities selected for the project are small, remote, and economically disadvantaged and had some of the most outdated maps and data in the state. Most of these communities are located in what's called the Unorganized Borough—portions of Alaska, comprising nearly half of the state's landmass, that lack centralized municipal governments. (A borough in Alaska is what other US states typically call a county.) The Unorganized Borough presents challenges in terms of governance, infrastructure development, and resource allocation.

Prior to this project, many of these communities used AutoCAD maps. While these maps were a great resource, they had some limitations. NOAA wanted to not only provide data updates for these communities but also modernize the delivery of geospatial information. Additionally, NOAA sought to expand the usefulness of the updated data by

← The communities being mapped are small, remote, and economically disadvantaged and have outdated maps and data.



← The final updated community infrastructure map for Savoonga, Alaska, includes categorized building footprints.

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creating and providing geospatial content across a variety of themes, including utilities and infrastructure.

Planning for the project involved coordinating closely with stakeholders, including the Alaska Department of Natural Resources, the Alaska Native Tribal Health Consortium, and the Alaska Division of Community and Regional Affairs. Dewberry also leveraged the services of a tribal liaison to support engagement with local communities and help validate data, including in areas of cultural significance and where land is used for subsistence.

A Well-Timed Opportunity to Explore Geospatial AI

Imagery serves as a vital source for extracting a wealth of geospatial information and is an invaluable resource for mapping and analysis. Acquiring high-resolution aerial and satellite imagery is not always feasible, however, given time and budgetary constraints. Furthermore, visually inspecting and hand-digitizing features from imagery can be time-consuming and expensive.

Geospatial AI and deep learning can help save time and money by automating manual processes related to imagery. But not everyone has the expertise or resources to create such tools or train deep learning models. Leveraging ready-to-use imagery sources and capabilities to automate the extraction of geospatial information is an appealing option for many organizations.

ArcGIS Living Atlas provides a wide range of ready-to-use content in a variety of modalities. This includes maps, apps, layers, and tools. When Dewberry reached out to Esri with its proposal in November 2024, the team was looking to use two specific pieces of ArcGIS Living Atlas content: the World Imagery map (links.esri.com/world-imagery-map), which provides high-resolution aerial and satellite imagery from around the world, and the Building Footprint Extraction – USA pre-trained deep learning model (links.esri.com/footprints-usa), which automatically extracts building footprints from high-resolution imagery sources.

→ All 17,000 building footprints were reviewed and refined if needed to improve their accuracy.

The timing of Dewberry's request was excellent. The ArcGIS Living Atlas imagery team was already preparing to publish a new tutorial, available at links.esri.com/ai-extract, that covered how to use AI to extract information from World Imagery. The tutorial includes a step-by-step workflow using a pretrained deep learning model to detect building footprints from World Imagery. The Alaska project's requirements were a great fit for the workflows and capabilities featured in the tutorial, so the project served as a practical application of it.

Comprehensive and Accessible Geodatabases

The Dewberry team leveraged several imagery sources for this project, including piloted and unpiloted aerial collections sourced from the State of Alaska, the University of Alaska Fairbanks, and Alaska Remote Imaging. Esri's World Imagery map served as the best available and most recent imagery for 46 of the 64 communities.

Following best practices, the team applied a rigorous quality-assurance process as part of the feature extraction workflow. To help efficiently identify irregularities, the team used ArcGIS Pro to calculate variables such as vertex count and perimeter-to-area ratio. The team then reviewed all 17,000 building footprints from the 64 communities and refined them where needed to improve the overall accuracy.

In total, 65 file geodatabases will be created—one primary geodatabase aggregating vector datasets for all communities, and 64 individual geodatabases containing community-specific vector data. Each geodatabase will include eight feature data sets, grouped by data theme, and contain numerous feature classes, depending on available data for each community. All

data will be stored as an Esri file geodatabase with metadata following standards from the International Organization for Standardization and detailed source lineage documentation.

The resultant geodatabases will be made accessible through multiple platforms, including the State of Alaska Geoportal, NOAA's Data Access Viewer, and Esri's ArcGIS Living Atlas. These platforms provide user-friendly interfaces for exploring, visualizing, and accessing geospatial data.

While the project is addressing specific data needs for emergency response and resilience planning, NOAA is also seeking to invigorate community mapping programs and document lessons learned. Contributing to Alaska's mapping initiatives and envisioning a thriving network supports a variety of long-term and complex challenges, including community relocation, behavioral health, and food sovereignty.

"It's about making sure every community has access to the tools and information [it needs] to support planning, development, and long-term resilience," said Palmer.



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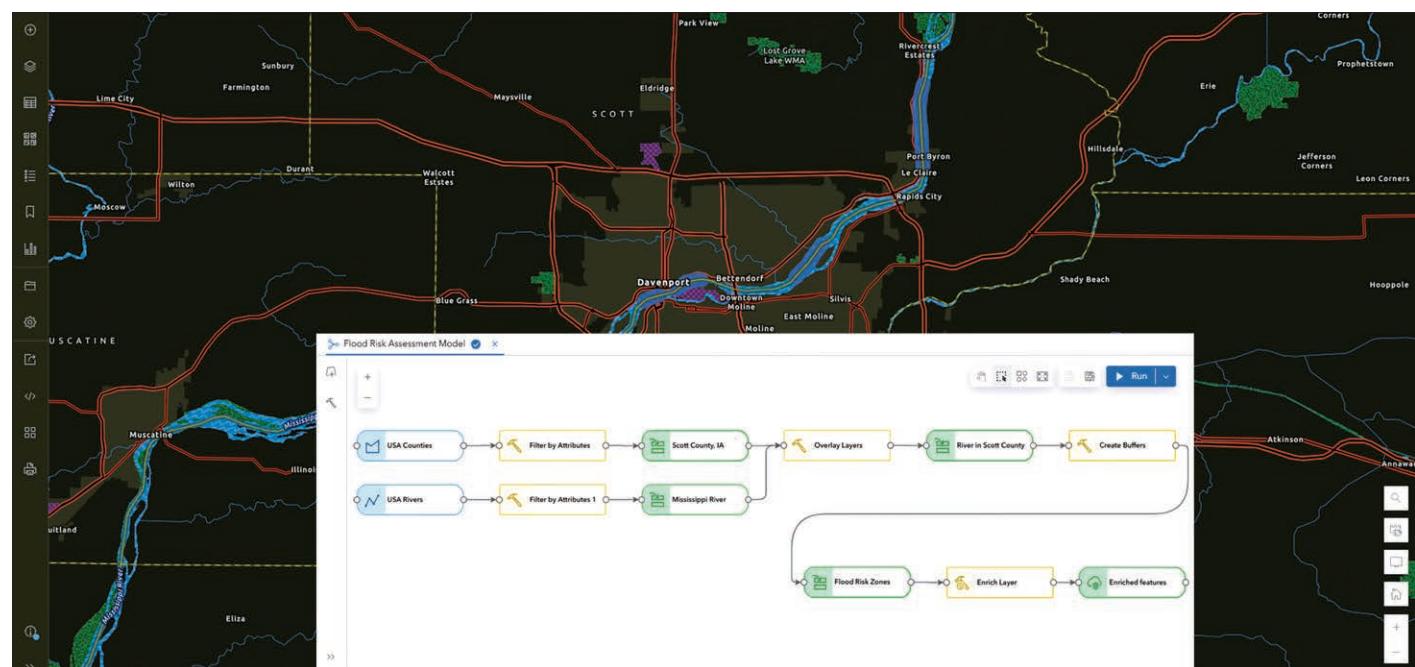
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ArcGIS Online Users Now Have Access to ModelBuilder in Map Viewer

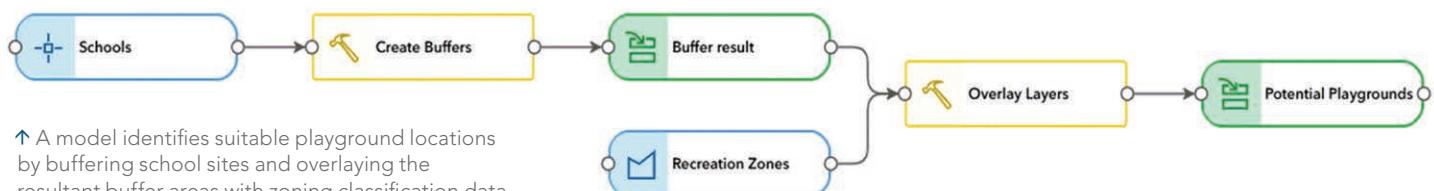
For many ArcGIS users, ModelBuilder is an essential tool for automating their desktop GIS workflows. Now, ArcGIS Online users can access ModelBuilder directly within Map Viewer, bringing powerful, no-code automation tools directly into their software as a service (SaaS) ArcGIS capabilities.

ModelBuilder enables analysts to streamline spatial analysis without writing code, saving time and reducing technical barriers. Models are used to create multistep workflows that automate various tasks ranging from simple operations to complex analyses. For example, a simple workflow could involve merging datasets and summarizing data by area, while a more complex analysis workflow might include advanced pattern detection like identifying hot spots or outliers.

For novices and experienced analysts alike, ModelBuilder offers a user-friendly visual environment for creating, organizing, and sharing analysis processes. The following are some of the key benefits of using ModelBuilder.



▲ ModelBuilder is now available within Map Viewer in ArcGIS Online.



A No-Code Approach

The greatest strength of ModelBuilder is its ability to put together sophisticated analysis workflows without requiring users to have any programming knowledge. Users can visually connect data and tools to form a process, such as designating input datasets for selected tools, or employ the Auto Layout option to automatically arrange model components. The intuitive visual interface makes ModelBuilder a great entry point for analysts who are still building their coding skills and may want to explore workflow automation in the future.

Automate Analysis Workflows

ModelBuilder allows users to automate repetitive tasks by adding and connecting analysis tools and datasets. This reduces the need to run individual tools manually and ensures consistency in the results. For example, an urban planner can create a model that identifies suitable playground locations by automatically buffering school sites and overlaying the resultant buffer areas with appropriate zoning classification data—combining multiple tools running in a single workflow. Once the model is created, it can run repeatedly, saving the urban planner time and reducing the chances of human error.

Document and Communicate

A model provides a visual, step-by-step interface that allows users to see exactly how a workflow progresses. Users can examine the

parameters applied for every tool employed in ModelBuilder, as well as the input and output for each step. This is particularly useful when users need to document or explain their methodology. For instance, a GIS instructor can use ModelBuilder to break down complex tasks into manageable steps to make it easier for students to visualize and understand how different GIS tools work together.

Improve Performance

During model execution, each tool only generates temporary intermediate datasets before the final output. This helps improve performance by preventing the creation of an output hosted feature layer after every tool. For example, if someone is running a complex spatial analysis with multiple steps—say, for data management tasks or spatial joins—ModelBuilder minimizes the overhead by ensuring that intermediate results are not written to disk. This can significantly speed up processing times.

Share and Collaborate

ModelBuilder enhances collaboration by letting users share models within their ArcGIS Online organizations and even publicly. This sharing capability promotes collaboration and knowledge transfer, eliminating duplicate efforts across teams. For instance, a hydrologist who develops a watershed analysis model can distribute it to regional offices, ensuring that each team employs the same methodology

while applying its own datasets. Similarly, environmental consultants can establish standard impact assessment models that maintain regulatory compliance across multiple projects, with each analyst able to view and understand the exact analytical steps being performed.

By using ModelBuilder, GIS professionals can simplify their workflows, improve productivity, and collaborate more effectively.

Get Started with ModelBuilder in ArcGIS Online

The integration of ModelBuilder into Map Viewer greatly enhances the analytical capabilities of ArcGIS Online.

ModelBuilder is available now to organizations with Professional or Professional Plus user types. Using ModelBuilder consumes credits based on the amount of time spent working within the ModelBuilder session. ModelBuilder supports most of the feature analysis tools in Map Viewer, including frequently used ones like Enrich Layer and Generate Travel Areas. Additional functionality is planned for future updates.

To learn more about leveraging analysis in ArcGIS Online and to explore the new ModelBuilder functionality, check out the help documentation at links.esri.com/mb-online. Discover more about this recent addition to Map Viewer at links.esri.com/blog-mb-online.



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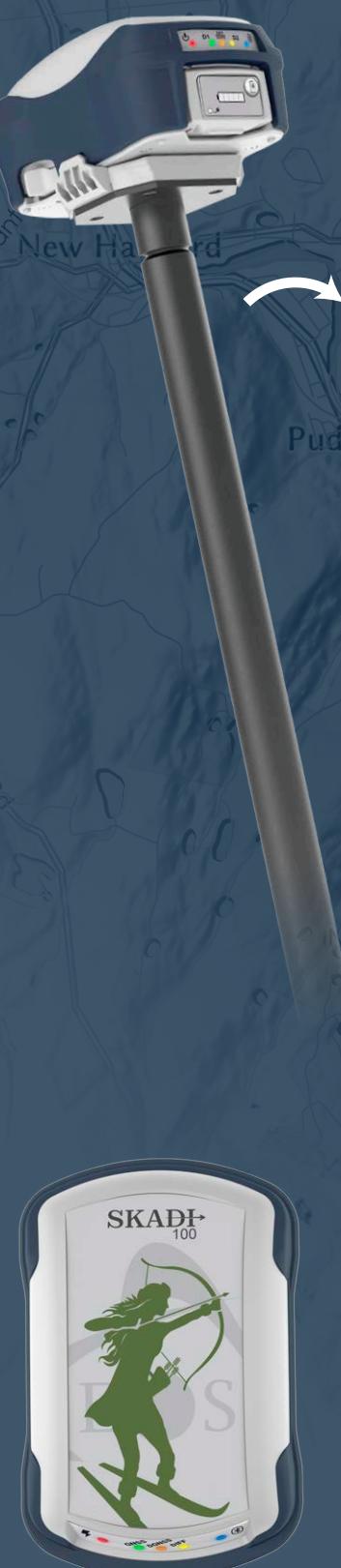
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Modern Network Information Management That Caters to Utilities of All Sizes

Esri's Three Distinct Implementation Options Let Utilities Deploy Enterprise GIS at Their Own Pace

For utilities, technology is becoming ever more important to their day-to-day operations and planning for the future. GIS plays a critical role in helping utilities undergo digital transformations where data flows freely—with geography as the common thread—and a modern system of systems works seamlessly.

Utilities that deploy ArcGIS technology can rely on location-based software, apps, and tools to help manage network data, assets, imagery, and mobile crews, as well as emergency response and community engagement. What's more, implementing a network information management system powered by ArcGIS—wherein all aspects of a utility's network are centrally administered in one geospatial platform—lets utilities employ GIS to model, visualize, and manage their network information.

"We are transforming our GIS to support a next-generation data model and utility applications," said Esri president Jack Dangermond. "It's not a separate product but an alternative way for users to manage massive amounts of data—hundreds of millions of objects—representing a complete digital utility."

Modern Network Information Management



↑ Esri has developed a modern data model that works for small, large, and growing utilities as their business needs evolve.

A Flexible and Scalable Geospatial System

A network information management system, with ArcGIS technology as its base, is a system of record that allows utilities to comprehensively manage their entire networks and all their complexity. It comes with advanced analytics and visualizations and is made available across the entire organization through a system of engagement. This enables utilities to streamline collaboration and gives disparate business units access to critical geospatial data. It also allows for advanced network modeling, visualization, and analytics.

A network information management system is flexible and scalable, so it works for small, large, and growing utilities. Utilities can begin implementing the system by simply mapping network assets to get a clear picture of their networks. They can then gradually add more detailed data about network assets as their business needs evolve. To manage network topology and connectivity, utilities can use ArcGIS Utility Network, which offers a single, unified model and extends the ArcGIS system with advanced capabilities.

Three Implementation Options

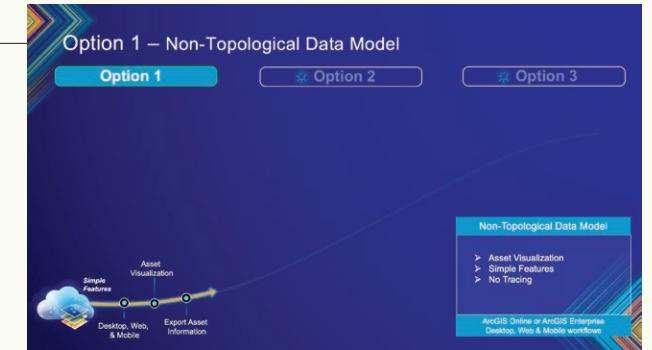
Recently, Esri introduced new implementation options for network information management, allowing utilities to try out ArcGIS Utility Network (or even a non-network option) and deploy it at their own pace. If a utility only wants to map its network assets, that's an option. If a utility wants to develop a full digital twin of its network using Esri's industry-standard models, that's doable. There are also many options in between.

"This model is scalable for both large and small utilities," said Dangermond. "Smaller customers with simpler networks can still benefit from the system's flexibility and scalability."

No matter the type or size of utility, Esri has a network information management solution available that includes relevant resources, migration tools, service packages, and help from Esri partners. The following are the three new implementation models that encompass all these options:

Option 1: A Non-Topological Data Model

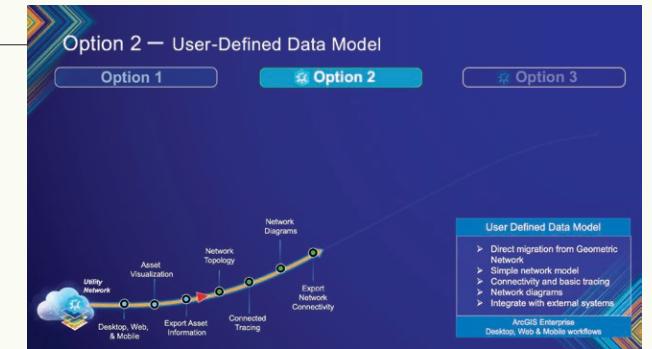
For utilities that don't need network connectivity right away, the first option is a great starting point. These utilities can map and visualize their network assets using a standard data model and preconfigured utility data management apps for both the office and the field. This option can be set up quickly to get utilities up and running fast.



↑ The first option enables utilities to visualize, query, and edit asset data based on simple features.

Option 2: A User-Defined Data Model

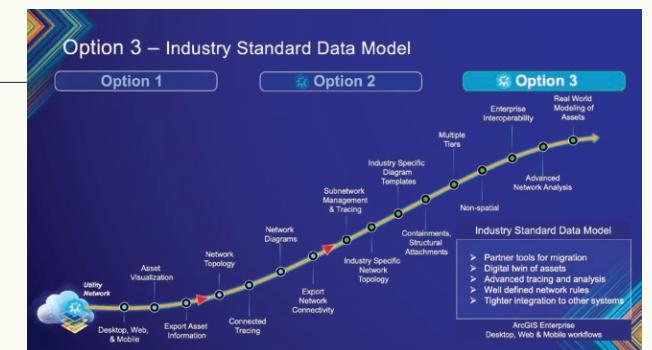
This is where ArcGIS Utility Network comes in. With the release of ArcGIS Pro 3.5, Esri introduced the new ArcGIS Utility Network migration toolset, which allows utilities to import an existing geometric network dataset directly into their utility network. This option employs a simple network model and topology to integrate with external systems, build connectivity to support tracing, and create network diagrams. And if a utility ends up needing more features and functionality, it can always upgrade to the third option when ready.



↑ The second option lets utilities directly migrate an existing geometric network dataset into the new system.

Option 3: Advanced Network Information Management

This option delivers all the advanced capabilities of ArcGIS Utility Network. Utilities can create a full digital twin of their networks using migration tools available in ArcGIS Solutions or with help from Esri partners that have the Network Management Specialty. (Find a list of those partners at links.esri.com/network-management.) They can also build subnetworks and containers to get the most detailed models of their network and its assets. Esri's industry-standard data models are also available to help utilities build their digital networks with predefined rules and attributes tailored to specific industries.



↑ The third option offers utilities advanced network management.

A Journey to Transform Utilities

By implementing a network information management system powered by ArcGIS, utilities can undergo a digital transformation that meets today's needs while preparing for the future. And with ArcGIS Utility Network, utilities get the most advanced network information model, built on top of industry-leading enterprise GIS software.

"This is about transforming utilities—a journey Esri embarked on a decade ago," said Dangermond. "This is our strategic direction for utilities, and we deeply appreciate the support and collaboration of our customers and partners in implementing these systems."

No matter which implementation option utilities choose for their network information management systems, Esri and its partners will be there with support every step of the way. Esri is committed to continuing to provide multiple implementation options, migration tools, and support services to help utilities reach their goals at a pace that feels right for them.

For more information on ArcGIS Utility Network and implementing a GIS-powered network information management system, go to go.esri.com/utilitynetwork.

North Carolina Utility Uses ArcGIS to Make Drinking Water Safer

By Brian Lendt and Mark Seastead, Black & Veatch

Established in 1774 in what is now Old Salem, North Carolina, Winston-Salem/Forsyth County (WSFC) Utilities is the second-oldest water system in the United States, according to the company. WSFC Utilities provides high-quality potable water to approximately 381,000 customers.

In 2021, WSFC Utilities began to prepare for new federal-level Lead and Copper Rule Revisions (LCRR), which went into effect last year. These revisions require utilities to inventory their service lines and notify residents when their water pipes are found to contain lead or copper, which can pose a variety of health issues that range from nausea to brain damage.

To help collect and manage its water service line inventory data, WSFC Utilities worked with Esri partner Black & Veatch to implement its LCRR program management platform. The platform uses and adapts Esri's Lead Service Line Inventory solution to provide powerful analytics and meaningful visualizations using ArcGIS Dashboards, ArcGIS Survey123, and ArcGIS StoryMaps—all hosted in the utility's ArcGIS Online and ArcGIS Enterprise deployments. This helped WSFC Utilities support public outreach, engage with customers, conduct field investigations, and efficiently replace affected service lines.

GIS Makes Rule Compliance Less Daunting

To reduce risks from lead and copper in drinking water, the Environmental Protection Agency

(EPA) established its Lead and Copper Rule in 1991, with the latest revisions announced in 2021. In November 2023, the EPA proposed expanding the Lead and Copper Rule to require utilities to replace all their lead pipes within 10 years, with few exceptions; provide regular inventory updates; and strengthen community education.

Complying with these revisions and proposed improvements can be daunting for many water utilities, especially when they are not accustomed to conducting digital inventories. But GIS has helped many water utilities—including WSFC Utilities—update their inventories, monitor sampling operations, and support program management for lead pipe replacement.

Additionally, the revisions have helped many utilities jump-start GIS upgrades and improve their data quality, since the new rules require utilities to give the public access to accurate and transparent information. Apps such as ArcGIS Dashboards and ArcGIS StoryMaps are critical to these endeavors.

A Complete System for LCRR Program Management

The first phase of WSFC Utilities' effort to comply with the LCRR included gathering, organizing, and analyzing LCRR-related task data—such as the status of service line inventories and activity related to property damage and leak repairs—in a centralized location in ArcGIS Online. Staff

then used ArcGIS Dashboards to build various dashboards that helped monitor the utility's service line inventories and water sampling program. The use of ArcGIS Arcade expressions enabled advanced formatting of the dashboards to make it easier to track the status of the project as a whole, share curated information with the public, and plan for next steps.

Working with Black & Veatch, WSFC Utilities also developed customer surveys using ArcGIS Survey123 to help track and complete the customer notifications, public education activities, and field investigations that the LCRR requires. The customer engagement aspect of this system—built within WSFC Utilities' ArcGIS Online environment—is based on Esri's Lead Service Line Inventory solution. It allows customers to approve access to their properties and enables staff to see, in real time, status updates of both the public and private sides of WSFC Utilities' field inventories.

"In addition to supporting activities for the LCRR program, the platform [developed by Black & Veatch] has provided us with insight into the quality of our existing data, supported data-driven decisions, and provided opportunities for continual improvement," said WSFC Utilities information systems lead Matt Whitman. "The overall experience has allowed us to expand our use of advanced geospatial tools and processes."

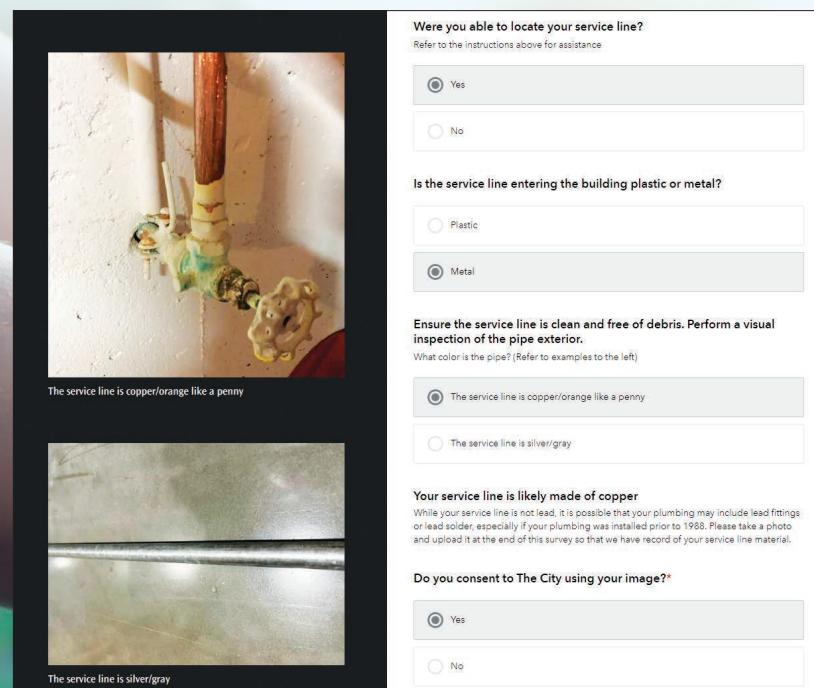
WSFC Utilities is also leveraging Python-based predictive analytics to estimate the likelihood that service lines are composed of unknown materials. Mobile crews then use Survey123 to verify these predictions on-site, providing critical feedback that further refines and strengthens the models over time.

Ultimately, according to Whitman, the long-term vision for the LCRR platform and the use of ArcGIS technology at WSFC Utilities is to support the ongoing lateral replacement program, as well as other utility planning and asset renewal programs. And Black & Veatch has been applying the insight it gained and the predictive modeling techniques it developed with WSFC Utilities to many of its other LCRR projects—many of which have already been accepted by the EPA.

"Our success lies not only in creating standardized templates, tools, and processes but also in empowering users to understand the LCRR; why it matters; and how their efforts contribute to the delivery of safe, reliable drinking water," said Justin Mitchell, senior data scientist at Black & Veatch and the lead developer of both the LCRR platform and the predictive model.

About the Authors

Brian Lendt is the geospatial operations lead within Black & Veatch's infrastructure advisory team, where he specializes in utility infrastructure renewal, geospatial analytics, and asset management. Mark Seastead is a senior integrated solutions strategist on the infrastructure advisory team at Black & Veatch, where he brings more than 25 years of experience in program management, consulting, and systems implementation and integration to a range of clients.



Were you able to locate your service line?
Refer to the instructions above for assistance

Yes

No

Is the service line entering the building plastic or metal?
Plastic

Metal

Ensure the service line is clean and free of debris. Perform a visual inspection of the pipe exterior.
What color is the pipe? (Refer to examples to the left)

The service line is copper/orange like a penny

The service line is silver/gray

Your service line is likely made of copper
While your service line is not lead, it is possible that your plumbing may include lead fittings or lead solder, especially if your plumbing was installed prior to 1988. Please take a photo and upload it at the end of this survey so that we have record of your service line material.

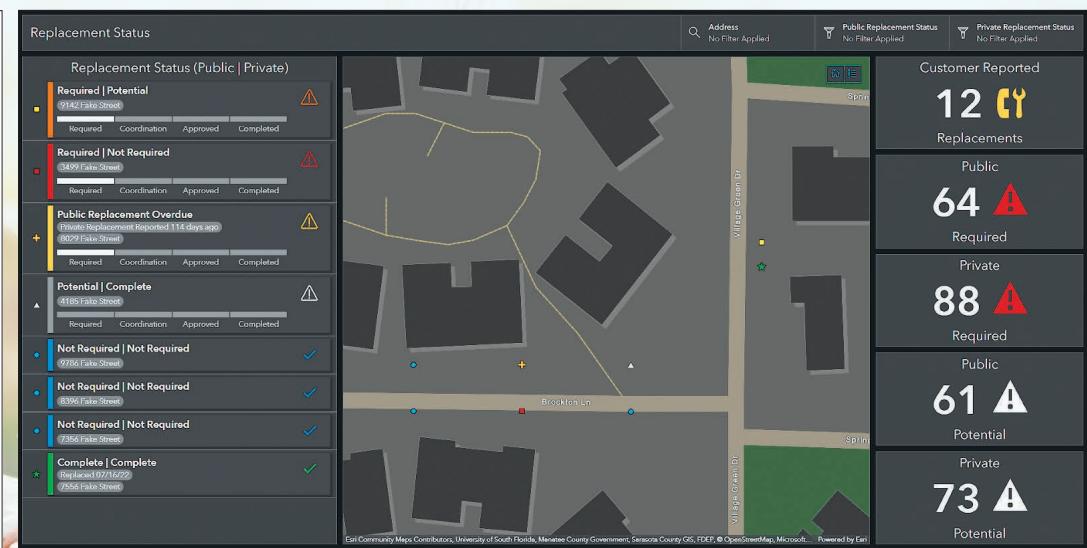
Do you consent to The City using your image?*

Yes

No

The service line is copper/orange like a penny

The service line is silver/gray



↑ The Replacement Status dashboard helps ensure that desktop and mobile crews are in sync about field activity progress.

↑ Winston-Salem/Forsyth County (WSFC) Utilities uses ArcGIS Survey123 to support public outreach and assist customers with reporting service line materials.

For details on Esri's Lead Service Line Inventory solution, go to links.esri.com/lssi. For more information about Black & Veatch's ArcGIS technology-based LCRR program management platform, explore the company's LCRR Program Management ArcGIS StoryMaps story at links.esri.com/bv-lcrr.



3D Models and ArcGIS GeoBIM Inform Light-Rail Reconstruction in Berlin

The S-Bahn opened in Berlin, Germany, in 1924 as an elevated light-rail system that complemented the city's underground U-Bahn rapid transit network.

Part of the S-Bahn was the privately constructed 2.8-mile Siemensbahn link, which included three additional stations. This link was built to serve Siemens employees working at the company's Siemensstadt facility, which featured a town with related amenities. Because Siemens AG relocated its headquarters to Munich in 1948, both the Berlin facility and the Siemensbahn S-Bahn link were eventually decommissioned in 1980.

In 2018, Siemens AG announced the construction of a new campus at Siemensstadt for research purposes. Included in these plans is the reactivation of the Siemensbahn light-rail system, which is scheduled for completion in 2029. The German national railway company, Deutsche Bahn AG, is overseeing the project. Because the central section of the track is considered a historical landmark, planning was challenging.

In preparation for the renovation work, Esri partner ARC-GREENLAB created 3D building information modeling (BIM) models of one of the Siemensbahn link stations, Wernerwerk, and its steel viaduct that would carry the train. The team at ARC-GREENLAB used ArcGIS GeoBIM, ArcGIS Online, and ArcGIS Pro to develop the models.

"Because of its age, it was necessary to recalculate the entire structural analysis of the viaduct and terminal building in the development of the as-built models," said Fabian Götszel, the team lead for computer-aided design (CAD) and BIM at ARC-GREENLAB. "This is an 800-meter section [of the viaduct] with 48 steel [columns holding up] a double track rail [line]. It includes the platform of Wernerwerk station with the reception building, roof, stairs, and related terrain."

Deutsche Bahn used the as-built models as a basis for creating subsequent models for the planning and construction required to refurbish the station and viaduct.



↑ Using ArcGIS technology enabled the team to combine detailed models of the railway viaducts with satellite images and less-detailed, textured buildings.

"The reopening of the Siemensbahn is part of an extensive urban redevelopment plan in northwest Berlin," said Hans-Martin Krausmann, the CEO of ARC-GREENLAB. "To develop new neighborhoods for residential use and economic development, public transportation is also set to be significantly expanded and upgraded."

Gathering Data and Building the 3D As-Built Models

To model the existing viaduct and station, ARC-GREENLAB team members collected terrestrial laser scan data using the RTC360 laser scanner from Esri partner Leica Geosystems. They then took the scan data and used ArcGIS Pro to create a point cloud. This required more than 1,200 scans. The team also used tachymeters—surveying devices that help rapidly determine distance,

direction, and elevation differences—and drones to ensure that the data was highly accurate.

ARC-GREENLAB acquired GIS and BIM data from the City of Berlin, including a one-meter digital terrain elevation model, parcel data, and Level of Development (LOD) 200 building models to help determine spatial relationships. The LOD rating system defines the level of detail and accuracy in a BIM model throughout a project's life cycle. For LOD 200, the design is refined enough to show various elements' approximate quantity, size, shape, and location.

This foundational data provided details about the station's original construction to guide renovation efforts. The team converted the LOD 200 building models into the Industry Foundation Classes (IFC) format so that the data could be used in the as-built BIM models.

The ARC-GREENLAB team also surveyed Wernerwerk station's foundation, columns, and steel beams, as well as the concrete footings on which structures stand. Team members collected data on service passages, railings, and drainage channels as well. On average, 3,000 individual parts were modeled per steel column. The team then verified the information, such as rivet patterns, the thickness of the steel, and plate dimensions, to identify any structural issues, including existing deformations.

Further Refining the Models for Planning and Construction

After completing the 3D as-built models, the ARC-GREENLAB team used them to create more refined BIM models for planning and construction processes. Team members prepared



↑ The Siemensbahn S-Bahn link and the Wernerwerk station, shown here, were largely abandoned during the 1970s.



→ The team produce highly detailed building information modeling (BIM) models that show what the reconstructed Wernerwerk station could look like.

→ The ArcGIS GeoBIM viewer app allows stakeholders to get an overview of all project-related data.

the data for the models by producing layers and then 3D scene layers using ArcGIS Pro. They then published the scene content to ArcGIS Online for sharing with project stakeholders over the web. After publishing to the web, they linked to georeferenced Autodesk Revit and CAD files stored in Autodesk Construction Cloud in a single, connected data environment using ArcGIS GeoBIM. This enables access to unified GIS and BIM project content through a centralized point of entry.

The team noted any planning issues in the models, such as existing structure deformations, and presented these in a dashboard made with ArcGIS Dashboards, as well as in an ArcGIS GeoBIM app to increase user accessibility among surveyors, planners, contractors, and engineers. Once construction begins, additional stakeholders can be invited to use the applications. The planning and construction models are developed simultaneously because any changes made to the planning model, in turn, affect the model developed for construction. Any issues that are found can be resolved in Autodesk Construction Cloud.

The planning and construction models are highly detailed at LOD 400. They include comprehensive representations of components that can be used for assembly planning and development. The precise model information available in LOD 400 allows the team to calculate the costs of the work as well.

"The planning and construction models are also used to verify any new structural calculations," said Götzel. "Identified issues in the calculations are assigned to their respective BIM model in the [Autodesk Construction Cloud] environment, and the person that identified the issue is notified when the necessary changes are made to the design. As a comprehensive project platform, ArcGIS GeoBIM provides access to relevant data for other stakeholders involved in the project."



↑ ArcGIS GeoBIM enables a cloud-to-cloud connection between ArcGIS and Autodesk Construction Cloud.

Strengthening Collaboration and Decision-Making

The use of ArcGIS GeoBIM assures those involved in the Wernerwerk station renovation that actionable issues are clearly presented through visualizations and are synchronized with Autodesk Construction Cloud. This enables interdepartmental collaboration and decision-making.

Since the BIM models are geospatially enabled through ArcGIS GeoBIM, they can be used for different analyses, such as those that determine topographical variations and soil composition to ensure the stability of construction. In addition, because of the extensive datasets

available, the team can design and implement other analyses in ArcGIS GeoBIM as needed. This allows a greater number of stakeholders to benefit from the data and capabilities provided by the BIM models.

"The use of BIM has huge growth potential in the construction sector," Krausmann concluded. "When working with BIM models, one of the biggest challenges is linking the Autodesk data world with the spatial context in GIS. Thanks to ArcGIS GeoBIM, this can now be easily implemented. This project shows how well ArcGIS GeoBIM can be integrated into typical workflows in [architecture, engineering, and construction]."

"The use of BIM has huge growth potential in the construction sector."

- Hans-Martin Krausmann, CEO, ARC-GREENLAB

↓ The team from ARC-GREENLAB took 3D laser scans of the existing viaduct.



← With a new campus being constructed at Siemensstadt, the Siemensbahn light-rail system is planning to be reactivated.





Wisconsin Enhances Airport Safety with ArcGIS Aviation Airports

When flight zones around an airport have an obstruction such as a building, tree, or cellphone tower that extends into designated airspace, the consequences can range from government fines to accidents. In the United States, a federal regulation known as Part 77 establishes standards and notification requirements for airport buffer zones—areas in, around, and above designated airports that must be evaluated periodically for airspace obstructions. Similar to highways with wide medians and emergency lanes, these buffer zones give pilots margins of error when flying planes in and out of airports.

To help comply with regulations, improve airport safety, and better communicate with airport neighbors and stakeholders, staff at the Wisconsin Department of Transportation's Bureau of Aeronautics applied the ArcGIS Aviation Airports extension for ArcGIS Pro to map airports and their surrounding areas, both on the ground and in the air.

A Unique Statewide Data Layer

Starting in May 2024, Christine Koeller, an ArcGIS program manager with the bureau, began using Aviation Airports to build a 3D Part 77 data layer for all public-use airports in the state. In March of this year, the bureau enabled public access to the app rather than providing polygon data on request, as had been done in the past. Now, users don't have to wait for their data requests to be filled; rather, they can get what they need when they need it via the app.

It's the latest step in the bureau's efforts to build data layers and GIS maps. These efforts also include mapping airport reference points (the approximate geometric center of an

↓ The red circle represents the Federal Aviation Regulations Part 77 conical surface. Due to its height above the ground, the conical surface is most often used to evaluate impacts from wind turbines and other tall towers.



airport's usable runway surfaces) and wildlife protection areas, which aim to mitigate conflicts between animals and air traffic. Koeller also helps the department and its stakeholders and partners visualize facility and runway data, including the characteristics of adjacent or nearby areas.

"If someone needs a map, I am here to help," she said.

The bureau's GIS data, which is refreshed every 56 days, is incorporated into the department of transportation's enterprise databases—the centralized source for authoritative data within the department. The data is located in the department's Oracle databases, and staff in the Bureau of Aeronautics manage it using ArcGIS Pro. The GIS data is then made available to everyone throughout the department of transportation via Scene Viewer in ArcGIS Online, and to the public via a community engagement platform built with ArcGIS Hub.

"As far as we know, we're the only state transportation department with a publicly available, statewide data layer of this kind," Koeller said.

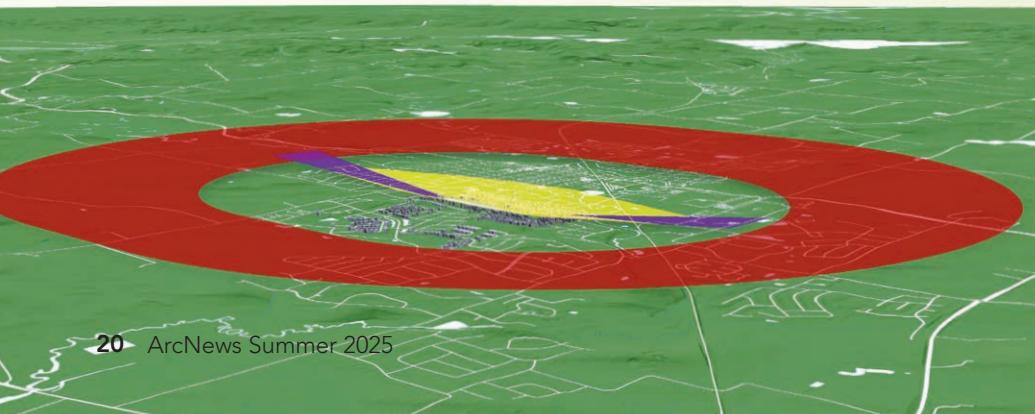
One of the capabilities of Aviation Airports that she appreciates is its ability to create multi-patch features—GIS objects that represent 3D objects' boundaries along with their visual characteristics such as texture, color, transparency, and geometric information.

"This gives us the ability to evaluate and quickly analyze current and potential obstructions, such as trees, towers, or buildings, while allowing users to look at the data three dimensionally and compare it to other 3D data," Koeller said.

Creating a statewide Part 77 data layer is a lot of work, according to Koeller. But she said that the Aviation Airports extension made it a lot easier.

"The extension takes complex written language and geospatial data and converts it to a visual format that's easy to understand," she said. "The data helps us show local community partners and other stakeholders what airspace is protected and what we're talking about when there's an obstruction."

The ArcGIS Aviation Airports extension for ArcGIS Pro helps airport staff manage aviation information and produce imagery using data management tools, database models, cartographic functionality, and workflow management components. Find out more at links.esri.com/aviation-overview.





↔ Keeping trees and other obstructions clear of airspace is critical to safety at airports such as Cable Union Airport (left) and Ephriam-Gibraltar Airport (right).



Improved Spatial Awareness

Aviation Airports has made airport safety evaluations much easier and more accurate, according to Bureau of Aeronautics airport compliance manager Hal Davis, who inspects hundreds of Wisconsin airports on a rolling three-year basis. The public-use airports he inspects have some zoning authority up to three miles from where their runways end. Part 77 has requirements for about 2 to almost 10 miles, depending on the characteristics of the aircraft and runways at a given airport. Both sets of protected areas are important.

"As the inspector, part of my job is to evaluate obstructions at airports statewide," Davis said. "That evaluation process used to rely on drawings that were made by hand. The extension automates the process, which reduces user error and helps in keeping records up-to-date."

Bureau staff also use the Surface toolset in ArcGIS Pro and exports from Site Scan for ArcGIS (part of the ArcGIS Reality suite) to create point clouds that help staff identify current and potential obstructions.

"It's a much better approach than using line of sight," Davis said.

The result is improved spatial awareness for airport managers, neighbors, and stakeholders.

"An airport manager can better spot potential obstructions and the consequences of extending a runway in the direction of a developing area, for example, and can share that 3D visual information with airport stakeholders who may want to use a crane or build a cellphone tower or something else that could cause an obstruction," Davis explained. "This data is critical to our mission of protecting airspace."

Getting Different Organizations into Agreement

Davis believes that other state aviation departments would find Aviation Airports useful.

"The solution should be of interest not only to the aviation community and transportation departments but [also] to state and local governments and typical airport stakeholders such as architecture, engineering, and construction companies," Davis said. "I think having this kind of data readily available would be a benefit to airports and their stakeholders around the country."

Esri product marketing manager Dylan Molnar concurred.

"By sharing airspace information with the public, the Wisconsin Department of Transportation aims to make flight paths as safe as possible," Molnar said. "Having accurate foundational data also improves internal processes, such as collecting obstruction data in the field, creating height limitation zoning, and ensuring that people in different organizations are all on the same page."

Molnar listed several of the extension's capabilities and benefits, including simplified data management; flexible 2D and 3D visualization for analyzing airport layouts, obstacles, surfaces, signage, and more; easier compliance with Federal Aviation Administration and International Civil Aviation Organization standards and requirements; ArcGIS product integration; and customization.

"These capabilities make the extension an important resource for modern airport management," Molnar said, "enabling users to improve efficiency; decision-making; and, ultimately, safety for organizations around the world that operate in the aviation sector."

For more information on how the Wisconsin Department of Transportation uses ArcGIS, email communications specialist Claire Paprocki at claire.paprocki@dot.wi.gov. To review the Bureau of Aviation's GIS data layers, visit links.esri.com/wisdot-gis.

The Wisconsin Bureau of Aeronautics has made its 3D Part 77 data layer available to the public.



A portrait of Dr. Jennifer L. Johnson. She is a woman with long brown hair, wearing glasses and a red top. She is standing in front of a colorful building with many windows, possibly a residential or institutional building. She is smiling and looking directly at the camera.



“ [ArcGIS Aviation Airports] takes complex written language and geospatial data and converts it to a visual format that’s easy to understand. The data helps us show local community partners and other stakeholders what airspace is protected and what we’re talking about when there’s an obstruction. ”

Christine Koeller, ArcGIS Program Manager,
Wisconsin Bureau of Aeronautics



In Australia, Apps Built with ArcGIS SDK for JavaScript Unlock Urban Insight

In a country where nearly 90 percent of residents live or work in cities, thoughtful urban planning is crucial to community health and well-being. That's why the Department of Transportation and Planning (DTP) in Victoria, Australia, has turned to location intelligence to enable smarter decision-making in its transportation, land development, and policy planning.

DTP has leveraged the Esri technology stack—including ArcGIS SDK for JavaScript, ArcGIS Pro, and ArcGIS Enterprise—to drive innovation in its use of spatial technology. Additionally, the department has employed an array of capabilities, from data-driven visualization to 3D client-side analytics, to develop custom web apps that have enabled staff to streamline processes and reduce manual work, significantly improving the organization's overall efficiency.

Doing Great Work with Spatial Technology

DTP's spatial services team consists of experts from diverse backgrounds, including urban planning, cartography, and spatial analysis.

"The members of my team share one thing: a passion to do great work with the spatial technologies we have available," said Justin Madex, a spatial services manager who leads a team of software engineers at DTP.

Spatial analysis plays a pivotal role in many of DTP's key projects. It helps staff calculate new buildings' potential to cast shadows on existing infrastructure; guide the development of affordable housing across the state; and design what are called 20-minute neighborhoods, where essential services are no more than a 20-minute walk away.

"Spatial technologies are empowering planning for Victoria's future," said Madex.

His team provides many forms of spatial services and support to the planning group. For example, team members are responsible for collaborating with local councils across Victoria and ensuring the accuracy and consistency of the spatial dataset associated with the state's planning scheme—a legal document that details the policies and provisions for land use and development. Victoria's planning scheme

includes 44 planning zones and 27 overlays. The dataset is extensive.

"Victoria is only half the size of California, but we have to work closely with all 79 counties across the [state] as they submit updates or amendments to the department," said Madex. "And since not all councils use spatial technology at the same level, amendments can be submitted a lot of different ways."

Until 2018, this meant that DTP had a group of staff members dedicated to processing these amendments and continually managing the planning scheme dataset.

"Since then, we've invested significant time in improving our operations," said Madex. "It started with the introduction of the Esri technology stack."

DTP integrated Python scripts, built add-ons to ArcGIS Pro, and implemented topology rules across the datasets with the goal of streamlining the process and reducing the amount of manual work that had to be done.



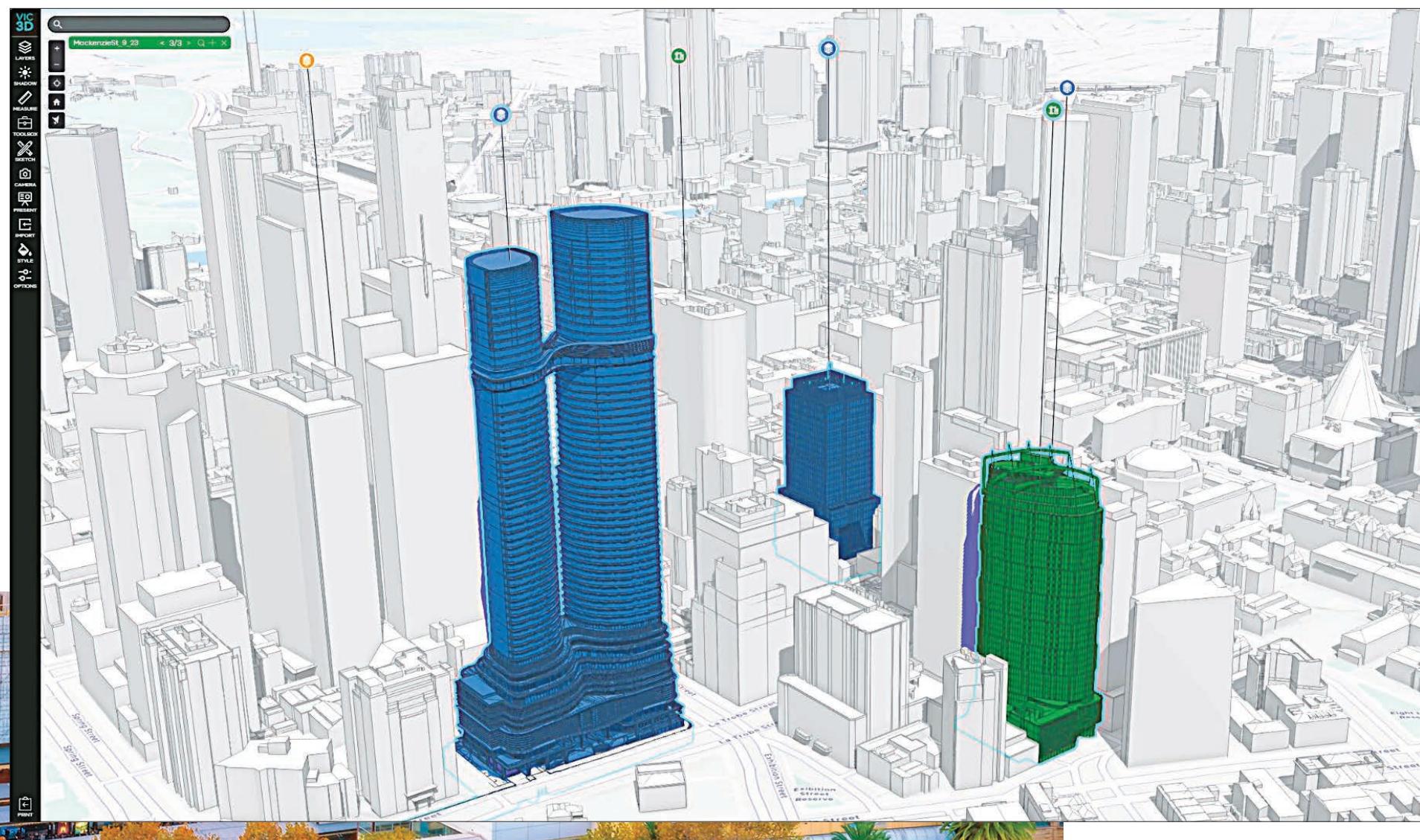
"We now spend far less time managing the dataset, thereby improving the team's overall productivity," said Madex.

Modern Apps Support Comprehensive Urban Planning

DTP has taken significant steps as well to enhance its development of web mapping apps to support urban planning. In-depth market research and a successful proof of concept revealed that ArcGIS Maps SDK for JavaScript was the best fit for the department's needs. The team's decision was further solidified by the SDK's road map for development, detailed documentation, extensive sample library, and strong user community—all of which aligned well with DTP's objectives.

"Interactive mapping applications are one of the most powerful tools we have for depicting complex scenarios and modeling," Madex said. "Applications built using the JavaScript Maps SDK

By leveraging 3D datasets, Vic3D enables users to visualize new developments within Victoria's existing landscapes.





are empowering us to put the spatial in the hands of our users who are traditionally nonspatial."

Using JavaScript Maps SDK, the department has produced modern custom web mapping apps that are user-friendly and highly functional. The apps are designed to handle large volumes of data and allow users to seamlessly integrate and visualize spatial information in real time. The various data layers that the apps support—including zoning, demographic, and environmental information—are all essential for comprehensive urban planning.

For example, the team used JavaScript Maps SDK to create an intuitive web mapping app for the Victorian government's Future Homes program, which offers a streamlined planning pathway to develop three-story apartment buildings. The app simplifies the process of determining eligibility for the program. The team also developed a web mapping app that helps modernize the approval process for new renewable energy projects. It allows planners to review and manage the progress of their permit applications and, ultimately, provides a view of renewable energy projects across the state of Victoria.

These and other apps are crucial for engaging with the community. They provide a transparent platform for stakeholders to view and interact with planning proposals. And their interactive nature enables users to simulate different planning scenarios that show potential outcomes and facilitate more informed decision-making.

A 3D App Provides Vivid Visualizations

One of the most innovative apps that DTP has developed is Vic3D, an app that provides 3D and augmented reality (AR)-based visualizations of Victoria's urban landscapes. In the sophisticated arena of urban development, this app ensures that the state's distinctive landscapes are deeply integrated into the planning process.

Vic3D, developed with JavaScript Maps SDK and supported by ArcGIS Enterprise, leverages several key capabilities of the software development kit (SDK), including the ability to import

textured and untextured realistic photo meshes; employ 2D datasets; perform viewshed analyses to calculate a new development's potential to overshadow existing built forms; and assess shadow accumulation using out-of-the-box widgets.

The app empowers planners to analyze diverse 3D datasets, such as those related to building models and topographic maps. These are crucial for evaluating—without technical assistance—the impacts of proposed developments on a city's cherished vistas and heritage sites.

Vic3D can also help stakeholders review planning permit models alongside existing structures, offering clear and tangible perspectives on new developments. This is vital for projects that might affect key landscapes and historical sites, since all new structures must harmonize with Victoria's stunning natural environment and vibrant city scenery. Moreover, the app integrates AR to give users an immersive experience that brings proposed changes to life.

This innovative approach to viewing possible future developments enhances public consultations and enriches the decision-making process, allowing stakeholders to get vivid visualizations of potential impacts.

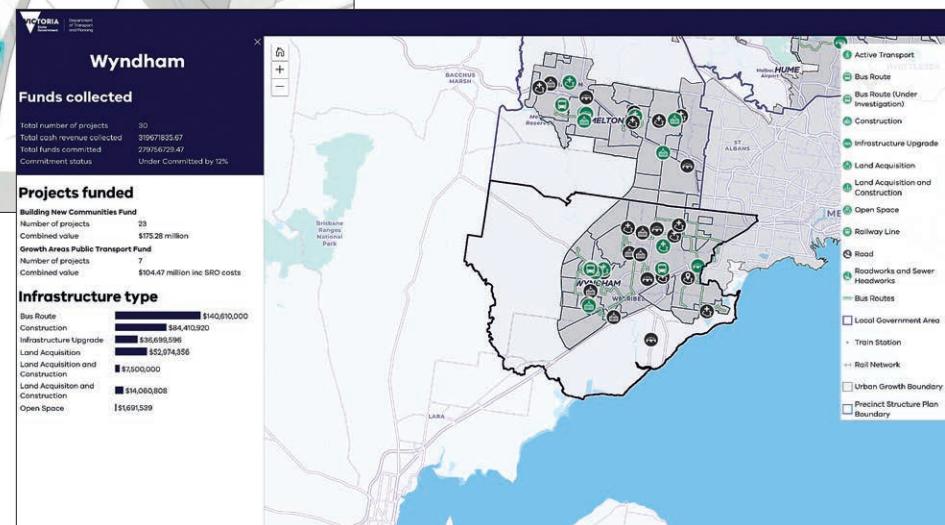
Enhancing Sustainability and Livability

By strategically employing Esri technology to its existing workflows and processes, DTP exemplifies a forward-thinking approach to urban planning.

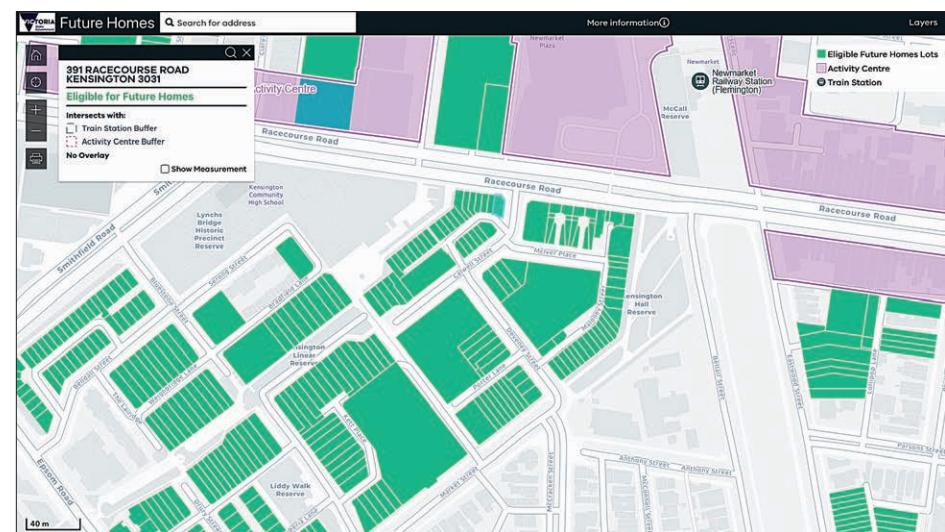
"Leveraging the web mapping technology available across the ArcGIS technology stack has not only enabled us to provide powerful decision-making spatial data to our users in an intuitive manner, but it has also uplifted the overall spatial intelligence of the department," Madex said. "More than ever, we have people across the department coming to us asking to leverage the platform for new and exciting projects."

DTP's innovative and adaptive use of spatial technologies has enhanced collaboration, efficiency, and accuracy across its planning processes, as well as enriched the quality of life of Victoria's residents.

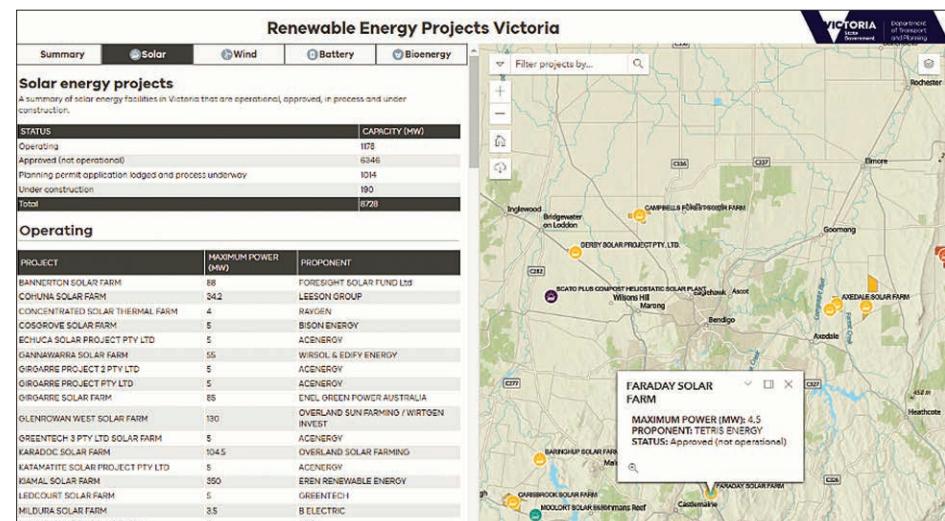
← The 3D app helps the Department of Transportation and Planning (DTP) calculate new developments' potential to overshadow other infrastructure.



↑ DTP in Victoria, Australia, created a web map that shows Growth Areas Infrastructure Contributions (GAILC)—fees collected to fund infrastructure development.



↑ An app shows properties, in green, that are eligible for Victoria's Future Homes Program, which offers a streamlined planning pathway to develop three-story apartment buildings.



↑ A public-facing interface summarizes all the renewable energy projects across Victoria.

High School Student Plots Safer Routes to School

School-age youth make up 23 percent of residents in the Bay Area community of Lafayette, California. When you add parent drivers, almost a third of the city's residents travel to and from Lafayette's six K-12 schools each day to attend school or drop off and pick up students.

Drop-off and pickup times near schools are hectic, with buses loading and unloading, kids hopping on bikes and scooters, and parents navigating vehicles along busy roads. Lafayette has limited sidewalks near schools and in many residential neighborhoods, so most students are driven to school, creating unsafe conditions for the fewer kids who walk or bike. Many parents and guardians witness this less-than-ideal pedestrian environment and choose to drive, increasing traffic and, in turn, further discouraging kids from walking and biking.

In theory, if safer walking and biking routes were more visible and well-known, parents would be willing to let their kids walk or bike to school. And if fewer cars drove to and from schools, arrival and dismissal would be safer for everyone, encouraging more kids to feel comfortable walking and biking.

To test this theory, local high school student Miela Hsu used GIS to create interactive proof-of-concept maps that outline suggested routes for walking and biking to four area schools.

"My mom used GIS in her job about 10 years ago, and she recommended that I try using ArcGIS Online to make the maps because it was pretty intuitive," Hsu said.

After learning how to make maps with ArcGIS Online, Hsu used ArcGIS Field Maps to collect data about pedestrian and bicycling amenities around schools. Hsu presented parents with a survey built with ArcGIS Survey123 to determine whether receiving information about safer pedestrian and bicycle paths around schools would change their driving behaviors. She also created stories with ArcGIS StoryMaps to show residents and members of the city council examples of what information a suggested-route-to-school map could contain.

Learning GIS and Gathering Data

Hsu kicked off the project by exploring many of the tutorials available for learning ArcGIS Online. These made it easy for her to learn basic GIS workflows, such as how to create features and symbolize

them on a map, as well as more advanced concepts like creating buffers and generating travel areas. The Make a Walk-Time Map tutorial, available on *ArcGIS Blog*, taught Hsu how to build the fundamental data she needed: the streets that were within a quarter mile, a half mile, and three-quarters of a mile of schools.

Because the City of Lafayette does not have an extensive GIS data catalog, Hsu created all the features either on the computer using ArcGIS Online or at school sites using ArcGIS Field Maps. Within ArcGIS Online, she employed the Generate Travel Areas tool to define the walking and biking area polygons and to find the streets within three-quarters of a mile of each school using the Include reachable streets parameter.

"ArcGIS Online had a lot of basemaps to choose from, as well as analysis tools that helped me identify feasible distances to expect kids to be able to walk," Hsu said. "Being able to categorize the roads by type using preexisting data, and having many icons to choose from, made creating the maps easy and fun."

Hsu then inspected the streets on foot to determine where there were sidewalks and multiuse paths that schoolchildren could use. She also assessed each path's condition. The objective was to find the safest and longest uninterrupted paths possible, so she surveyed the streets to identify any gaps in pedestrian and cycling infrastructure. During the survey, Hsu found that some necessary connectors were of very low quality. For example, some asphalt pathways were deeply cracked or had tree roots growing up that made them uneven, and some roadways had no shoulder.

An important aspect of the pedestrian and bicyclist experience is the presence of road safety features such as crossing guards, traffic signals, rapid rectangular flashing beacons, and crosswalks. Amenities such as bike racks at schools and nearby remote drop-off and pickup locations can help encourage walking and bicycling as well. Hsu looked for these features in person and recorded data about them in ArcGIS Field Maps.

Building an ArcGIS StoryMaps Story

Using ArcGIS StoryMaps, Hsu quickly built an interactive story that led with the narrative of why walking and biking to school is good and how students could do both of these safely in Lafayette.

In her related maps, further down in the story, Hsu depicted the best pedestrian and cycling options, using green lines to denote suggested sidewalks or walkways and purple lines to display suggested multiuse paths. She symbolized low-quality connecting paths with red dashed lines. To add visual interest to the maps, she

included custom vector symbols that represent crossing guards, traffic lights, flashing pedestrian beacons, bike racks, and school drop-off and pickup zones.

Hsu presented maps of two neighborhoods—each with two schools in it—using the Floating Sidecar layout in ArcGIS StoryMaps so that users could explore the areas around the schools while simultaneously seeing the map's legend. She wanted users to be able to see what all the symbols mean without having to scroll.

At the end of the ArcGIS StoryMaps story, Hsu included an image of the Lafayette School District's traffic safety rules.

Getting Results

Hsu wanted to test the theory that an ArcGIS StoryMaps story featuring suggested walking and biking routes to school could help parents find paths that they would consider having their kids try. She circulated a version of the story that included an embedded ArcGIS Survey123 form. Parents and guardians were asked what schools their children attend; how they take their kids to school; what they thought of the maps; and, having received that information, how likely they were to let their kids try walking or biking to and from school.

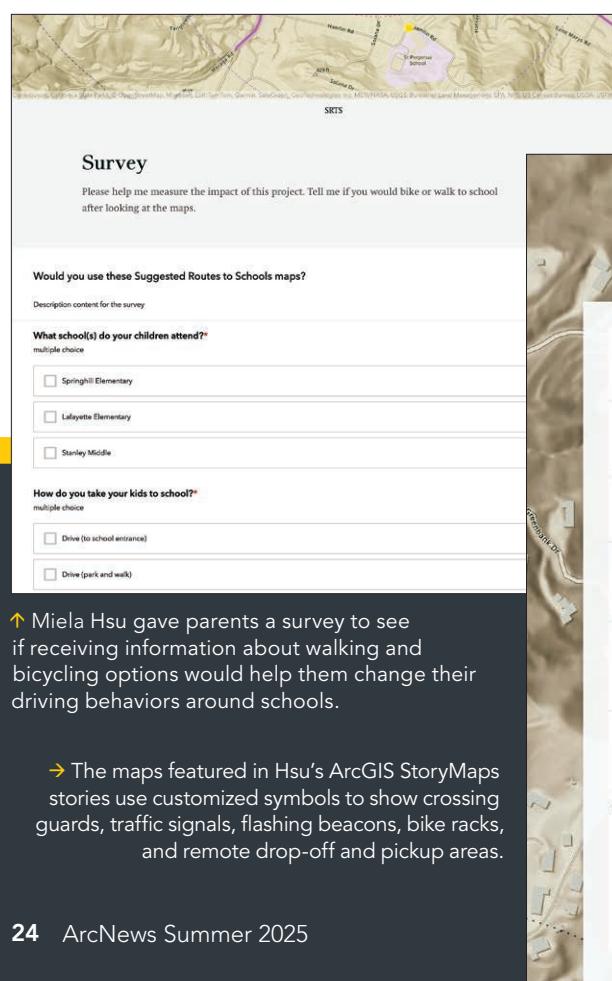
Nearly half of the respondents said they learned a new route from the maps. Of the parents and guardians who had only driven to school previously, 90 percent said they would try parking a quarter of a mile away from their kids' school and walking the rest of the way for drop-off and pickup. These results showed the value of suggested-routes-to-school maps in encouraging parents to help decrease congestion and increase safety around Lafayette's schools.

As cochair of the city's Youth Services Commission, Hsu emailed Lafayette's mayor and several city councilmembers to see if she could present her findings to them. The mayor and a city councilmember agreed to meet with her, so Hsu created a third ArcGIS StoryMaps story to display her results.

"Presenting my work to the mayor and a councilmember was a great way to show what I found around the schools and give them suggestions for spots that could be improved," Hsu said.

The government officials appreciated Hsu's detailed work and the findings she presented.

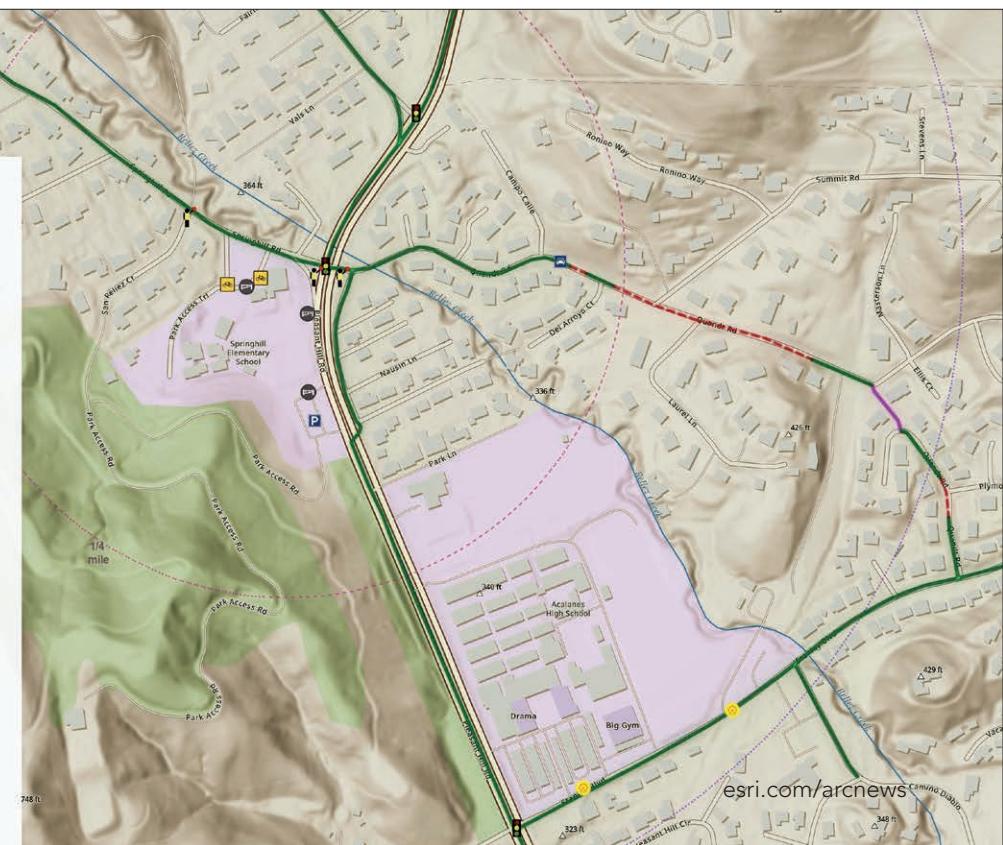
"Over the past few years, our city focused deliberately on [making] safety improvements near schools," said Lafayette Mayor Susan Candell. "This mapping project filled a real need for parents and students, and we are grateful to Miela for providing this new, valuable resource for our residents. In addition, it helped identify gaps in our sidewalk system that we included in our improvement program."



The image shows a screenshot of a survey and a StoryMaps interface. On the left, a survey titled 'Survey' asks users to measure the impact of the project by biking or walking to school. It includes questions about school attendance and driving habits. On the right, a StoryMaps interface displays a map of a residential area with schools highlighted. A legend on the left side of the map defines symbols for suggested paths, crossing guards, traffic lights, and bike racks. The map shows various streets, parks, and school buildings.

↑ Miela Hsu gave parents a survey to see if receiving information about walking and bicycling options would help them change their driving behaviors around schools.

→ The maps featured in Hsu's ArcGIS StoryMaps stories use customized symbols to show crossing guards, traffic signals, flashing beacons, bike racks, and remote drop-off and pickup areas.

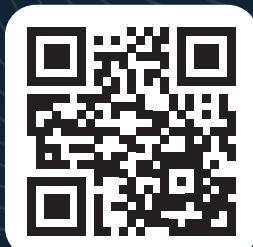


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The Power to Help

When Hurricane Helene struck the Carolinas on September 25, 2024, Dr. Patricia Carbajales-Dale and many of her colleagues at Clemson University—located about two hours from hard-hit Asheville, North Carolina—were stranded in their homes without electricity and internet. Yet, as so many communities came together to support one another after the hurricane, they found several ways to assist with relief efforts in and around Clemson, South Carolina—and even as far away as Asheville—using GIS.

"We all helped each other. We put everything else on hold, and we didn't do anything but emergency response," said Carbajales-Dale, the executive director of Clemson University's Center for Geospatial Technologies. "I feel like with GIS, we have the tools and the power to help when things like this happen, so I should drop everything and help. Honestly, nothing feels more important or more meaningful to me."

"You Know How Life Is"

Carbajales-Dale's interest in GIS was ignited during a different kind of emergency when she was in college in Madrid, Spain. She was studying forestry and engineering, and there were massive forest fires around her hometown of Ourense, in Galicia.

"I saw that GIS could bring all these models together showing the slope and the wind direction and the vegetation and where the helicopters were," she recalled. "My dad was an architectural drawer, so he used to do things by hand. And then CAD and AutoCAD came into his field, and it kind of took over. So when I was studying engineering and I saw GIS, I thought, 'This is going to take over, so I better study it,'" she said.

Her university didn't offer GIS classes, so she looked all over the world to find a master's degree program in GIS. As she recalls, there were only three at the time, so she enrolled in the first cohort of GIS master's students at the University of Redlands in California—a few miles away from Esri's headquarters. She figured she'd stay for a year, get her degree, improve her English, and then take the technology back to Spain and apply it to forest fires.

"But you know how life is," she said.

After graduating, Carbajales-Dale got a job at a water resources consulting company in Santa Barbara, California. She then worked at the University of California, Santa Barbara, in the planning department before being hired by Stanford University, where she established and ran the Stanford Geospatial Center.

"It was a dream job" said Carbajales-Dale. "My job was to help people use GIS. I would get a surgeon who needed help with data for surgery patients, or I would get someone from urban studies. It was an incredible experience."

While at Stanford, Carbajales-Dale developed and taught a course called GIS for Good that allowed students to work on projects for the United Nations High Commissioner for Refugees (now known as UNHCR, the UN Refugee Agency), the International Rescue Committee, and two other nonprofits. During the course, representatives from the agencies flew in from Geneva, Switzerland, and elsewhere to support the students. Carbajales-Dale also got a startup satellite company (that is now a well-known imagery provider) to direct its only satellite at some of the class's projects so that the students could use imagery.

"It was just everybody coming together to make this class successful," she said.

The students mapped refugee camps to help one organization determine where to put solar equipment. They helped another organization map its operations in several countries to figure out where to increase outreach efforts about its services. They also did a suitability analysis to help one organization choose where to put its support offices near a conflict-ridden international border.



↑ Dr. Patricia Carbajales-Dale

Despite the time differences between the students and stakeholders and the complexity of the projects, "the students really responded well to the challenges," Carbajales-Dale said.

She only got to teach the class once, however, because after just four years at Stanford, her husband—whom she met when he was a postdoctoral researcher at Stanford—received a faculty job offer at Clemson. So she moved with him, ready to continue innovating with GIS at a new institution.

Spotlighting Cool Tech While

Focusing on Impact

Clemson is a land-grant university in western South Carolina that is deeply committed to not only supporting education and research but also providing public service and outreach to the local community, especially farmers.

"Clemson offers a geography curriculum, but not in the traditional way you would see it at some other universities," said Mark Lecher, an Esri account manager for the education sector. "The university uses GIS to help out local municipalities, the county, and others. They aid in 911 dispatching, help the county develop long-range framework plans, and things like that. And Patricia has grown GIS at the university so that anything

↓ Carbajales-Dale and her team made an ArcGIS StoryMaps story to train dozens of Clemson extension agents on how to use the ArcGIS Survey123 form to record damage.

1.2 Notice the first page has an overall view of the structure of the survey.

1.3 Review the instructions on each page, and at the bottom of the page, click **Next**.

1.4 To view the content of an entire page, you might need to scroll down on your phone, as shown in this video.

1.5 On the second page, Overall Site Information, notice the mandatory fields (have a red asterisk):

- **Select County:** choose a county from the dropdown menu
- **Location of Damaged Site or Business:** at a very minimum type the zipcode
- **Damage Caused By:** you can select several causes

1.6 Once all your information is entered, click **Submit**.

OPTION 2: COLLECTING DATA OFFLINE USING PHONE APP

If you suspect or know that you will not have data service for your phone in the area you will be surveying, you must have the App installed and surveyed downloaded on your device BEFORE you leave for the field. Below are the overall steps you must take to collect data if you are to be offline.

Powered by ArcGIS Survey123

Demonstration of filling survey online

↓ An impact assessment form, made using ArcGIS Survey123, helps farmers and extension agents record damage after heavy storms, droughts, and floods.

Impact Assessment Information Form

Overall Site Information

County

Type of Survey*

Individual field Individual farm County

Date/Time

5/5/2025 09:49 AM

DISASTER EVENT TYPE

Select one

Hurricane Flooding Ice Storm Tornado

Freeze/frost event Drought

Other

NAME OF DAMAGED SITE OR BUSINESS

↓ Extension agents, including Matthew Fischer, pictured here, now use Survey123 to record crop damage after natural hazards.



Clemson does to help the surrounding communities, there's a good chance that GIS is involved."

When Carbajales-Dale moved to Clemson, she joined the IT department as a facilitator for the university's supercomputer, the Palmetto Cluster. She also began teaching a GIS workshop in the basement.

"After 10 months or so, there was more demand, and then there was momentum to create a center in partnership with the library," Carbajales-Dale recalled. "Now, in addition to me, we have the GIS manager, a GIS and drone specialist, a developer, a temporary GIS analyst, and an intern."

She also renovated some space in the library, giving the Center for Geospatial Technologies a training room, a collaborative area, a sandbox, and even virtual reality equipment.

"Patricia is finding ways to get multiple departments, many people, and a ton of students really excited about GIS by spotlighting the cool things," Lecher said. "And then she ties it back to the really impactful things that GIS can do."

For example, when Hurricane Debby struck the southeastern United States in early August 2024, Carbajales-Dale and her team—in collaboration with Clemson's Agribusiness Program—turned to ArcGIS Survey123. They employed Survey123 to develop a form that farmers and Clemson extension agents (university representatives who bring applied research to local communities and farms through educational programming and consultations) used to record information including how many acres got flooded, what farms' estimated crop yield and loss was, and how much livestock was lost. They could include photos as well. This data was then reported to the county and, if needed, state and federal relief agencies to help facilitate disaster aid. The survey can be used for hurricanes, floods, drought, hailstorms, and any other natural hazards that affect agriculture.

The form used for Debby was too long, though, so Carbajales-Dale and her team began developing version 2.0. And then Hurricane Helene hit.

"We kicked it into high gear," she recalled.

The Power of GIS During Emergencies

Hurricane Helene pounded Clemson, though not as hard as some other places. But since the area was not in the hurricane's direct path,

people were not very well prepared, according to Carbajales-Dale.

"In my neighborhood, we got trapped for two days. I couldn't leave because we had trees that came down in the neighborhood," she said. "I didn't have extra food, and we lost electricity."

Once her neighbors used a chainsaw to cut a path through the trees, Carbajales-Dale was able to get to Clemson to check on her team members and get to work.

At Pickens County, where Clemson is located, the GIS team was short two people, so Carbajales-Dale sent her GIS manager, Gakumin Kato, to work there. The county was also keeping track of anyone who called in or passed through the emergency center for help—to get oxygen or medicine, have a tree removed from their rooftop, or find shelter. Each evening, after Carbajales-Dale had worked all day and started working on wrapping up her PhD at night, Pickens County and two other counties sent her the data they'd collected from residents in need that day. She geocoded it, published it to ArcGIS Online, and sent it back to the counties.

Carbajales-Dale was in contact with the Esri Disaster Response Program (DRP) and Clemson's Esri account manager throughout all this. They alerted her to an AI-based plug-in for Survey123 that was in beta that the counties could have used to automatically capture and geocode contact information from photos of residents' driver's licenses. Although Carbajales-Dale and her team got the plug-in working, the counties were too overwhelmed to switch workflows partway through the emergency. Carbajales-Dale hopes they can use it for the next emergency.

The Survey123 form that station agents had been using to help farmers after Hurricane Debby came in handy again—and it made a splash at the state and federal levels as well. Version 2.0 was shorter than the initial version, and station agents helped farmers across the region record damage. Newspapers reported the data, counties posted it on their websites, and even the South Carolina Office of Resilience asked Carbajales-Dale for the information.

"All this data then went to the governor and even to Washington, DC, to help farmers get aid for the losses they [sustained]," said Carbajales-Dale,

who credited Dr. Adam Kantrovich, Clemson's Agribusiness Program team director, with designing the survey form and summarizing the data for government officials.

These officials also used the data to run models that estimated additional relief needs, since not all farms filled out the form.

"Survey123 was a game changer for this because, before, this information came in on paper," Carbajales-Dale explained. "Since Hurricane Helene, we've done another review of the survey, and we've trained about 80 station agents to use it across all sorts of disasters. It's very important for the state."

Another important project that the Center for Geospatial Technologies spearheaded after Helene was an analysis to help helicopter pilots figure out where to land to drop off aid. The ground was unstable, and some critical supplies had already been lost. Working in concert with a Clemson soils and avalanche expert, Carbajales-Dale's team and Greg Dobson of the University of North Carolina, Asheville—who was working in the center while his hard-hit university was closed—put together models to determine the best places to land.

One missing piece of the project was satellite imagery, so Carbajales-Dale and Dobson asked everyone they knew to send any new imagery they could find of Asheville and the surrounding areas. Lecher, people affiliated with the Esri DRP, and even a friend from Carbajales-Dale's master's degree program who now works for the US Army Corps of Engineers delivered.

"It was a group effort," Carbajales-Dale said. "Esri and Mark were reaching out, saying, 'Patricia, there's imagery from here.' The Army Corps was telling me, 'There's this imagery.' Everyone was pitching in. It was so beautiful to see how everybody was working together."

Throughout her career, not only has Carbajales-Dale seen the power of GIS to bring people and information together, but also she has been a key driver of those faculties—as evidenced by her incredible, quick work in the aftermath of Hurricane Helene.

"GIS is so powerful, especially during an emergency," she said. "It's how we can truly make a difference."

From left to right, Clemson's GIS analyst Grisha Post; University of North Carolina, Asheville, director of geospatial technology Greg Dobson; and Clemson's GIS and drone specialist, Jared Gingrich, work on the helicopter landing project.



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Visualize Your Work Like You Visualize Your Data

By Tim Nolan, Collin County, Texas

Most of us start each day with high hopes of getting stuff done. And then we quickly realize that things aren't going as planned as more assignments get piled onto the ones we already have. A geospatial technology professional's work is never done.

To make progress on our increasing workloads, we often try to do several tasks at once. We simply have to multitask to finish all our work.

This is the multitasking fallacy. Human brains are not wired to work on many tasks at once. In fact, there is a lag when we switch from one task to another because we must reframe our thoughts each time we start a new task. This context switching can result in a 40 percent loss of productivity throughout the day, according to "The True Cost of Multi-Tasking," a 2012 article in *Psychology Today* by behavioral psychologist Dr. Susan Weinschenk. Some of us end up spending more time context switching than actually doing work. Over time, this can lead to anxiety, disengagement, and burnout.

One way to manage heavy workloads is to develop a personal kanban—a productivity method that divides tasks, visually, into three columns that show work that hasn't been started, work that's in progress, and work that's finished.

Here's how to develop your own personal kanban.

See Your Work

Most people's workdays consist of too many tasks to focus on all at once—especially when we have other ideas floating around in our heads too. So let's build a visual system around this work.

First, take each task and write it down on its own sticky note. Some tasks may be project related, others may be personal, and still others may be ideas for the future. Identify whether each task is easy or hard. Try to recognize which tasks you have full control over and which ones require collaboration. You may begin to see patterns in your work.

About the Author

Tim Nolan is a senior IT manager for Collin County, Texas. He is also a faculty member of the Modus Institute. Nolan has more than 30 years of experience as a leader, speaker, and geospatial practitioner.

Now that all these tasks are out of your head, we can build the personal kanban. Simplicity is key. On a whiteboard or a digital board, create the following three columns:

- Options
- Doing
- Done

Move all your sticky notes into the Options column. Then, pick the tasks that you are currently working on and move them into the Doing column. Take another look at the Options column and move any other tasks that you need or want to do into the Doing column.

Observe what you have just done: You've taken all the work that you're stressed-out about having to do, broken it down into separate tasks, and displayed it all on a board. By moving tasks into the Doing column, you have also prioritized your work.

As you go through your workday, keep your personal kanban current. When you finish one task in the Doing column, move its sticky note to the Done column. Do you feel a sense of accomplishment? You should!

Now your Doing column has space for new work. Grab a task from the Options column to fill the slot. Then complete another task in the Doing column. When that task is finished, move its sticky note to the Done column. You are engaging in that virtuous cycle of doing work, finishing it, feeling good, and starting new work.

Limit What's in Your Doing Column

Beware of moving too many tasks into your Doing column, and definitely don't move all your tasks there. Why? Think about driving.

When there are too many cars on the road, it creates congestion. You move slowly, if at all. But what about when there are only a few cars on the road? Traffic flows, and you get to your destination faster.

Instead of crowding your Doing column with too many tasks, creating congestion, let your work flow. Focus on just a few tasks, and complete them one at a time.

Only pull new work into the Doing column when you've moved something else into the Done column. This ensures that you have the capacity to take on a new task. Don't let new tasks be pushed on you. That creates a traffic jam.

How big should each task be? As a general rule, you should be able to complete each task in one day, preferably in five hours or less.

For example, let's say you are asked to recommend where to build a new fire station. Consider the many tasks that this assignment requires, from geocoding and doing driving distance analyses to identifying an appropriate property that's available for purchase. Write each of these tasks on a sticky note and put them all into your personal kanban. Let everyone—including yourself—see what it will take to complete the request. This enables you, your team, and the requester to make informed decisions about when the work needs to start and how long it will take to complete.

Limiting your Doing column takes practice. Many of us have become so accustomed to being overworked that restricting the number of tasks we're taking on is uncomfortable. Experiment with it and give it time. Having just two or three tasks in your Doing column is optimal. Eventually, you will find your flow.

How to Manage Urgent Requests

What about urgent work? Ideally, when you get an important, last-minute request, you can add the work to your Options column and get to it once you've moved the task you're working on into the Done column.

In some cases, however, you may have to stop what you're doing and start on the urgent work right away. Move the urgent task directly to the Doing column and start the work.

On your sticky note, write down why you had to do this work so promptly. Then, when you look at your Done column, see if any patterns emerge regarding urgent work. Last-minute requests break the limits you set for your Doing column, so learn from your Done column and see if you can figure out how to mitigate these requests in the future.

Simplifying the Complex

As geospatial technology professionals, we simplify the complex. We conduct spatial analysis to see trends, create dashboards to monitor conditions, and turn large reports into beautiful maps that tell a story.

When it comes to our workloads, we can also simplify the complex by using a personal kanban. Just like how we take disparate data and visualize it on maps and dashboards to help with decision-making, we can take our work tasks and visualize them in columns, helping us decide what to do now and what can wait until later.

The Geospatial Professional Network (GPN) advocates for visual management systems. Participants at the GIS Leadership Academy are introduced to the personal kanban method of organizing work. Learners create their own personal kanban board that symbolizes the start of their visual management journey and perform additional visual management exercises.

Registration is open for the GPN's next GIS Leadership Academy, taking place in Savannah, Georgia, December 8–12, 2025; and for the Advanced GIS Leadership Academy, happening in New Orleans, Louisiana, November 3–7, 2025. Visit thegpn.org/GLA for more information.

The personal kanban method of organizing work is based on Jim Benson and Tonianne DeMaria's book, *Personal Kanban: Mapping Work | Navigating Life*. Benson and DeMaria also founded the Modus Institute, an online training provider of Lean and Agile management techniques.





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Advancing Land Rights Through GIS

By Amy Coughenour Betancourt, Carolina Reynoso Pieters, and Madaleine Weber, Cadasta Foundation

This year marks a decade since the Cadasta Foundation (an Esri partner) was established with a simple, powerful idea: that maps can do more than define boundaries—they can unlock land tenure rights, economic and social opportunities, and environmental resilience.

Powered by Esri technology, Cadasta's platform and training have helped communities in 50 countries map more than 115,800 square miles of land, advancing land rights for more than 7 million people. By making land rights visible, GIS-based tools give people access to legal protections, advisory services, and a more secure future.

A Mission Born from the Global Land Data Gap

More than 1 billion people live and work on land without formal legal recognition, leaving them vulnerable to eviction, conflict, and ecological risk. Indigenous peoples, local communities, women, and youth are disproportionately affected.

For example, while Indigenous peoples and local communities manage 54 percent of the world's remaining intact forests, they legally own only 11.4 percent of them, according to the World Resources Institute. This stark gap highlights the urgency of recognizing the rights of those who care for the world's most critical ecosystems.

Cadasta was built on the understanding that communities already know and steward their land; they simply lack the tools and training to formally document and defend their land rights. The organization's mission is to democratize access to geospatial technology, making it easier and more affordable for people to claim, protect, and manage their resources.

A Decade of Impact

Since its founding, Cadasta has supported more than 100 projects in 50 countries. The organization works at the intersection of community action and institutional reform—bridging local communities and governments to ensure that land systems reflect realities on the ground. Using mapping, the organization helps people defend their identities, aids communities in deepening their resilience, and aims to build a just and sustainable future.

Alongside delivering technology and training to communities, Cadasta provides advisory services to governments to help land administration systems be more responsive, inclusive, and

accessible to historically excluded populations. This includes integrating community data into official systems, training government officials on participatory practices, and advising fit-for-purpose land administration.

Cadasta's globally distributed team of GIS and land specialists, trainers, and regional advisers—along with a committed board of directors, donors, and local partners—has enabled Cadasta to ensure that its approach is technically sound, scalable, and responsive to diverse communities.

In India, Tata Trusts and the Odisha state government worked with Cadasta to document the property rights of more than 525,000 people living in slums. This supported the issuance of occupancy certificates and broader urban upgrades, benefiting over 1 million people.

In Uganda, the organization collaborated with the Ministry of Lands, Housing and Urban Development, along with the Ujamaa Foundation and the Uganda Community Based Association for Women and Children's Welfare (UCOBAC), to support the issuance of 5,500 Customary Certificates of Ownership, securing the land for more than 45,000 individuals—nearly 19,000 of whom are women.

In Brazil, Cadasta and Espaço Feminista trained local women and youth to map 15 informal settlements. Using GIS tools, they cut survey times from months to hours. As a result, 1,370 households received formal titles, with 85 percent of those in women's names or jointly held, and new municipal laws recognizing informal settlements.

In Belize, youth mapper Analita Cal helped document her village's rivers, farms, trails, and sacred forests.

"This map is very important to the villagers because the younger generation is coming," she said. "They will get the knowledge and the information about the village—how we use the land, where we live."

Most recently, Cadasta launched the Strengthening Land and Forest Rights Program, supported by international development funding from the United Kingdom's Foreign, Commonwealth & Development Office. The program works with 13 local partners around the world to document and secure land for Indigenous peoples, Afro-descendant peoples, and frontline communities. Since its launch, the program has helped document more than 17,000 square miles of land, with 425 square miles

submitted for formal legal recognition. Through outreach, training, and mapping activities, the program has reached or supported 400,000 people, including many women and youth.

Technology That Serves People

Since 2019, Esri technology has powered Cadasta's platform. Built on ArcGIS Online and incorporating other software and apps such as ArcGIS Survey123, ArcGIS Field Maps, and ArcGIS StoryMaps, the platform enables real-time, participatory data collection, even in the most remote and resource-constrained areas. Partners can manage and act on their own data to support land registration, forest monitoring, and urban planning.

Accessibility is a priority. Cadasta's tools are mobile enabled, offline capable, and usable by people with varying technical skills. Most importantly, Cadasta ensures that communities have ownership and control over their own data and decisions.

The work of securing land rights begins with trust. Relationships come first. Additionally, no two contexts are the same: What works in Colombia may not translate to Kenya. That's why Cadasta has embedded flexibility into its technology and prioritizes training, follow-up, and long-term support.

Cadasta's role is as much about relationship-building as it is about technology—linking communities, civil society, and governments through a shared commitment to land rights.

Meeting the Moment

The demand for Cadasta's approach is stronger than ever. As foreign aid shifts and governments seek to improve their land systems to generate increased revenue, the need for community-centered, data-driven models is only growing.

Land rights are foundational to peace, equity, and opportunity. They unlock access to credit services and sustainability—especially when women and youth are central to the process.

In 2021, Cadasta received a Special Achievement in GIS (SAG) Award from Esri for its leadership in land records and cadastral fields. In 2022, Esri gave Cadasta the Sustainable Development Award for helping partners advance the United Nations' Sustainable Development Goals through impactful mapping, performance tracking, and stakeholder engagement.

To learn more about Cadasta, visit cadasta.org.

Cadasta will continue to expand its work with Indigenous peoples, local communities, smallholding farmers, and customary landholders while deepening its support for governments. But there is also a larger opportunity: to transform the land administration sector to be more inclusive, technologically enabled, and resilient. This means embracing participatory methods, centering community voices, and addressing long-standing inequalities in land access.

A Call to the Geospatial Technology Community

Ten years ago, Cadasta set out to use geospatial tools to secure land rights. A decade later, the organization has seen how land rights catalyze economic opportunity, resilience, and self-determination.

But Cadasta cannot do this work alone. That's why we are calling on the Esri user community and the global geospatial technology community to help scale up rights-based mapping and build the next generation of land systems.

We invite technology companies, governments, nongovernmental organizations, and funders to help Cadasta co-create affordable, adaptable solutions and invest in long-term systems that support data sovereignty, community ownership, and local leadership.

Maps are just the beginning. They do more than show boundaries. They represent people, relationships, history, and the future that communities around the world are working to build. Geospatial tools help make that visibility possible. But it's the people who bring the maps to life.

Together, we can build a world where everyone has the right to stay, grow, and protect the places they call home.

▼ ArcGIS Survey123 and ArcGIS Field Maps enable data collection in remote areas.



About the Authors

Amy Coughenour Betancourt is the president and CEO of Cadasta. With 30 years of experience in the social sector, she is a global thought leader in land rights, geospatial technology, and sustainable development. Carolina Reynoso Pieters is the senior director of global programs at Cadasta. Her background in climate adaptation, inclusive market systems, and land rights across sub-Saharan Africa enable her to lead global programs that support land and resource rights for local communities. Madaleine Weber is Cadasta's senior communications adviser. With experience in international development communications, Weber helps amplify stories of impact and promotes land and resource rights around the globe.

Map It, Name It: The Power of Place Names in Maps

The Relevance of Cartography A Cartographer's Perspective

By Dr. Georg Gartner

International Cartographic Association

Maps are more than simple representations of physical space. They shape people's understanding of the world, influence political and cultural narratives, and reflect historical and ideological perspectives. The phrase "if it's on a map, it matters" underscores the profound power of cartography in defining not just places but also territorial claims, identities, histories, and contemporary circumstances.

One of the most potent elements of this power lies in geographic names. These names are not just labels or arbitrary designations; they are imbued with cultural meaning, history, political messages, and more. Naming a place is an act of authority, as it reflects who controls a space and whose narratives are prioritized.

For example, colonial powers often renamed places, erasing Indigenous names and replacing them with ones that reflected their own heritage. This practice was a form of cultural domination, symbolizing control over both the land and its history. In North America, Africa, and Australia, Indigenous names were frequently replaced by European names, signifying the imposition of foreign rule. In contrast, the revival or preservation of Indigenous names represents efforts to reclaim cultural heritage and assert identity.

Let's take a look at some of the ways the names on maps both shape and are shaped by politics, identity, and culture—and how commercial interests and technology now play into this.

The Marks of Territorial Disputes and Conflicting Claims

Maps are often used to stake political claims, and geographic names are central to this process. When a country names a disputed territory on its official maps, it is making a statement about sovereignty.

Examples abound in waters where multiple nations lay claim to various islands and maritime areas. The naming of these territories reinforces each country's territorial assertions, even when those claims are contested by other nations or international law.

Similarly, the naming of cities and regions in conflict zones reflects political allegiances. In Israel and

Palestine, for instance, the naming of places can be a politically charged issue. Additionally, maps produced in other parts of the world might label the same area differently, reflecting the perspective of the mapmaker's country or ideology.

National Identity and Cultural Heritage in Place Names

Geographic names play a crucial role in national identity. Countries undergoing political or cultural change often rename streets, cities, and even regions to reflect their evolving identities. After the fall of colonial regimes or oppressive governments, renaming places is a way to reject past dominance and assert self-determination.

For instance, after gaining independence from Britain, India changed many of its city names to better reflect Indigenous heritage. Bombay became Mumbai, Madras became Chennai, and Calcutta became Kolkata. These changes were not just cosmetic but also symbolic, marking a return to local identities and breaking away from colonial legacies.

Similarly, in post-apartheid South Africa, the renaming of places was an effort to honor figures from the anti-apartheid struggle and recognize Indigenous and African heritage. Pretoria, the administrative capital, has seen parts of the city renamed to reflect Indigenous history, demonstrating how maps can serve as tools of cultural redefinition.

Changing Historical Memory Through Erasure and Resistance

When a place is renamed, it can also be an act of historical erasure. In cases where powerful nations or groups impose new names, they can effectively remove the memory of previous inhabitants and their cultures. This has happened throughout history—from the Romans renaming their conquered territories to the Soviet Union renaming cities to reflect its Communist ideology.

Resistance to such expunging can take the form of restoring old names. One example is the movement in Turkey to recognize and reinstate the original Armenian, Greek, and Kurdish names of towns and villages that were changed during periods of nationalist policies.

How Commercial Interests and Technology Impact Names on Maps

In the digital age, the way maps are created and distributed has changed, yet the power of geographic names remains significant. Online mapping services such as OpenStreetMap, Google Maps, and Apple Maps influence global perceptions of geography. The ways these

organizations and companies name disputed regions or use specific terms for places can spark controversy. For instance, debates have arisen over whether mapping services should refer to the waters between Saudi Arabia and Iran as the "Persian Gulf" or the "Arabian Gulf," reflecting the geopolitical tensions between Iran and other countries in the Middle East. A more recent debate has emerged over the United States renaming the "Gulf of Mexico" the "Gulf of America."

Additionally, commercial interests play a role in place naming on maps. The practice of selling naming rights for stadiums, parks, and landmarks demonstrates how place-names can be commodified. This phenomenon extends to digital mapping, where businesses compete for visibility on search engines and popular mapping platforms, influencing what people see and how they navigate spaces.

The Enduring Influence of Geographic Names

In an era of globalization and digital mapping, the power of geographic names is more relevant than ever. The choices made by governments, corporations, and digital platforms determine which names are seen and recognized. This, in turn, influences people's perceptions of geography, history, and current events.

As long as names appear on maps, they will continue to matter, shaping the way people understand and navigate their worlds. Thus, it is crucial to preserve their accuracy and meaning on maps. Properly displaying place-names ensures respect for local traditions while providing valuable context for understanding the geographic landscape.



About the Author

Dr. Georg Gartner is a full professor of cartography at the Vienna University of Technology in Austria. He is currently serving his second term as president of the International Cartographic Association (ICA).



AI and Location Intelligence Are Key for Major Event Security

By Fraser Charles, Dataminr

Securing major events, such as world-renowned sporting competitions or national elections, is a complex undertaking. These events involve large numbers of people and present significant security challenges. By leveraging effective technologies, event organizers can create powerful tools that enhance preparation for, responses during, and analysis after big events.

In particular, event organizers can integrate Esri partner Dataminr's AI-powered real-time risk detection tools with Esri's advanced GIS mapping and location intelligence products to improve their security strategies at every stage of an event. Here's how this cutting-edge technology combination works.

Pre-Event Planning: Lay the Groundwork for Success

Preparation is critical for major event security. Technological solutions that help organizers anticipate risks, allocate resources, and coordinate effectively are essential.

Identify Threats Early

The key to identifying threats early is investing in an AI-powered real-time information platform that can process millions of public data sources—such as social media, public sensor data, audio scanners, the deep web, and the dark web—to detect emerging risks, events, and threats and notify organizations before they escalate. This proactive approach gives organizers the lead time they need to prepare for potential security threats, traffic disruptions, or weather hazards.

Leverage Location Intelligence

Having a GIS that can bring together historic and real-time data to uncover patterns, such as crime hot spots or high-traffic zones, is imperative for building a strategic security plan. The ability to layer this information on maps allows stakeholders to visualize potential vulnerabilities and plan around them.

Before a major sporting event, for example, organizers can use GIS to dynamically create and adjust map views of key areas such as athlete housing and stadiums. These map views can be paired with real-time risk intelligence to give organizers a comprehensive understanding of potential threats and their context.

Optimize Resource Deployment

By combining real-time intelligence with geospatial data, organizers can efficiently distribute security personnel and resources to the most appropriate places. Using GIS software and apps, they can model traffic flows, simulate crowd movements, and create detailed digital replicas of event venues. During an election, for instance, local authorities can pinpoint polling stations that expect high foot traffic and prioritize sending security officers there.

About the Author

Fraser Charles is the senior director of partner ecosystems at Dataminr. He leads technology alliances with strategic partners that integrate with the company's real-time AI platform for event and risk detection.

Go to links.esri.com/dataminr-demo to learn how to deploy Dataminr's solutions and Esri technology to secure your next major event.

Enhance Collaboration

Large-scale events often span multiple jurisdictions and require coordination across agencies. Ensuring that various stakeholders receive real-time alerts and use centralized mapping tools facilitates data sharing between mobile teams, law enforcement, and other security organizations—ultimately enabling unified preparation.

During the Event: Maintain Situational Awareness in Real Time

Once the event begins, the focus shifts to live monitoring and rapid response. By leveraging real-time information from Dataminr in GIS-based dashboards, organizers can ensure that they stay a step ahead of potential disruptions.

Detect Risks in Real Time

AI-powered real-time risk detection tools that synthesize text, images, video, sound, and machine-generated sensor data excel at spotting anomalies and threats as they happen. Effective tools alert key personnel about situations such as public disorder, safety risks, or rapidly evolving weather conditions. These alerts can be integrated into an organizer's operational workflows, giving staff working the event seamless access to critical insight.

Improve Situational Awareness

Spatial analysis enables event teams to visualize threats in the context of geography. For example, during an international sporting tournament, organizers can use ArcGIS Online, ArcGIS Enterprise, ArcGIS Velocity, and the ArcGIS Solutions Watch Center solution to closely monitor potential disruptions like structure fires or violent altercations near stadiums and adjacent areas. Combining this with hyperlocal insight delivered by real-time risk detection tools, decision-makers gain a complete picture of unfolding events.

Make Decisions Rapidly

Equipped with real-time intelligence, organizers can quickly prioritize actions and redeploy resources to high-risk zones when needed. For instance, if transportation routes near a venue become congested, GIS software and apps can suggest alternative paths for attendees and notify traffic control teams about how to manage the situation.

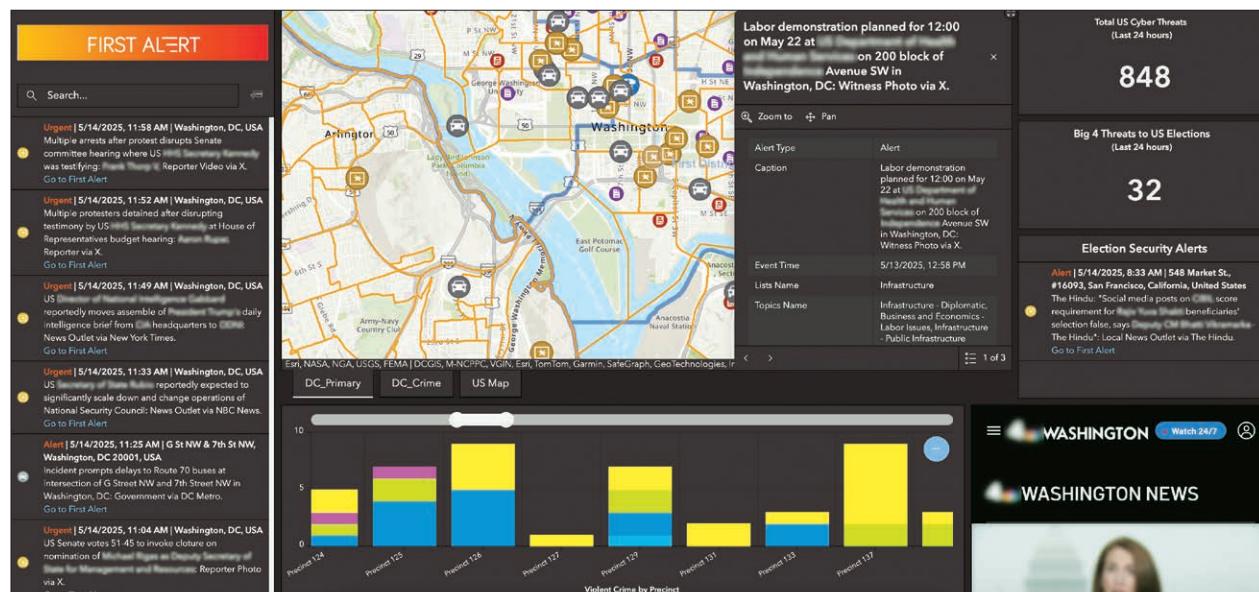
Coordinate Across Departments

Since major events often involve overlapping jurisdictions and differing levels of authority, minimizing delays and confusion is key. Incorporating real-time intelligence and mapping solutions into existing workflows gives stakeholders seamless communication.

Real-World Examples

During a recent high-profile international sporting event, organizers used Dataminr and Esri technology to create map-based dashboards to address isolated security threats and ensure safe crowd dispersal. Similarly, during recent national election events, AI-powered tools and GIS technology from Dataminr and Esri provided election security teams with insight into disruptions and helped them ensure voter safety.

↓ To detect emerging threats, an AI-powered real-time information platform, as shown in this example, processes millions of public data sources, including social media, news reports, and public sensor data.



Post-Event Analysis: Learn and Adapt for the Future

Once an event ends, conducting post-event analysis is essential. Technology that combines AI-powered real-time risk detection with geospatial capabilities allows data to be archived, visualized, and analyzed. Teams can then assess how they managed risks, where gaps existed, and what worked well. After an election, for instance, crime data collected near polling stations can help security teams improve officer deployment strategies for future elections.

Learn from Anomalies

Gaining post-event insight isn't just about resolving past issues; it also helps event organizers and security teams prepare for the future. For example, if a venue faced challenges with evacuation during an emergency, using ArcGIS to develop a digital twin of the venue could help organizers model and test alternative evacuation routes.

Reuse and Refine Security Plans

Major event security plans are complex, comprehensive, and time-consuming to develop. The ability to save, adapt, and reuse security plans for future events offers immense value. These plans, enhanced by Dataminr's real-time intelligence integrated with ArcGIS, create a record that reduces preparation time and improves outcomes for future events.

A Cohesive Operational Environment

The complexities involved in putting on large events today present organizers with a range of challenges—from dealing with large, dense crowds that can be targets for disruptive activities to coordinating events that take place in multiple locations and require coordination across private and public-sector organizations. These challenges can be addressed by integrating multiple tools and bringing various teams together in a common operating picture.

The value of effectively combining modern geospatial and AI-powered technology includes the following:

- With GIS-based digital twins, organizers can simulate venues to test scenarios and refine their security strategies.
- Organizers can leverage AI-driven location intelligence to contextualize threats specific to certain venues or event configurations.
- Systems can be scaled to meet the needs of events that range from local get-togethers to international gatherings.

Best Practices for Securing Major Events

Drawing from experience, the teams at Dataminr and Esri have developed several best practices for planning and hosting big events:

- Prioritize collaboration: Establish partnerships across agencies early in the process and maintain a unified operating picture.
- Leverage real-time insight: Use AI-driven alerts and GIS mapping to stay agile during live events.
- Plan for the long term: Develop security plans with future reuse in mind, incorporating lessons learned from past events.
- Invest in innovation: Harness the latest tools, such as GIS-based digital twins and AI, to stay ahead of emerging challenges.

Major events always require a robust and multilayered security strategy. GIS combined with AI-driven insight helps organizations plan smarter, act faster, and adapt better to potential risks.

Esri Startup Graduate Creates Digital Twin for Leading Logistics Company

Effective supply chains are crucial for ensuring that customers can access what they need, when they need it. There are many factors that can delay or interrupt a supply chain. Sometimes the consequences are a mere inconvenience, but sometimes—as in the case of food and medications—a disrupted supply chain can be disastrous. That's where Waterfront Logistics comes in.

Waterfront Logistics is a leader in supply chain solutions, known for leveraging advanced geospatial technology to optimize operations and enhance decision-making. But the company, which offers shipping and logistics services, faced a critical challenge: It had fragmented data systems functioning in silos. Essential operational data—ranging from dispatching and telematics to yard management and chassis tracking—was stored in disparate platforms, making it difficult for teams to aggregate, analyze, and act on insights efficiently.

Recognizing the need for a transformative approach, leaders at Waterfront sought a solution that would break down data silos and introduce location intelligence as a core driver of operational efficiency. They worked with ESP Logistics Technology (esplogisticstech.com)—an Esri partner that recently graduated from the Esri Startup program—to implement ESP Maestro, a cutting-edge supply chain analytics platform, along with ArcGIS Online, ArcGIS Dashboards, ArcGIS Experience Builder, and ArcGIS Notebooks, to develop a digital twin of Waterfront's supply chain that shows information in real time. Now, Waterfront has a comprehensive, geospatially informed view of its operations.

Integrated Supply Chain Data

Waterfront operates across major transportation hubs and port gateways and has an extensive portfolio of services, including yard management, intermodal drayage, full truckload, dedicated fleets, transloading, warehousing, distribution, and equipment parking. With the company's data stored and used in different systems, employees were spending a great deal of time manually creating reports and determining key performance indicators (KPIs). The lack of synchronization between telematics data and real-time dispatching and container movements caused resource allocation to be inefficient.

"Visibility and actionable data are critical within the supply chain to improve speed to market and reduce cost," said Waterfront CEO Bill Peratt.

To gain visibility of its data and be able to act on it more quickly, Waterfront partnered with ESP Logistics, which specializes in geospatial analytics and AI-driven supply chain optimization. Founded in Los Angeles, California, in 2020, the company focuses on connecting the global supply chain through a cloud-based geospatial platform to increase productivity, reduce environmental impact, and strengthen agility in the face of supply chain risks.

ESP Logistics' ESP Maestro is a data integration system that connects various datasets and links different parts of the supply chain. Powered by ArcGIS, the system hosts apps that gather,

refine, and analyze data. Each app enables asset owners to monitor and analyze their operations geospatially through real-time data collection and historical data mining.

"The ESP platform provides us with the ability to consolidate our operating systems into a single platform, digest data, and [generate actionable] outcomes," said Peratt.

Accurate, Actionable Insight

With ESP Maestro, Waterfront seamlessly integrated its telematics, yard management, and dispatching systems, merging critical data into a single, user-friendly interface. The team also deployed ArcGIS Dashboards and ArcGIS Experience Builder in conjunction with ESP Maestro to create a digital twin of its operations. This real-time operational command center, which digitally mirrors real-world activity, helps Waterfront employees holistically visualize and analyze supply chain data to make more effective decisions.

The integration of Dashboards and Experience Builder gives Waterfront's teams accurate, actionable insight into employees' work hours, fuel consumption, total dispatches, emissions tracking, and safety events. Dashboards built with these apps cover a range of issues, from KPIs and telematics to ship tracking and yard management. Being able to see analytics about turn times (how long it takes to complete a process), terminal queues (the time it takes cargo to be loaded or unloaded at a terminal), and the temporary locations of containers while they're in storage yards—all in real time—improves dispatch efficiency and reduces idle time, saving the company effort and resources.

From Predictive to Prescriptive Analytics

Waterfront's implementation of ESP Maestro and ArcGIS is just the beginning of its geospatial transformation. Having consolidated the company's supply chain data into one system and built a digital twin, ESP Logistics is now harnessing the power of geospatial AI and machine learning to provide Waterfront with real-time decision support and prescriptive modeling.

Relying on both historical and live data streams, ESP Logistics is helping Waterfront move from predictive analytics, which identify potential disruptions, to prescriptive analytics, which automate recommendations and actions to maximize network performance. Through machine learning algorithms that analyze historical data to enhance dispatch sequences, prescriptive analytics can provide Waterfront with real-time recommendations, such as dynamic routing changes, improved fleet allocations, and proactive interventions to prevent bottlenecks.

To continually refine Waterfront's spatial models and provide more profound operational insight, ESP Logistics uses ArcGIS API for Python with ArcGIS Notebooks to automate scripting and geospatial modeling. This ensures that Waterfront staff can get the most out of this best-in-class system, even if they don't have technical expertise.



▲ Dashboards help asset owners monitor and analyze their operations geospatially, in real time.



▲ Waterfront Logistics' digital twin mirrors its real-world supply chain operations.

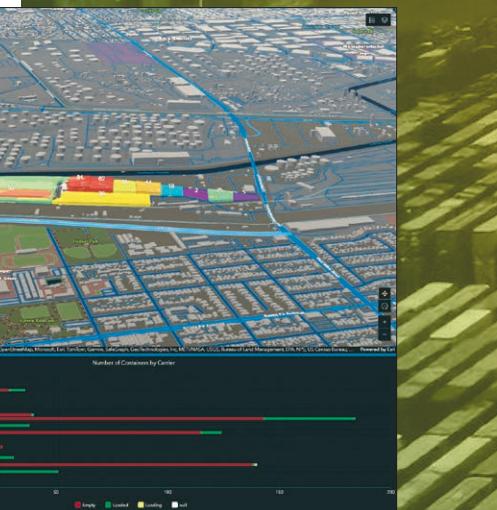
Technology for Both Today and the Future

Integrating ESP Maestro and ArcGIS has allowed Waterfront to make substantial operational improvements. Employees can access real-time data through a centralized ESP Maestro dashboard, eliminating time-consuming manual data collection.

Staff can gain a real-time understanding of yard conditions, asset locations, and queue times, which simplifies dispatch operations and helps them reduce idle time. With analytics-powered insight into in-terminal times and queue durations, employees can plan more effectively and increase efficiency. Additionally, having AI-powered emissions tracking and fuel consumption analytics helps staff reduce costs and support environmental sustainability efforts.

By integrating ESP Maestro with Esri's GIS solutions, Waterfront has seamlessly switched to a data-driven, location-aware logistics model. Waterfront's teams now have real-time insight into operations, can rely on prescriptive analytics, and benefit from AI-enhanced decision-making. As Waterfront progresses in its digital transformation, the use of geospatial AI will continue to be crucial in driving intelligent, efficient, and sustainable logistics operations.

"Looking to the future of supply chain, it is critical to have a technology platform that supports the needs of today but also continues to develop solutions for the future," said Peratt.



For more information on the Esri Startup program, go to links.esri.com/startup.



Esri Recognizes Partners for Extending the Reach of GIS in Innovative Ways

During the 2025 Esri Partner Conference, held March 9–10 in Palm Springs, California, Esri honored nine partners for their outstanding use of ArcGIS to help customers achieve their goals. The award-winning companies are recognized for implementing Esri technology in productive and innovative ways that not only extend the reach of GIS but also advance the use of geospatial technology. Read on to get to know each of these award-winning partners and what makes their work stand out.



Use of Emerging Technologies with ArcGIS to Deliver an Innovative System

samdesk | samdesk.io

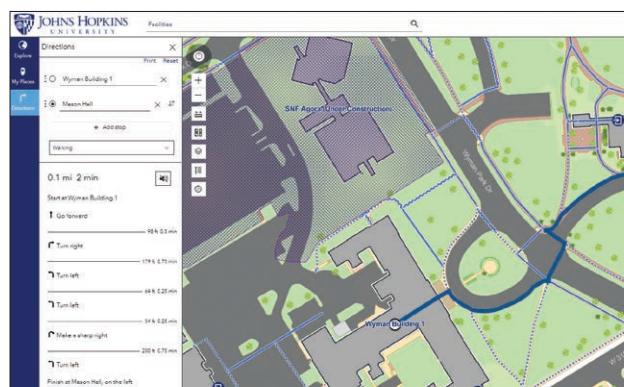
Real-time situational awareness is critical to keeping people and assets safe. Traditionally, disruptions have been difficult to spot the moment they happen—including major disruptions such as disease outbreaks, natural disasters, or geopolitical shifts. Over the last decade, samdesk has addressed this gap with its AI-powered crisis detection and monitoring platform, which provides real-time indicators and warnings for breaking events. Samdesk technology integrates with Esri's ArcGIS to deliver the geospatial dimension of crisis data, allowing organizations to visualize, assess, and act before a crisis escalates. The samdesk API puts real-time incident data directly into ArcGIS, updating every minute to furnish the most accurate, actionable intelligence available. This sets a new standard for proactive situational awareness, helping organizations such as the Los Angeles County Metropolitan Transportation Authority (LA Metro) improve its decision-making to enhance public safety.



Compelling Use of Esri Technology to Impact Current Global Issues

JMT Technology Group | jmttg.com

Staff at JMT Technology Group understand the complex world of geospatial data and are deeply committed to creating practical, user-centered GIS solutions that have a significant impact. For example, they helped build the Johns Hopkins Wayfinding App, which is available to assist about 7,000 students in navigating Johns Hopkins University's 140-acre, tree-covered Homewood campus. The company's expertise in leveraging Esri products, including ArcGIS Indoors, ArcGIS Experience Builder, and ArcGIS Velocity, helps clients understand their data in ways that would not have been possible otherwise. JMT Technology Group enables its clients to maximize the value of their collected data by designing integrated workflows, incorporating cutting-edge technology, creating tools for process management, and producing advanced visualizations. Specializing in system design and the development of spatially enabled business solutions, JMT Technology Group has extensive experience customizing and configuring Esri products and integrating them with other progressive technologies.



Successful Customer Engagement Through Partner-to-Partner Collaboration

OpenGov | opengov.com

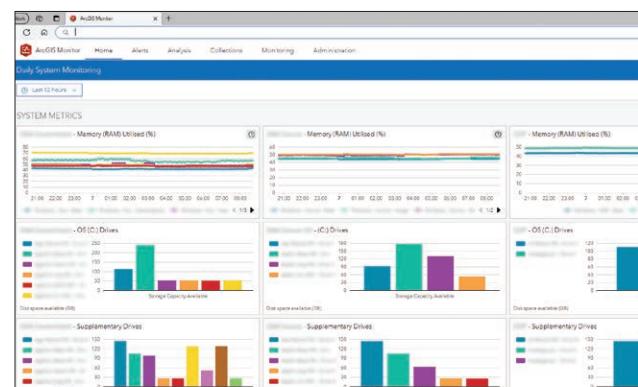
OpenGov is the leader in developing AI-enabled software for cities, counties, state agencies, and special districts—all with the goal of powering more effective and accountable government. Serving over 2,000 communities across the United States, OpenGov helps teams move beyond spreadsheets and disconnected systems by integrating ArcGIS to provide real-time, data-driven tools for asset management, work orders, permitting, licensing, and more. By eliminating inefficiencies, improving collaboration, and automating workflows, OpenGov helps agencies work more efficiently, adapt to change, and strengthen public trust. "OpenGov and ArcGIS have been such a success story across the organization," said Andy Richter, public works asset manager for the City of Colorado Springs, Colorado. "I never thought in my wildest dreams how it would just go across the entire enterprise as it has with different departments using it."



A Large-Scale ArcGIS Implementation Using Multiple ArcGIS Products

Onneer | onneer.com.au

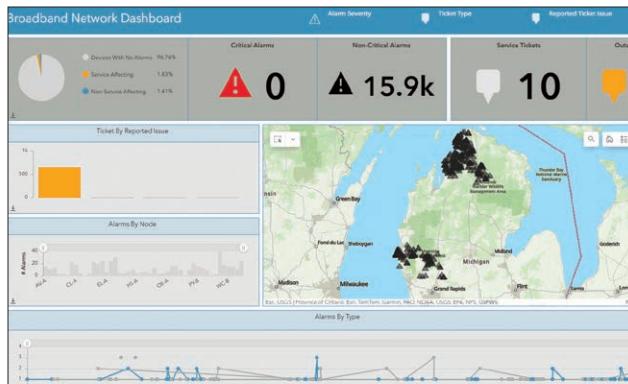
A company specializing in establishing the core of integrated geospatial infrastructure at the national level, Onneer focuses on implementing secure, sustainable, and modern enterprise GIS using multiple Esri products, including ArcGIS Enterprise and ArcGIS Monitor. Staff at Onneer understand the challenges facing public and large-scale organizations in making norm-breaking changes to their capabilities, so the company assists them with figuring out how to leverage ArcGIS as the heart of their smart, geographically driven initiatives. Onneer's ability to design, implement, and operate enterprise GIS at scale is key to its involvement in numerous large projects, including the ambitious *Digital Atlas of Australia*, which aims to provide a central platform for users to access and employ curated, trusted spatial data from across government. Onneer supports its customers' continued success with ArcGIS technology and is ready to apply its skills to various organizations' unique challenges.



Successful Integration of ArcGIS with Another IT System

National Information Solutions Cooperative | nisc.coop

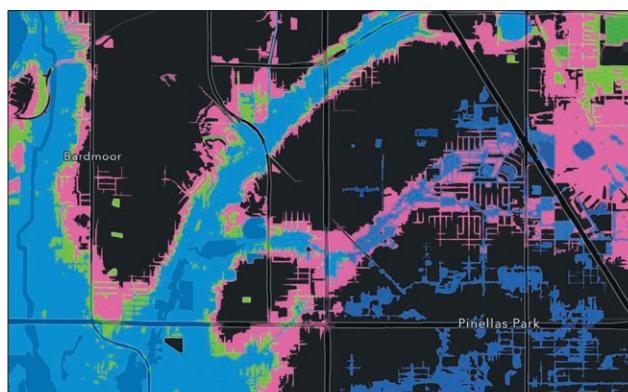
The National Information Solutions Cooperative (NISC) is an information technology cooperative that develops, implements, and supports software and hardware solutions for more than 960 independent broadband companies, electric cooperatives, and other public power entities in all 50 US states and beyond. Esri products are integral to NISC's Operations Solution, which helps provide efficiencies in building and maintaining model integrity for outage management, engineering analysis, and other business needs. The intelligent, integrated mapping tools also assist NISC's members in leveraging visual data to uncover relationships, trends, and patterns that are essential in planning and enabling data-driven operational decision-making. By combining cutting-edge mapping capabilities with members' existing data, NISC's partnership with Esri drives actionable insight that is critical for optimizing NISC's enterprise solution.



Transformative Use of Analytics

Halff | halff.com

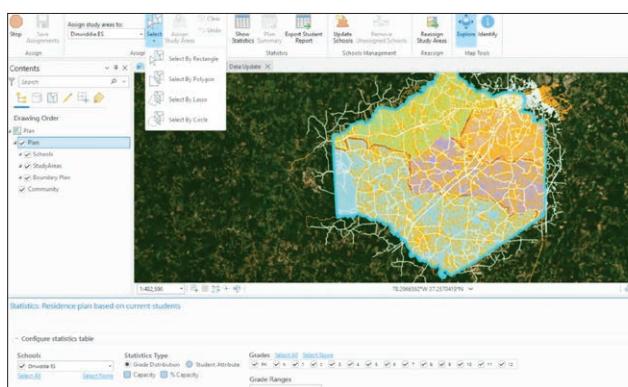
Halff is a full-service infrastructure consulting firm with a 75-year legacy of improving lives and communities. As an Esri partner for more than 20 years, Halff uses advanced Esri technology to help local, state, and national agencies mitigate risks and make data-driven decisions. The firm provides services such as flood modeling, mapping, vulnerability assessments, and asset management. Committed to excellence and innovation, Halff leverages the latest development tools and predictive methods to monitor infrastructure assets and develop flood risk products and apps that assist communities in risk prevention and improving emergency response. Halff develops and maintains asset inventories and physical and desktop condition assessments, in addition to providing professional guidance on GIS and asset management implementations.



Leveraging ArcGIS for New Markets and New Customers

MGT | mgt.us

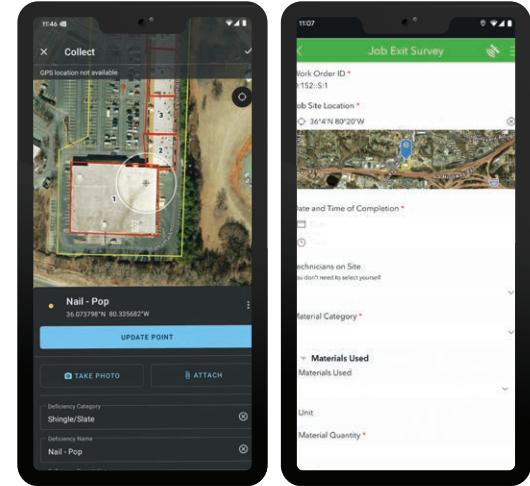
MGT partners with Esri across North America to provide advanced GIS for educational organizations and state and local government entities. Leveraging Esri's powerful software including ArcGIS Pro and ArcGIS Online, MGT delivers specialized tools, such as SchoolSite Pro, and services. These encompass comprehensive school district planning solutions that cover enrollment, boundaries, and facilities, along with critical indoor GIS and incident mapping for enhanced safety across various public sectors. MGT's expertise in spatial analysis and data integration empowers leaders to optimize operations, make informed decisions, and improve community services by employing Esri's leading GIS technology.



Successful Deployment of a New Field Asset Management System Leveraging the ArcGIS Mobile Worker User Type

GCS | gcs.yourdatasmarter.com

GCS specializes in geospatial consulting, cloud GIS migration, and business system integration to enhance operational efficiency. Serving customers in the United States and around the world, GCS empowers industries such as utilities, natural resources, and field services by leveraging advanced GIS solutions. Most recently, in partnership with North Carolina-based Highland Roofing Company, GCS deployed a field service operations solution that incorporates ArcGIS Field Maps, ArcGIS Workforce, and ArcGIS Survey123, along with Oracle's NetSuite, to optimize field asset management. The solution streamlines crew dispatching, real-time data collection, and business system integration, improving workflow efficiency, cost savings, and data accuracy. "GCS designed and developed a solution that has saved countless hours and improved throughput through operations, sales, [and] administration while enabling us to better serve our clients," said Highland Roofing Company CFO Jamie Schmidt. GCS president Mike Beltz added, "Integrating ArcGIS with business systems enables smarter, more efficient decision-making."



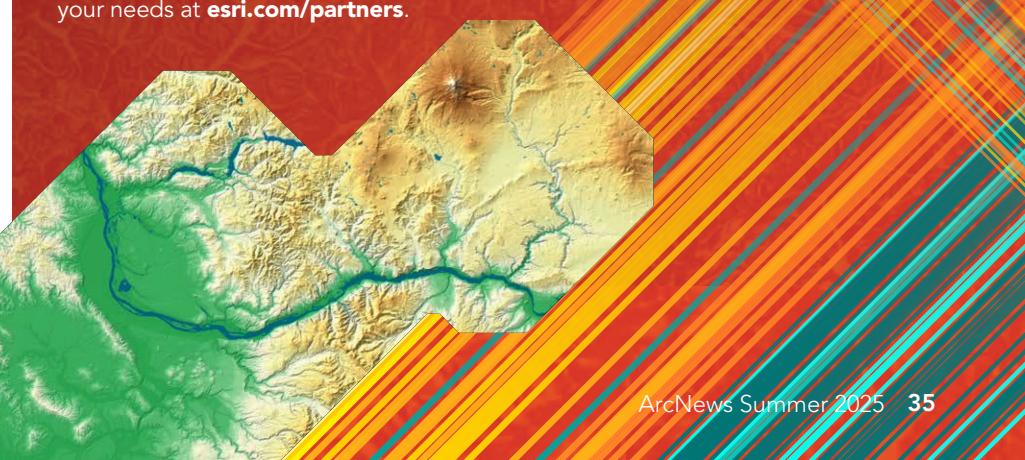
Successful Modernization of a Customer's GIS Leveraging New Esri User Types

The Sidwell Company | www.sidwellco.com

The Sidwell Company is a leading geospatial solutions provider specializing in GIS modernization for local governments. Sidwell extends and implements ArcGIS to enhance land records management, public safety, and GIS operations. Working across more than 30 US states and collaborating with Esri's US regional offices, Sidwell helps agencies adopt and utilize ArcGIS by focusing on system integration, strategic planning, and managed services. Sidwell has the State and Local Government and Parcel Management specialties and is an ArcGIS Marketplace provider. The company offers an ArcGIS bundle for local governments that includes ArcGIS Pro, ArcGIS Enterprise, ArcGIS Online, ArcGIS Parcel Fabric, the Equitable Property Value solution, and the Agricultural Parcel Analysis solution, along with Sidwell's Parcel Administrator solution. Clients such as Jefferson County, Alabama, benefit from improved efficiency, better data quality and accuracy, and enhanced public engagement.



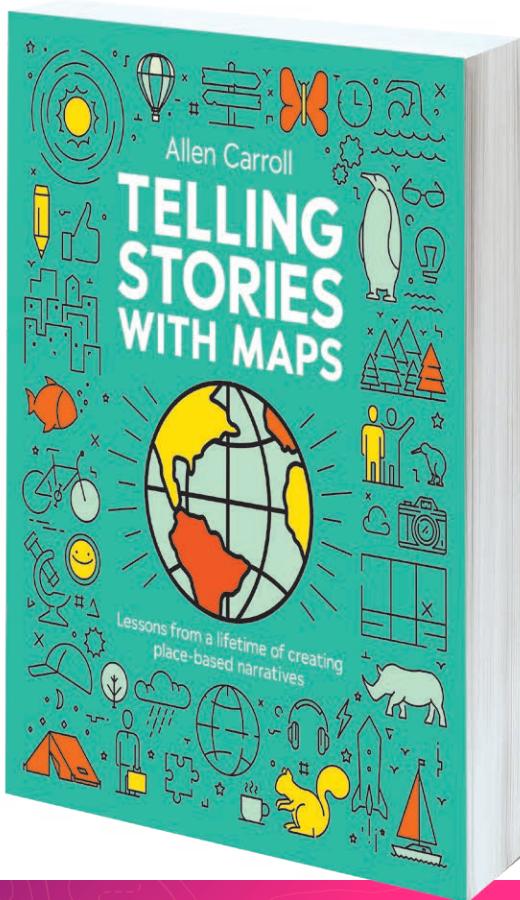
Esri partners represent the rich ecosystem of organizations around the world that work together to extend the ArcGIS system and implement it in distinct ways to solve specific problems. Find partners that meet your needs at esri.com/partners.



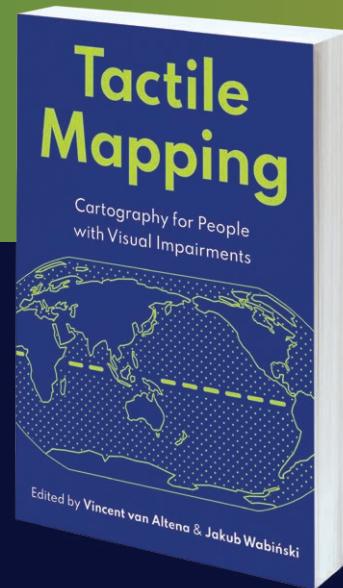
NEW BOOKS FROM Esri Press

**Telling Stories with Maps:
Lessons from a Lifetime of Creating
Place-Based Narratives**
By Allen Carroll

While humans have used maps for centuries—from scraping patterns in the sand to charting every place on Earth—the digital age has revolutionized the way maps are created, distributed, and consumed. The internet forged enormous opportunities for storytelling, enabling maps to interact with other multimedia elements, including photos, videos, audio, and text, to tell countless tales about the world. In *Telling Stories with Maps: Lessons from a Lifetime of Creating Place-Based Narratives*, author Allen Carroll brings his 27 years of experience working for both the National Geographic Society and Esri to showcase how maps tell stories and enrich narratives by providing context and insight. The book, which features a foreword by Lonely Planet cofounder and renowned travel writer Tony Wheeler, contains rich illustrations, with examples ranging from traditional maps to the latest digital visualizations. Readers will be inspired to produce place-based narratives that intrigue their audiences. June 2025, 244 pp. Ebook ISBN: 9781589487956 and paperback ISBN: 9781589487970.



This book will be available at the 2025 Esri User Conference, and there will be a book signing. Visit the Esri Press booth to find out more.



Tactile Mapping: Cartography for People with Visual Impairments
Edited by Dr. Vincent van Altena and Dr. Jakub Wabiński

While most people rarely think about their eyes' capacity to capture the world around them, for many people, injuries, illnesses, aging, and other health issues hinder their ability to see and navigate their surroundings. When it comes to maps, assistive technology can only do so much and often can't relay the nuances of a landscape, changes in elevation, or the presence of nearby bodies of water. This lack of geographic awareness makes it difficult for people with visual impairments to explore unfamiliar neighborhoods and gain a geospatial understanding of local, regional, and international phenomena. Tactile maps can be life-changing for people with visual impairments, offering them greater independence and inclusion. Yet much of the research done in this field has been inaccessible to a broader audience. *Tactile Mapping: Cartography for People with Visual Impairments* aims to bridge this gap by exploring the subject from a multidisciplinary perspective, illustrating cartographic theory with real-life case studies and user stories. A collaboration among skilled professionals, domain experts, and people with visual impairments, *Tactile Mapping* offers fresh insight from three perspectives: user experiences, scientific research, and practical implementations. The book offers cartographers and other geographic practitioners new knowledge on the foundations and methods of presenting geographic information in more accessible ways. August 2025, 270 pp. Ebook ISBN: 9781589488366 and paperback ISBN: 9781589488359.

Got Tilt?

**Introducing:
New Skadi Tilt Compensation™
from Eos Positioning Systems®**

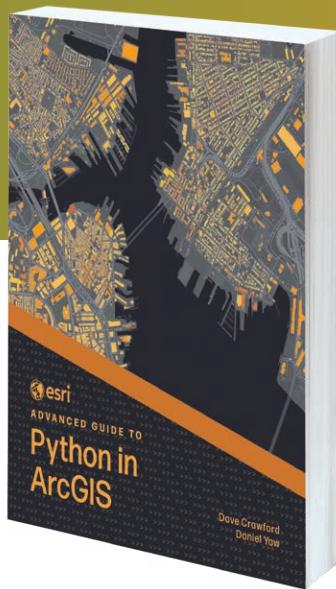
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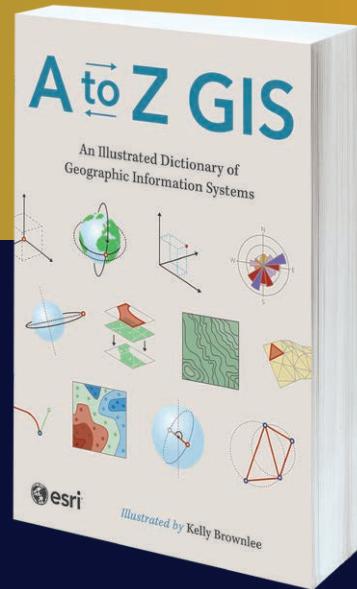
www.eos-gnss.com



Esri Advanced Guide to Python in ArcGIS

By Dave Crawford and Daniel Yaw

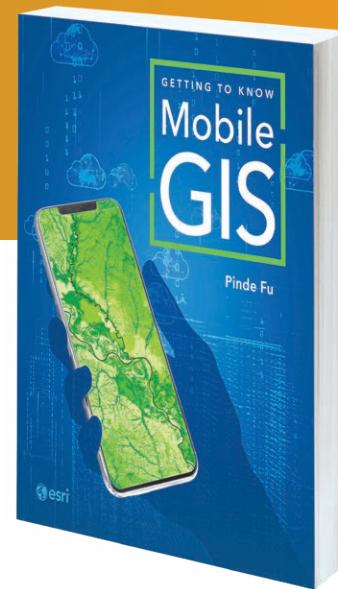
Are you ready to take your Python knowledge to the next level? *Esri Advanced Guide to Python in ArcGIS* teaches readers how to integrate Python with ArcGIS capabilities. With step-by-step tutorials that get increasingly complex with each chapter, authors Dave Crawford and Daniel Yaw teach readers technical and problem-solving skills that can be applied to job-focused assignments, including understanding client needs, performing market analytics, and managing ArcGIS Online organizations. Intermediate and advanced programmers looking to enhance their GIS capabilities will be able to take the concepts outlined in the book and immediately use them in projects. June 2025, 268 pp. Ebook ISBN: 9781589488243 and paperback ISBN: 9781589488236.



A to Z GIS: An Illustrated Dictionary of Geographic Information Systems

By Esri

As GIS has evolved and grown, so has the language of this powerful technology. With more than 1,400 new terms and nearly 400 high-quality illustrations, the third edition of *A to Z GIS: An Illustrated Dictionary of Geographic Information Systems* helps readers elevate their understanding of GIS. Written, developed, and reviewed by more than 200 subject matter experts, this comprehensive, fully cross-referenced dictionary—with nearly 3,000 terms in total—is essential for managers, programmers, users, writers, editors, and students discovering the interdisciplinary nature of GIS. March 2025, 354 pp. Ebook ISBN: 9781589488120 and paperback ISBN: 9781589488113.



Getting to Know Mobile GIS

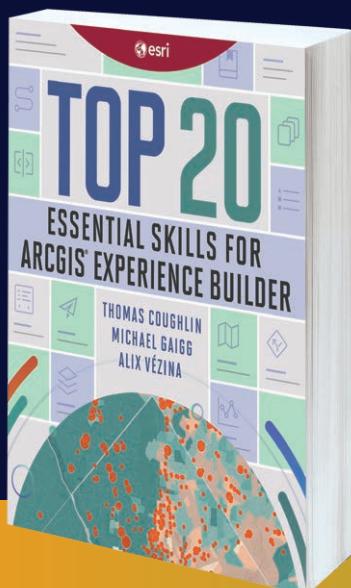
By Dr. Pinde Fu

“Mobile first” and the “post-PC era” aren’t just buzzwords; they represent today’s reality. Within the GIS industry, the mobile internet has profoundly transformed how people acquire, visualize, analyze, and disseminate geospatial information. *Getting to Know Mobile GIS* helps GIS professionals and students grasp the opportunities presented by Mobile GIS across business operations in a variety of organizations. Using a low- to no-code approach, the book includes detailed tutorials that make the principles of Mobile GIS fun and easy to learn. It helps readers become immediately productive in creating enterprise GIS solutions for online and offline spatial data visualizations, data collection, location sharing, and workforce coordination. February 2025, 286 pp. Ebook ISBN: 9781589488083 and paperback ISBN: 9781589488076.

Top 20 Essential Skills for ArcGIS Experience Builder

By Thomas Coughlin, Michael Gaigg, and Alix Vézina

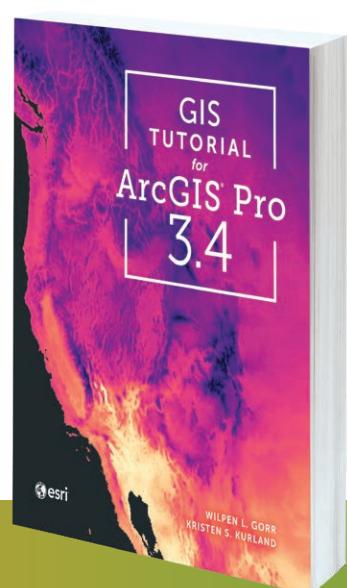
Beginners and experienced GIS users alike will gain a better understanding of how to use ArcGIS Experience Builder by reading *Top 20 Essential Skills for ArcGIS Experience Builder*. In bite-size chapters, readers learn what kinds of apps they can make with Experience Builder and how to make those apps look good. Each of the chapters takes about 45 minutes to complete and, together, they cover how to create apps to visualize data, perform analysis, explore 3D environments, and more. July 2025, 346 pp. Ebook ISBN: 9781589487925 and paperback ISBN: 9781589487949.



GIS Tutorial for ArcGIS Pro 3.4

By Dr. Wilpen L. Gorr and Kristen S. Kurland

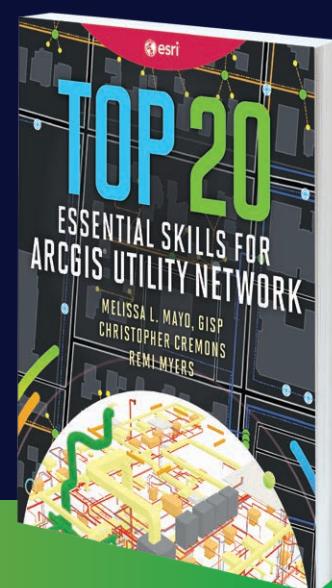
GIS Tutorial for ArcGIS Pro 3.4 is the premier book for anyone looking to learn ArcGIS Pro. Written by award-winning Carnegie Mellon University instructors Dr. Wilpen L. Gorr and Kristen S. Kurland, *GIS Tutorial for ArcGIS Pro 3.4* introduces readers step-by-step to basic ArcGIS Pro skills, such as how to design a map, use file geodatabases, perform geoprocessing and geocoding, and do spatial analysis. June 2025, 326 pp. Ebook ISBN: 9781589488175 and paperback ISBN: 9781589488151.



Top 20 Essential Skills for ArcGIS Utility Network

By Melissa L. Mayo, Christopher Cremons, and Remi Myers

Top 20 Essential Skills for ArcGIS Utility Network is a practical guide for GIS technicians and analysts who already use ArcGIS Utility Network or are migrating to it. The book focuses on 20 essential skills for using Utility Network that were chosen based on user input and suggestions, as well as troubleshooting done over the past few years. Short, to-the-point chapters with detailed tutorials simplify important tasks, giving readers a solid foundation in Utility Network workflows and processes. July 2025, 268 pp. Ebook ISBN: 9781589488281 and paperback ISBN: 9781589488274.



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Training

Build Effective Apps with ArcGIS Experience Builder

Developed and delivered by in-house experts, Esri's instructor-led courses serve GIS beginners and experts alike. They teach new workflows and essential concepts, enabling participants to glean better insight from data, improve operations, and meet complex challenges.

A new course called **ArcGIS Experience Builder: Advanced Techniques** is for anyone who wants to expand their foundation-level ArcGIS Experience Builder skills. Over two days, attendees learn how to design and build responsive and accessible web apps that feature GIS content or capabilities. The course covers workflows and best practices for how to effectively leverage data views, configure popular widgets, and integrate other ArcGIS apps into a web app—all without writing code. Learn more at go.esri.com/aeb-advanced.

For those who don't yet have foundation-level Experience Builder skills, the **Building Web Apps with ArcGIS Experience Builder** instructor-led course is a perfect place to start. Explore course details at go.esri.com/aeb-intro.

When multiple staff members need to be trained for a GIS project or on a new ArcGIS implementation, organizations can hold private classes—and then extend this experience by adding a coaching session. In a coaching session, the instructor reinforces knowledge and skills via in-depth discussions and demonstrations that tie directly into the organization's workflows, environment, and data. Learn more at go.esri.com/coaching-day.

Organizations can also streamline access to instructor-led training by getting an Esri Training Pass. Find out more at go.esri.com/trpass2025.

Get New ArcGIS Tips and Tricks in Just One Hour

Esri Academy's live training seminars provide a great way to learn GIS concepts and workflows fast. These one-hour seminars cover tips and tricks, best practices, and ArcGIS software demonstrations. Each live seminar is presented twice (on a Thursday), recorded, and made available for free.

The next live training seminar will cover geospatial artificial intelligence (GeoAI) in ArcGIS. View upcoming seminars at esri.com/lts, and check out all recorded training seminars at go.esri.com/recording. Recently recorded seminars include the following:

- Power Data-Driven Decisions with ArcGIS Dashboards
- ArcGIS Drone2Map Essentials
- ModelBuilder in ArcGIS Online Map Viewer

An Exciting Fall for MOOCs

Massive open online courses (MOOCs) provide a great way for people to invigorate their GIS learning. Over six weeks, participants learn about trending topics and new workflows that help them advance their own knowledge and improve their work.

Registration is currently open for the following MOOCs:

- **Cartography.**—Anyone can make beautiful maps, and this MOOC, which runs from August 27 to October 8, shows participants how. Experts discuss mapping tips and techniques while highlighting the knowledge and skills needed to make maps beautiful, accurate, and easy to interpret. Sign up at go.esri.com/carto-mooc-2025.
- **Spatial Data Science: The New Frontier in Analytics**—Attendees of this MOOC learn data-engineering workflows and how to gain insight from data using spatial methods and algorithms, regression analysis, deep learning models, space-time cubes, and more. This MOOC runs September 17–October 29. Sign up now at go.esri.com/sds-2025.
- **The ArcGIS Imagery MOOC: Foundations and Frontiers**—There are many uses for and types of imagery, and imagery's integration with GIS is rapidly expanding. This brand-new MOOC shows participants a modern approach to utilizing imagery and remote sensing capabilities to solve real-world problems. Be sure to join this first offering of the MOOC, which begins October 22. Sign up at go.esri.com/imagery-mooc-2025.

Each MOOC includes access to software, a forum with peers from around the world, expert videos, guided exercises, and a certificate of completion.

Certification

Validate Your Expertise

Young professionals and seasoned ArcGIS users alike can leverage the Esri Technical Certification Program to establish their credibility, validate their skills, and advance their careers.

"Becoming Esri certified has significantly enhanced my professional and academic journey. It has validated my expertise in GIS and spatial analysis, providing me with the confidence to tackle complex geospatial challenges," said Onyedikachi Joshua Okeke, a spatial statistician and GIS analyst who recently earned his master's degree. "Employers and collaborators recognize the certifications as a testament [of] my proficiency in using Esri tools like ArcGIS Pro for geospatial data analysis, visualization, and decision-making."

Check out the exams that are currently available at go.esri.com/get-certified. And watch for updated ArcGIS Enterprise exams being released later this year.

Go to esri.com/training for more information.

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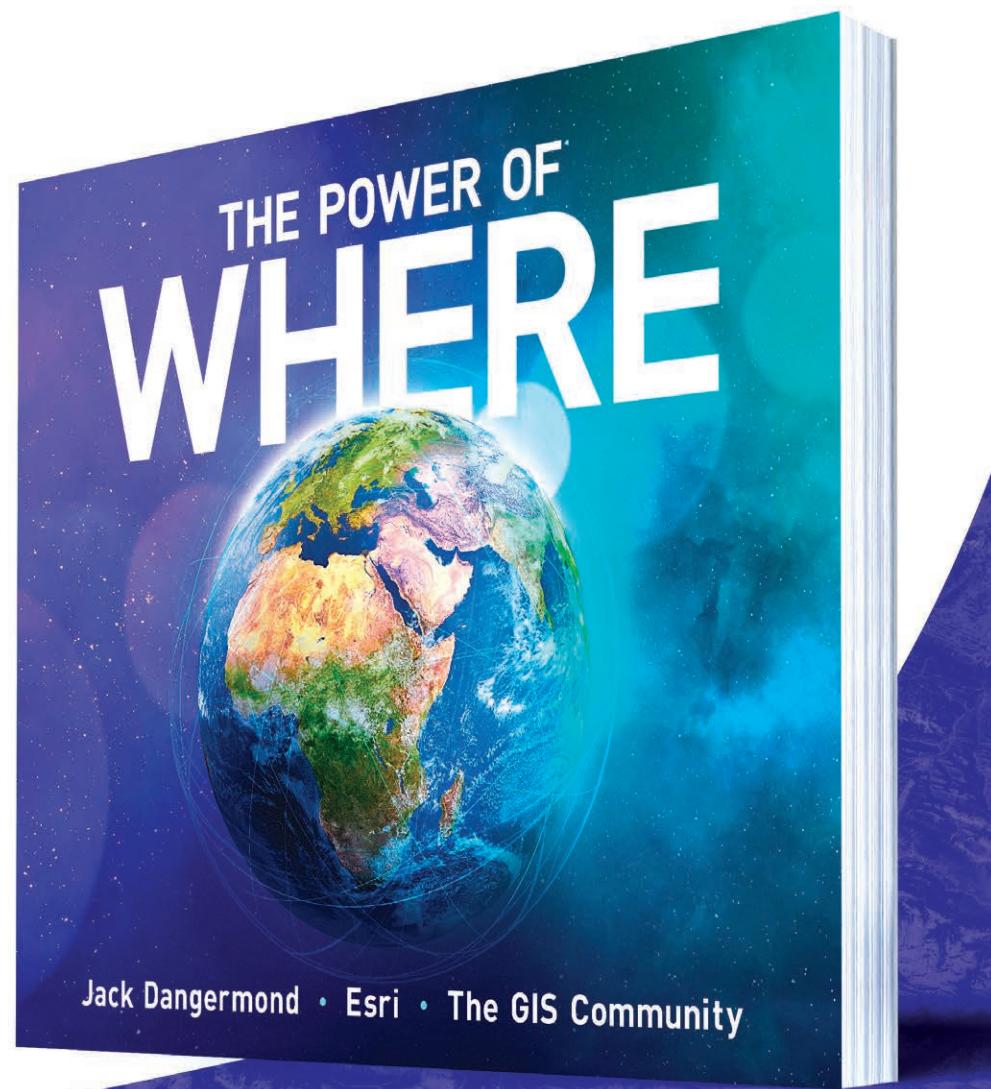
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