Esri News
for State & Local Government

Yolo County's Enterprise GIS Approach to Elections

In 2018, Yolo County, California, embarked on a journey of continuous innovation by integrating location-based solutions into its election operations. Today, the county continues to expand the use of geographic information system (GIS) technology in every aspect of elections, demonstrating that true innovation is not a onetime event, but a sustained effort.

The Yolo County Elections Office improved how it dispatched assistance and displayed election results during the 2018 midterm elections. Significant progress has been made since its first implementation of ArcGIS Enterprise. The office has a clear understanding that elections are spatial. To employees, it's about knowing where ballots are, where voters live, and where more resources are needed; dispatching staff to resolve concerns; and informing election winners.

Having the Vision to Keep Improving Through GIS

Before 2018, staff relied on phone calls to intake assistance requests for voting locations, and then would have to call

their Election Day rovers to see who was nearby to address any concerns. Employees then turned to a workflow using ArcGIS Workforce and ArcGIS Dashboards that showed a complete overview as requests came in, automated assignments based on location and availability of rovers, and real-time progress as assignments were completed.

"At the time, seeing where staff were on a map and knowing who was nearby gave control back to our Elections Office," said Jesse Salinas, assessor, clerk-recorder, and registrar of voters for Yolo County. "We knew what was happening when and could follow up with staff if things were taking longer than expected."

Salinas continued, "That instance showed how the functionality of a map and GIS can provide so much insight. And if it can simplify the workload there, it could also streamline other aspects of our work."

Since then, Yolo County staff have moved from street-range-based addressing in their election software to address point. The election and GIS teams worked together to verify addresses

against the county's primary address database to provide greater address accuracy, which is essential to making sure voters receive the correct ballot.

"Our Elections Office just gets it. They know that to provide our residents with the best service, they must think spatially and determine how location is the basis of every part of their work," said Mary Ellen Rosebrough-Gay, GIS manager for Yolo County. "Now, each time they come up with a new idea for a workflow, they ask how GIS can support it."

Today, the Yolo County Elections Office, in collaboration with the county's GIS team, has established an Election Day command center site using ArcGIS Experience Builder. This site features several operational dashboards that support individual workflows crucial to opening a voting center, ensuring proper language resources at voting locations, tracking real-time ballot movement, managing wait times, and reimbursing volunteers' mileage. The value of GIS, once part of a single workflow, has now permeated every aspect of the county's Election Day operations.

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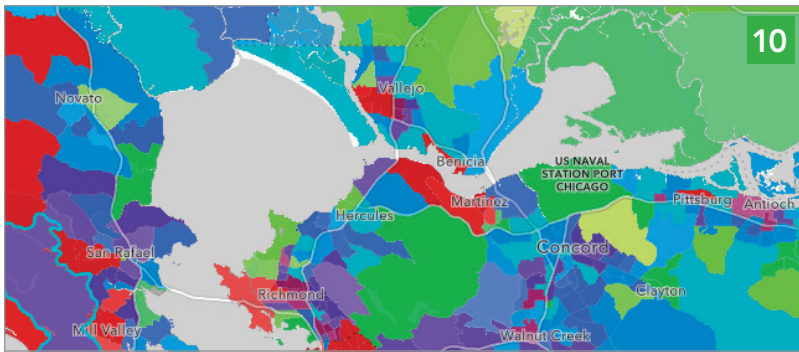
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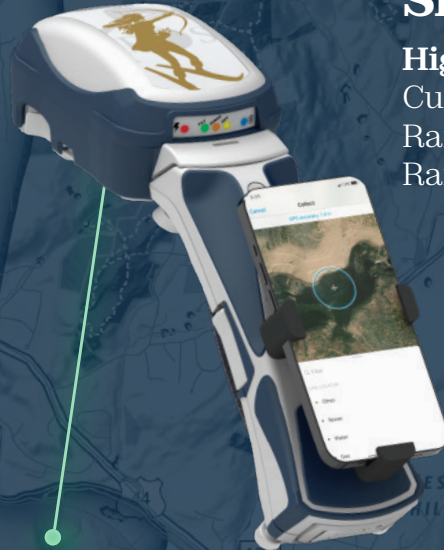
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Yolo County's Enterprise GIS Approach to Elections continued from cover

Robust Ballot Collection Workflow

When staff are dispatched to collect ballots, their location is pinged every 30 seconds from the moment they leave election headquarters to when they return from their assigned voting location. At that point, ballot collection staff input how many ballots were collected and at what time, along with other necessary information, and take pictures using ArcGIS Survey123. That information is then fed to a real-time dashboard that office staff can see. As ballot collection staff drive to drop box locations, the dashboard shows their bread crumbs of where they have been and where they are heading to ensure that they are taking the most optimal routes.

"As soon as 8:00 p.m. hits, ballot counting begins, and the pressure is on. Knowing which voting location's ballots need to be retrieved gives me a clear understanding of where we are in the process," said Armando Salud-Ambriz, Yolo County deputy of elections. "It can get very intense and stressful. Having a map where I see where the ballots are coming from ensures nothing gets overlooked."

As ballots arrive, election staff recount the ballots and then reenter what they counted into a form that feeds the information on their Ballot Collection Counts dashboard to ensure that the recount and the initial count match. As staff sign off information within the application, it ensures that no ballot is uncounted. If there is a discrepancy, staff can address it then and there. When this happens, each step is time-stamped in GIS for further reporting services or any possible audits. Again, every piece of information related to ballot collecting is recorded and stored in the county's GIS. The data being collected can go beyond this workflow to support yearlong planning efforts and analyses.

Impact of GIS Technology on Ballot Collection

Once the ballots are accounted for, election staff can use the information collected to further analyze how each vote center and drop box performed. Previously, because the ballot collection data was handwritten on paper forms, transcribing the data on spreadsheets was so time-consuming that conducting further analysis was always an afterthought. Now that ballot-related information is recorded and uploaded directly into the GIS, the county can quickly filter through the data to create additional dashboards that provide more insight on overall performance

The county's Elections Office can now see when the voting spikes occurred and which voting locations and options peaked on what days. Having access to information like this on the fly allows county staff to quickly see where they can make future adjustments or determine which communities may need additional drop boxes. The more quickly staff have answers to the questions that come right after an election, the sooner they can allocate time and resources to improve the next election. Using a GIS-enabled election management system, the technology in their workflows is constantly storing every bit of information to respond to any need, question, and possibility that may arise and provide insight they didn't have before.

As with any election, everyone involved is waiting for election results as soon as voting locations close. As part of one of the original workflows the county used GIS to conduct, county staff moved away from tabulated results that only displayed result counts per candidate and measures, and toward multiple interactive dashboards that displayed who won where. The Elections Office continues to display county election results via interactive web maps that foster transparency. After so many years of maintaining this data in GIS, staff can

→ The Election Day command center site that features several Election Day dashboards is a one-stop shop where all real-time data being collected simultaneously is housed and can be viewed by supervisors.
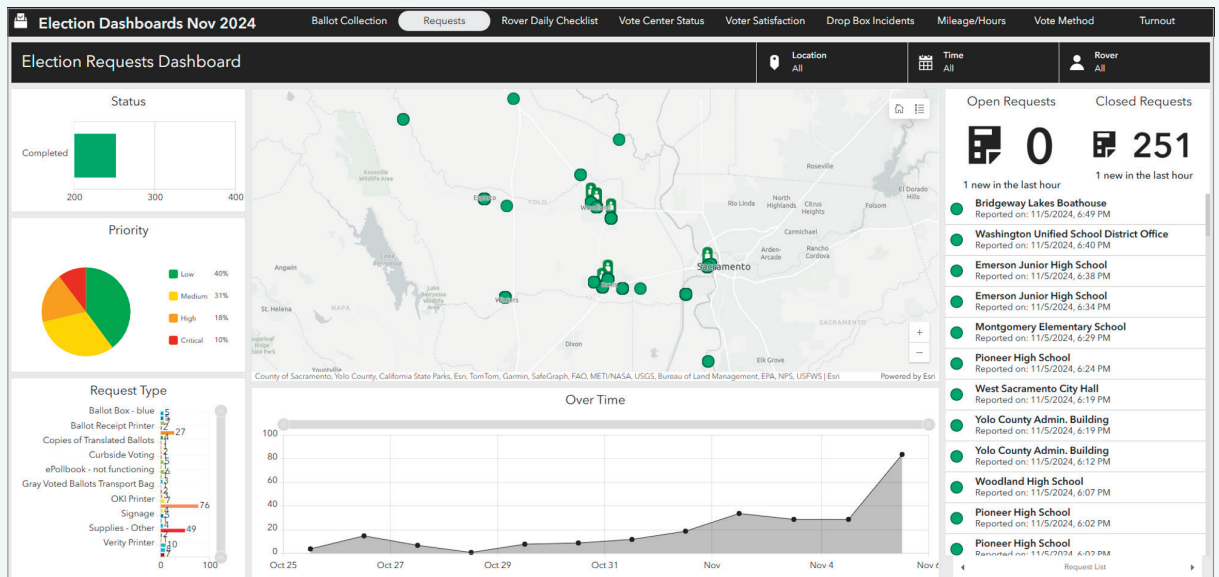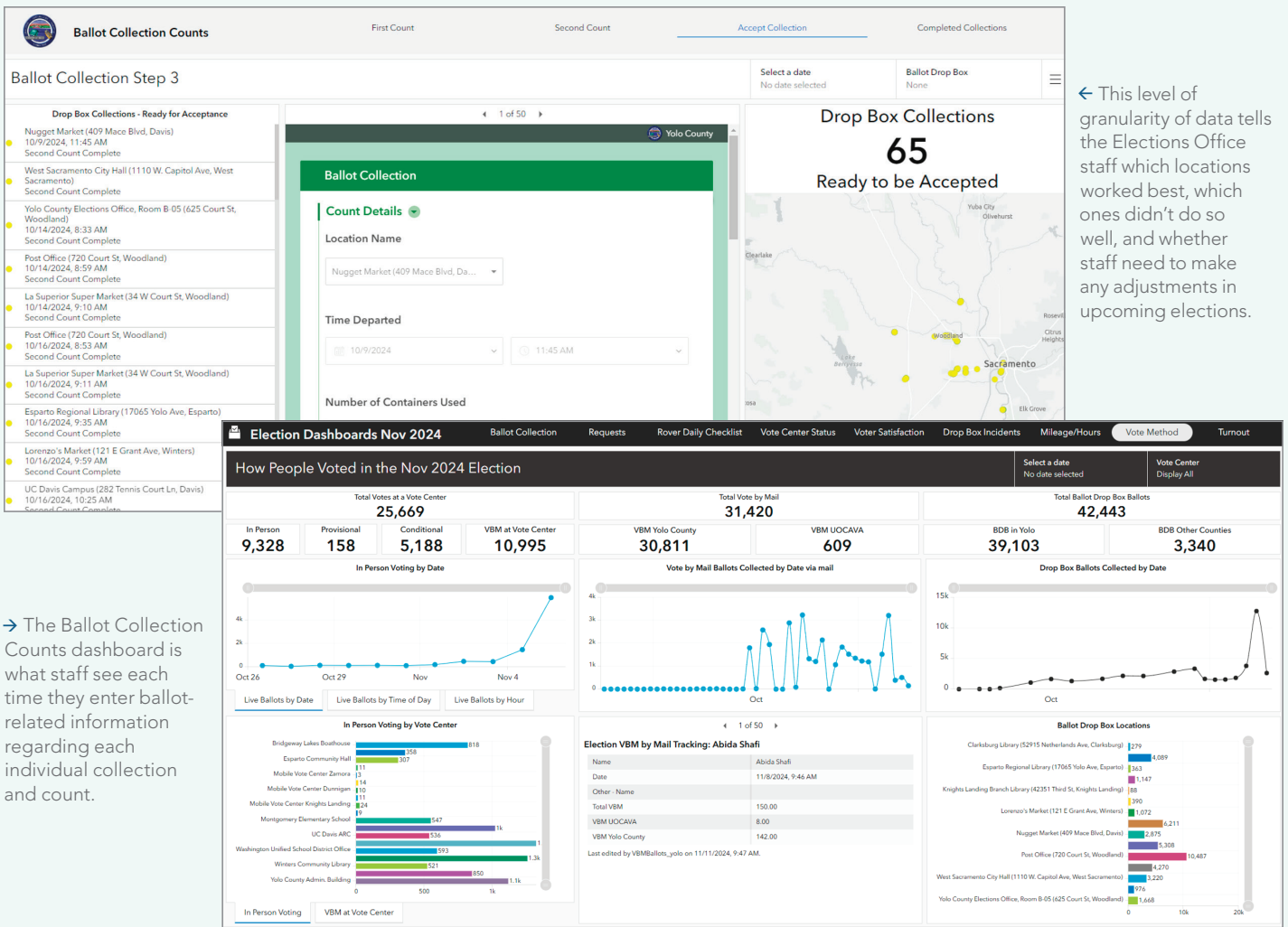
← This level of granularity of data tells the Elections Office staff which locations worked best, which ones didn't do so well, and whether staff need to make any adjustments in upcoming elections.

→ The Ballot Collection Counts dashboard is what staff see each time they enter ballot-related information regarding each individual collection and count.

also compare voter turnout year over year, demonstrating the long-term value of the data and the consistency of the election process.

Maximizing the Value of Election Data to Support Outreach

The county also has voter turnout data that goes back to 2018 in GIS. This helps pinpoint which precincts have had low voter turnout over the years. Prior to 2018, Salinas's goal was to look at patterns of low participation in the various neighborhoods and develop strategies to change the less engaged election patterns of the past toward greater participation in the future.

Today, he and his team are doing just that. The county can display voter information on a map and overlay other variables and demographic information

to fully understand who recently participated and uncover any barriers to voting. For example, because the team members have each registered voter's address, they can calculate the commute time for each voter in relation to existing voting locations and determine whether those locations are optimal. Additionally, the team can see what languages are predominately spoken in areas of low turnout and voter registration.

As county staff begin to see which neighborhoods need more resources, they can continue to double down on these areas and prioritize their voter outreach efforts. Yolo County has recently partnered with a local nonprofit to canvas neighborhoods with low turnout. County staff have equipped volunteers going door-to-door with an ArcGIS Survey123 form. After visiting

each household, the volunteers are asked to input information about their interaction, whether they left voting resources, and the predominant household language.

Similarly to previously mentioned workflows, that data is then fed to a dashboard in real time to inform the Elections Office of overall progress per neighborhood and gather authoritative demographic data.

Beyond the countywide required mailings, the county can now provide additional focused outreach to lower turnout areas, which will ultimately save the county thousands in resources.

For more information on how to use GIS for your next election, go to go.esri.com/GIS4Elections.

Effectively Manage GIS Service Delivery with the GIS Request Management Solution

By Brandi Rank and Dan Wickens

ArcGIS Solutions helps you make the most of your GIS by providing purpose-driven, industry-specific configurations of ArcGIS technology.

Various state and local government organizations use GIS technology to manage location-based data, derive insights, optimize operations, and engage internal and external stakeholders. Traditionally, expertise in GIS evolved within distinct business units or departments and was tailored to meet their specific requirements. However, with the increasing adoption of GIS, there's a growing inclination to integrate it with other IT services and amplify its business impact. Consequently, organizations are combining resources into dedicated GIS service providers and tasking GIS professionals with delivering services across all divisions. Clearly defining the GIS services you provide and effectively managing their delivery is crucial. Understanding customer satisfaction and communicating the business impact of GIS services promotes the sustainable use of GIS technology in an organization. It also helps organizations justify any investments required to expand the use of GIS technology.

Esri's GIS Request Management solution delivers a set of capabilities that help GIS service providers solicit requests for service, manage the delivery of GIS services, and promote the value of GIS to internal stakeholders.

Enrich Organizational Engagement

Maybe your CIO is thinking about consolidating IT services and service providers and transferring the systems to a larger IT organization. Or perhaps your organization is undergoing deep budget cuts and executives see GIS as fractured or redundant. As a GIS manager, you're at a crossroads. Either you come out of your technical comfort zone and quickly learn to think
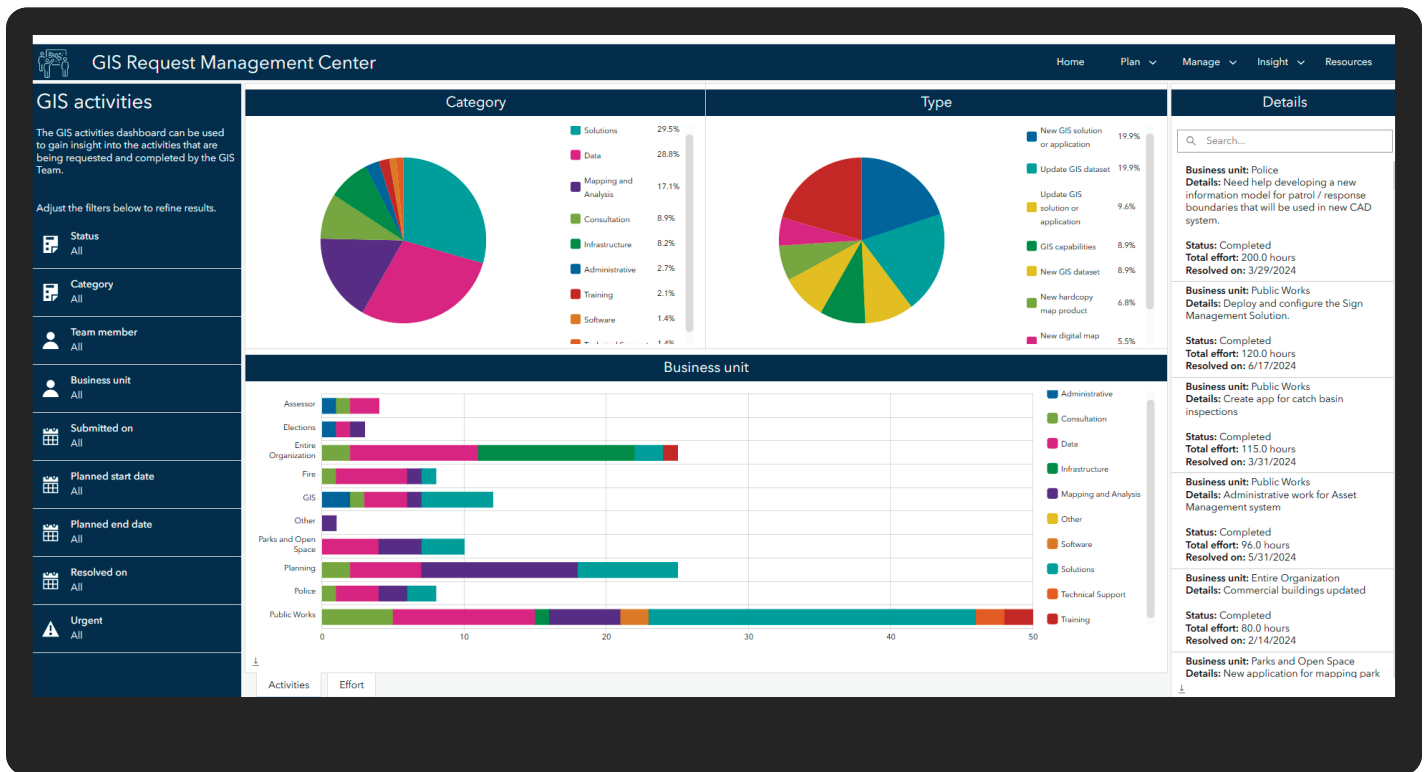
↑ A dashboard enables GIS managers to understand requests as well as the related activities performed for internal stakeholders.

↑ GIS managers can use a dashboard to handle GIS requests as well as to understand planned activities and team member capacity.

↑ Internal stakeholders can visit the GIS Service Center site, created using ArcGIS Hub, to gain access to geospatial products and relevant services.

strategically about outcomes and business value, or you risk losing employees, funding, or even your entire program.

How can the GIS Request Management solution help? The solution includes several pre- or partially configured apps that help drive increased participation and collaboration in your organization:

- A hub where you can share key GIS program information with internal stakeholders, increase GIS knowledge in your organization, and proactively deliver relevant GIS services
- A digital form for internal stakeholders to request ArcGIS accounts, which you can then use to grant them access to existing GIS maps, apps, and data
- A digital form for internal stakeholders to request GIS services, which allows you to capture relevant information and begin the GIS service delivery process
- A dashboard for you to monitor and manage GIS requests efficiently

Streamline GIS Service Delivery

Perhaps you have developed a geospatial strategy or road map that has established a vision and path to organizational success, but you aren't sure how to implement it. GIS Request Management includes apps that can help you organize GIS activities that are aligned with your GIS strategy or road map:

- A digital form for staff to record additional GIS activity, allowing you to catalog required GIS work and incorporate it into your GIS service delivery process
- An app to manage ArcGIS account requests, allowing you to provision access to GIS maps, apps, and data efficiently
- A series of apps to manage and quickly resolve GIS requests

and related activities, which helps maintain organizational confidence in GIS services
- An app for you to monitor GIS service delivery to ensure that GIS resources are allocated effectively and that GIS requests and related activities are aligned with your GIS strategy

Improve GIS Program Performance

Lastly, don't underestimate your role as a customer service provider. What if your team missed a critical deadline and now your team is no longer trusted? How can you be sure that you are doing a good job promoting your services and managing service delivery if you don't know how your customers feel about the services you provide? GIS Request Management includes apps that help you collect this critical information, allowing you to adjust and adapt your services when necessary:

- A digital form to capture internal stakeholders' satisfaction with how you resolve GIS requests for service and related activities
- An app to monitor GIS service delivery, allowing you to ensure that GIS requests and related activities are aligned with customer needs and your organization's business strategies

Managing a GIS program is hard work, but it's also necessary. Fortunately, the GIS Request Management solution can help you with some of your managerial needs.

Learn more about the GIS Request Management solution.

Transforming State and Local Government Operations with ArcGIS Workflow Manager

Enhancing Government Efficiency and Service Delivery

Managing critical infrastructure and delivering essential services are paramount responsibilities for state and local governments. However, these organizations often face challenges in optimizing efficiency, productivity, and accuracy.

ArcGIS Workflow Manager emerges as a powerful solution, offering a framework to enhance the way governments manage submissions and approvals, field operations, and infrastructure design and asset management, to name a few examples. Workflow Manager is a scalable workflow management system that orchestrates repeatable GIS and non-GIS operations. It simplifies the performance and management of work across enterprise/self-hosted, cloud, and desktop environments in ArcGIS, and it integrates seamlessly with third-party
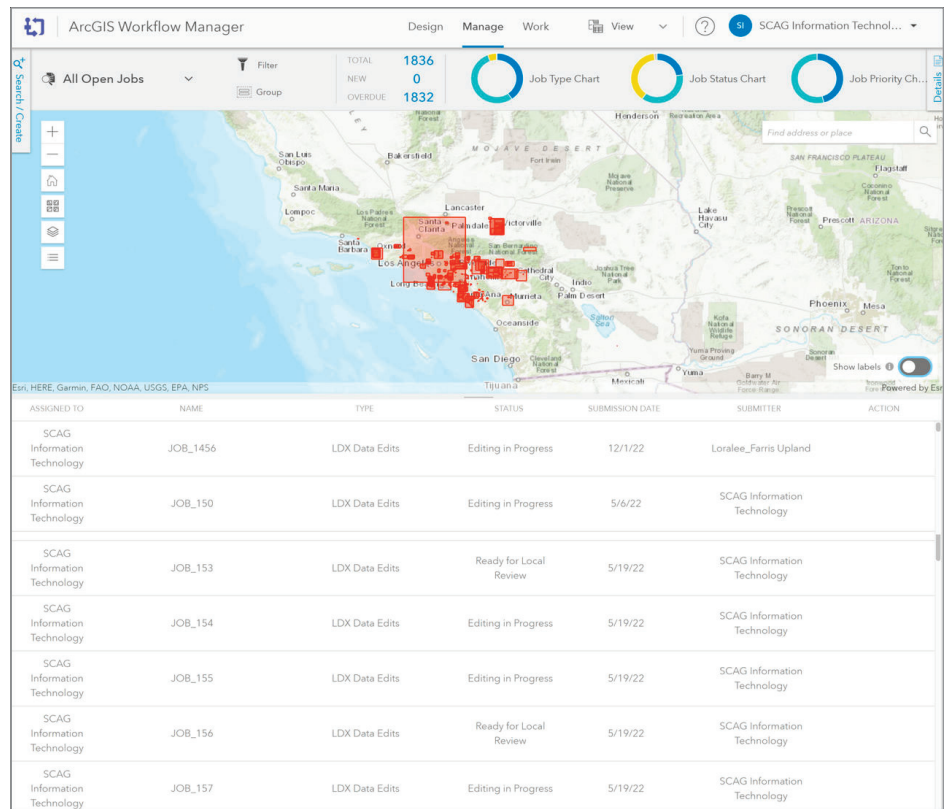
↑ The Manage page is used to create new work, update existing work, and continually monitor progress. The image shows all the jobs that are currently open as well as their statuses.
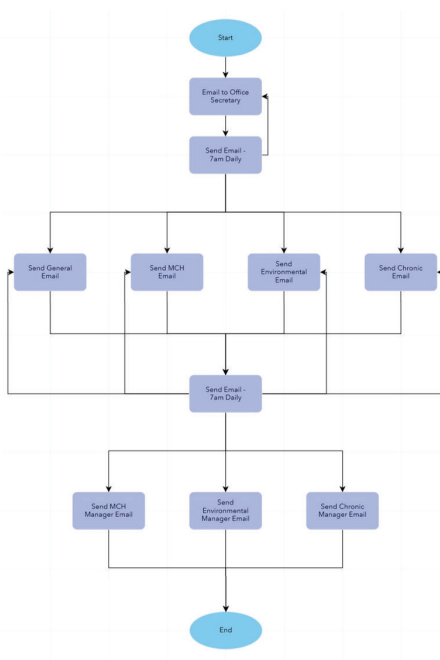
↑ The workflow diagram orchestrates each special event request through the assignment process, automatically notifying the appropriate staff when a new request is received and assigned.

asset management systems.

This article explores the significant benefits of ArcGIS Workflow Manager and shares real-world success stories from the Southern California Association of Governments and the City of Bethlehem. Through these examples, we showcase how ArcGIS Workflow Manager empowers state and local governments to achieve operational excellence and better serve their communities.

Key Benefits of ArcGIS Workflow Manager for Government Organizations

ArcGIS Workflow Manager automates and streamlines business operations by incorporating a geographic approach for managing and tracking work in

a centralized system. This allows organizations to improve efficiency, productivity, and accuracy by eliminating the need for paper-based processes and manual data entry.

Workflow Manager can be configured to meet specific needs, ensuring that it can be tailored to an organization's unique workflows and requirements. It resolves challenges with process management and workforce coordination, leading to increased productivity. Furthermore, Workflow Manager improves accountability and transparency by providing a clear record of work activities, helping organizations make informed decisions and optimize their operations.

Southern California Association of Governments

The Southern California Association of Governments (SCAG) manages and updates the vast amounts of data required for regional planning due to the diverse and growing needs of Southern California. In a state with a population projected to reach 45 million by 2050, SCAG needed to efficiently gather and process data from 191 cities and six counties to support sustainability and transportation initiatives. The main challenge was the lack of a standardized process for data collection, which previously involved various formats such as marked-up maps and spreadsheets, making it difficult to manage and integrate data effectively.

To address these challenges, SCAG implemented ArcGIS Workflow Manager, an ArcGIS Enterprise extension, to standardize the input and review processes and how data was submitted by local jurisdictions. Workflow Manager not only streamlined data collection and integration but also enhanced transparency and collaboration among stakeholders. It allowed SCAG and local jurisdictions to track inputs and updates efficiently, ensuring that data was accurately reflected in the regional planning database. The implementation of Workflow Manager led to significant improvements in managing data contributions, reducing the time and resources required and enabling more effective regional planning.
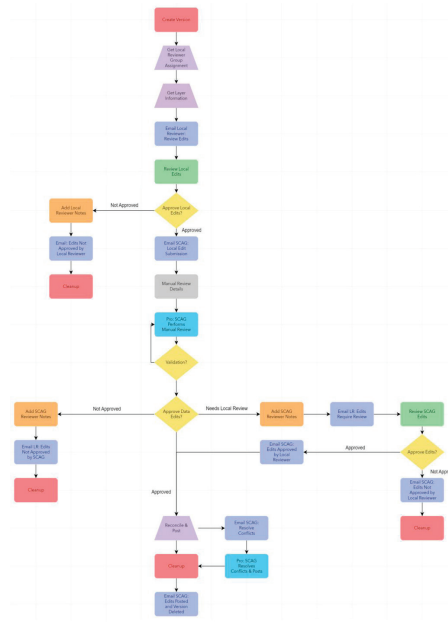
↑ This workflow diagram shows the steps in the Local Data Exchange (LDX) data editing process.

City of Bethlehem Health Bureau

The City of Bethlehem Health Bureau was introduced to Workflow Manager during the Esri User Conference. Impressed by its capabilities, staff immediately implemented the product and are successfully in production with two workflows: one for internal staff to request time off and the other for managing special event requests from the community. The focus is primarily on the second workflow, which has transformed how the department handles community requests for public health events.

Previously, the process was cumbersome and manual; community groups like nonprofits and educational institutions would contact the bureau via phone or email to organize an event. These requests were then haphazardly assigned to health officials through informal means such as word of mouth, requiring officials to manually add events to their calendars. With the adoption of the Workflow Manager extension in ArcGIS Online, this process has been completely automated. Now, community groups can submit their requests online through an ArcGIS Survey123 form, which is then systematically approved and assigned to the appropriate personnel. This automation has not only saved a significant amount of time but also allowed the bureau to capture and document institutional knowledge, track the history of requests, and maintain records, thereby modernizing operations.

Embracing ArcGIS Workflow Manager for Operational Excellence

In conclusion, ArcGIS Workflow Manager stands as a comprehensive work management system tailored to meet the unique challenges faced by state and local government organizations. By leveraging the capabilities of Workflow Manager, organizations can improve overall efficiency, productivity, and accuracy for informed decision-making as well as deliver exceptional services to their communities.

Embracing this powerful solution will undoubtedly yield significant benefits, transforming the way these organizations manage critical infrastructure and provide essential services to their constituents.

To learn more, please go to go.esri.com/WorkflowManager.
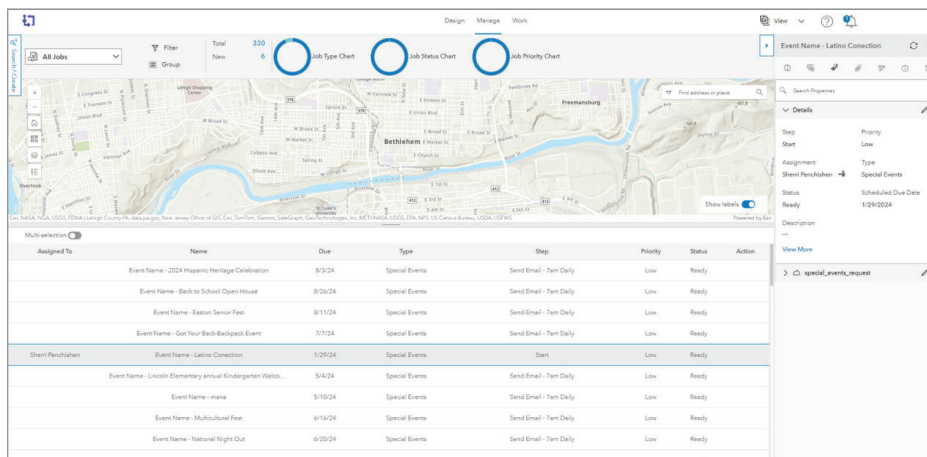
↑ Staff have easy access to view recent special event requests and track request statuses.

US Census American Community Survey (ACS) Layers are Updated in ArcGIS Living Atlas of the World

Updated and New 2019–2023 Layers

On December 12, the US Census Bureau released its 2019-2023 American Community Survey (ACS) five-year estimates. Within days of the data release, the ArcGIS Living Atlas of the World policy maps team updated 112 layers with the new data as well as the 2023 TIGER boundaries.

Having these layers in ArcGIS Living Atlas for free saves GIS users many hours or even days of download and data processing time. These hosted feature layers enable people to explore, map, and analyze ACS data at state, county, and tract levels.

The ACS helps local officials, community leaders, and businesses understand the changes taking place in their communities. Many federal agencies use ACS data to answer key policy questions, and many nonprofits rely on ACS data when applying for grants. Local governments and businesses often incorporate ACS data into their planning and resource allocation. This information helps determine how more than $675 billion in federal and state funds are distributed each year. Through the ACS, we know more about jobs and occupations, educational attainment, veterans, whether people own or rent their homes, and other topics so that we can assess the past and plan for the future.

ArcGIS Living Atlas of the World has 130 of the most popular ACS tables and over 2,200 attributes in hosted feature layers that are performant, available across the ArcGIS platform, and—best of all—free to all GIS users. Each layer
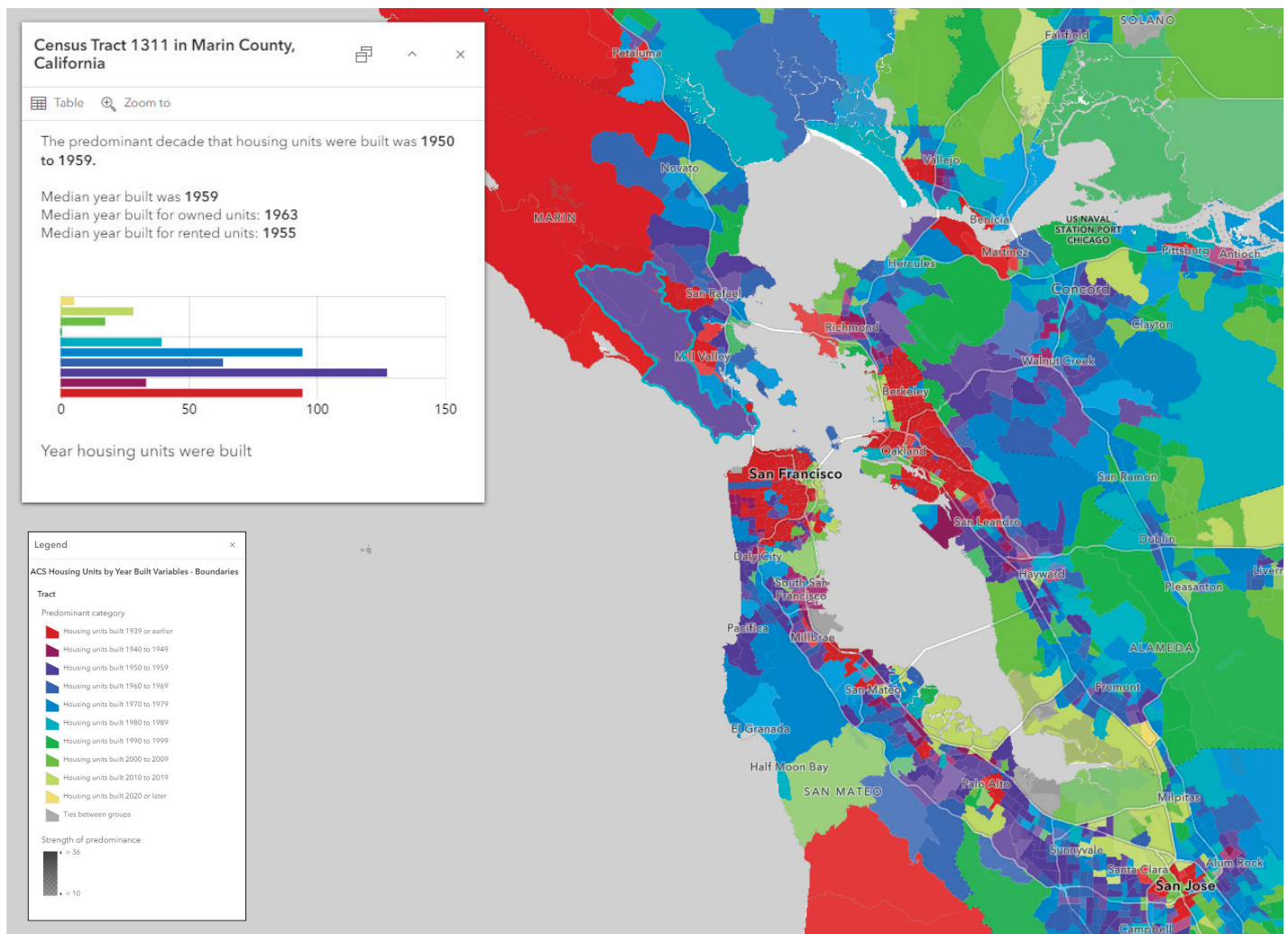
is topic based, combining related tables into a single, easy-to-use layer. These layers have clear field aliases based on census documentation and long descriptions that communicate detailed census information. Additional calculated fields for common totals, percentages, and ratios that people often derive, along with the associated margin of error for each calculated field, are added to each table. The layers have smart default symbology centered on the corresponding national value, custom informative pop-ups, and cartographically friendly coastlines.

All ACS-hosted feature layers are refreshed annually with the latest census data shortly after the release, saving GIS and census data users weeks of laborious data processing. Each layer undergoes a rigorous quality-assurance process from data download to layer update, with data checks at each major step in the process to guarantee data accuracy. Tools used throughout the process take advantage of the latest advancements in ArcGIS Online and ArcGIS API for Python, ensuring up-to-date processes and best practices throughout.

The current five-year ACS data layers can be accessed in ArcGIS Pro and ArcGIS Online, Esri's configurable mobile apps and dashboards, and ArcGIS StoryMaps. There are also preconfigured web maps available in ArcGIS Living Atlas, and all maps using these layers will automatically contain the newest ACS figures.
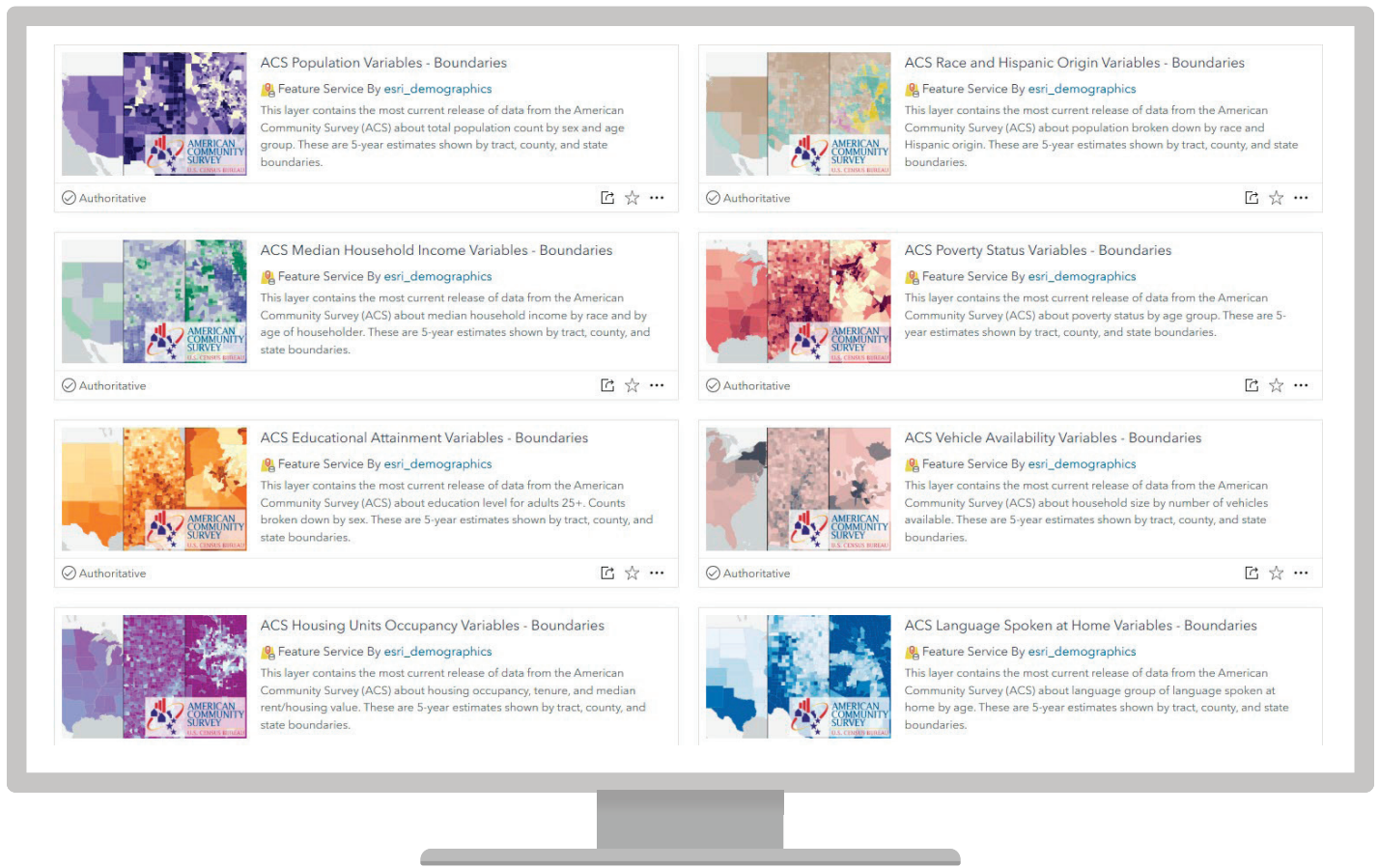
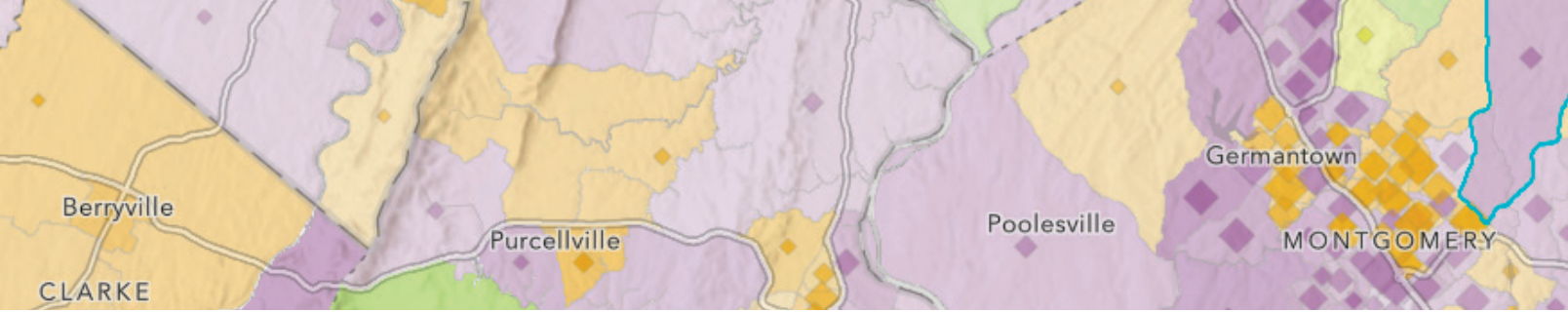To learn more about the latest updates and how to use ACS data layers in ArcGIS Living Atlas, visit our FAQ page.

ACS Population Variables - Boundaries
Feature Service By esri_demographics
This layer contains the most current release of data from the American Community Survey (ACS) about total population count by sex and age group. These are 5-year estimates shown by tract, county, and state boundaries.
Authoritative

ACS Race and Hispanic Origin Variables - Boundaries
Feature Service By esri_demographics
This layer contains the most current release of data from the American Community Survey (ACS) about population broken down by race and Hispanic origin. These are 5-year estimates shown by tract, county, and state boundaries.
Authoritative

ACS Median Household Income Variables - Boundaries
Feature Service By esri_demographics
This layer contains the most current release of data from the American Community Survey (ACS) about median household income by race and by age of householder. These are 5-year estimates shown by tract, county, and state boundaries.
Authoritative

ACS Poverty Status Variables - Boundaries
Feature Service By esri_demographics
This layer contains the most current release of data from the American Community Survey (ACS) about poverty status by age group. These are 5-year estimates shown by tract, county, and state boundaries.
Authoritative

ACS Educational Attainment Variables - Boundaries
Feature Service By esri_demographics
This layer contains the most current release of data from the American Community Survey (ACS) about education level for adults 25+. Counts broken down by sex. These are 5-year estimates shown by tract, county, and state boundaries.
Authoritative

ACS Vehicle Availability Variables - Boundaries
Feature Service By esri_demographics
This layer contains the most current release of data from the American Community Survey (ACS) about household size by number of vehicles available. These are 5-year estimates shown by tract, county, and state boundaries.
Authoritative

ACS Housing Units Occupancy Variables - Boundaries
Feature Service By esri_demographics
This layer contains the most current release of data from the American Community Survey (ACS) about housing occupancy, tenure, and median rent/housing value. These are 5-year estimates shown by tract, county, and state boundaries.

ACS Language Spoken at Home Variables - Boundaries
Feature Service By esri_demographics
This layer contains the most current release of data from the American Community Survey (ACS) about language group of language spoken at home by age. These are 5-year estimates shown by tract, county, and state boundaries.

The Key to Understanding Your Community

American Community Survey Layers in ArcGIS Living Atlas of the World

The American Community Survey (ACS) layers in ArcGIS Living Atlas of the World cover a wide range of topics: population, income, education, health insurance, language, race and ethnicity, and more. These layers contain data for states, counties, and census tracts. More than 100 layers are available, each focusing on a specific topic. These layers are free to use and can be downloaded to your local drive as needed. You can start today to gain insight about your community and make data-driven decisions on topics that are top of mind.
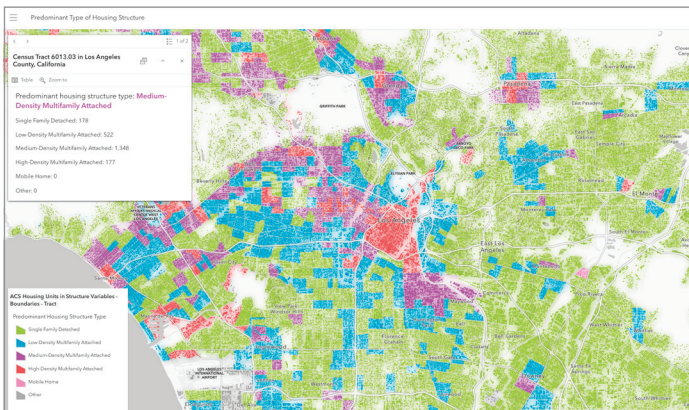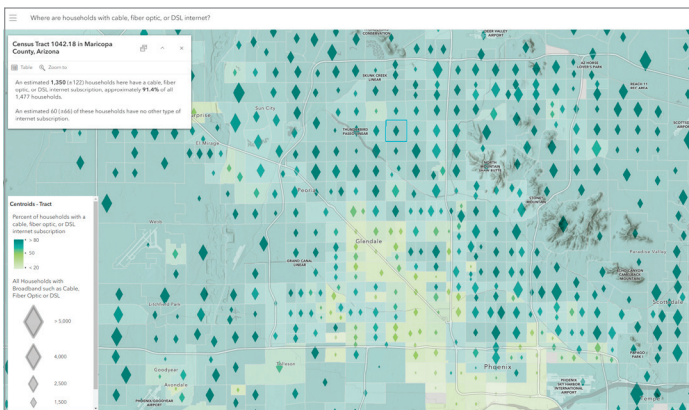

Los Angeles County, California
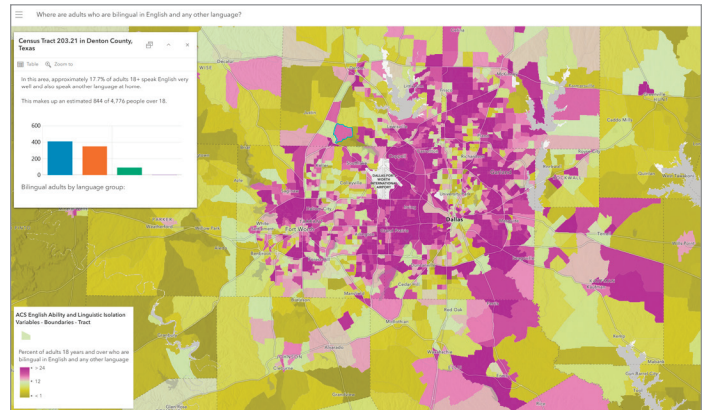What is the predominant type of housing structure?
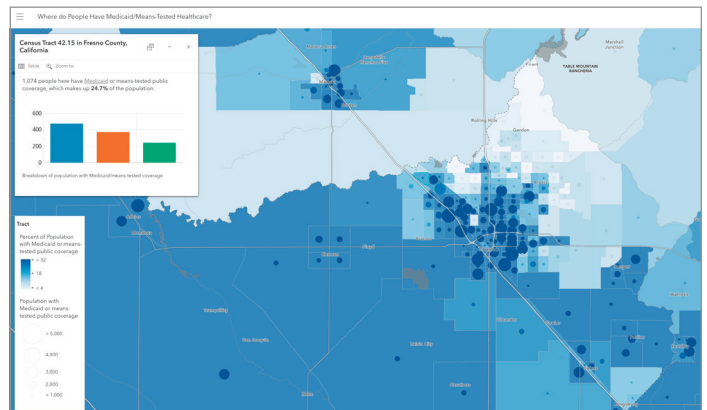
Fresno County, California
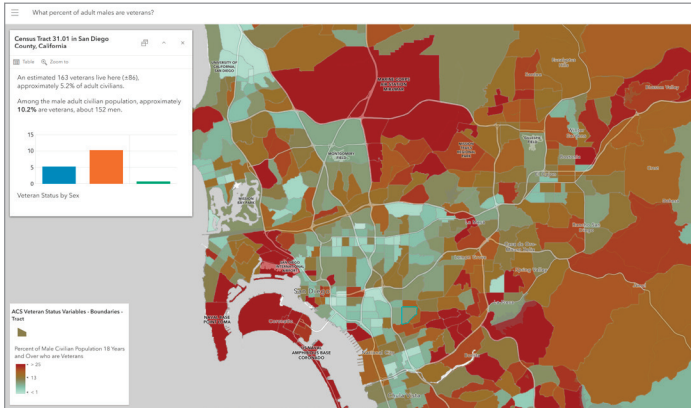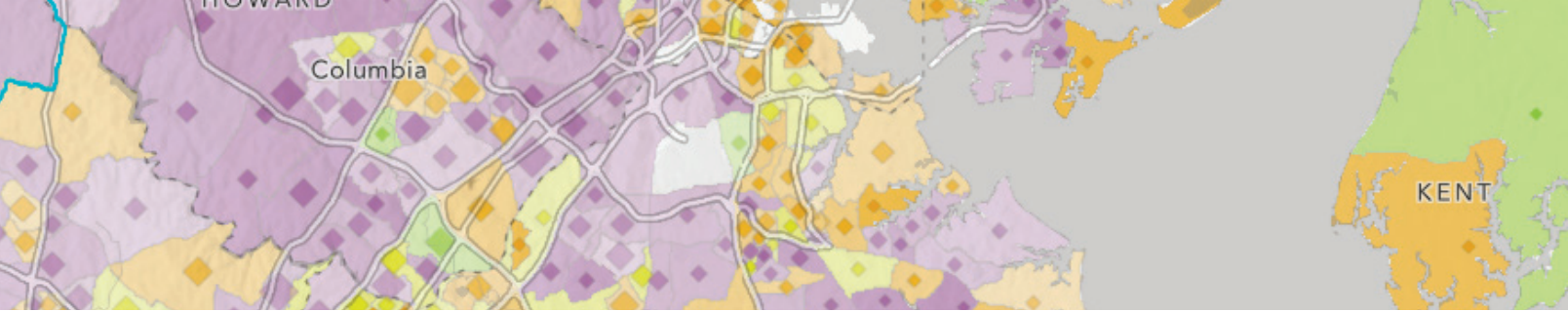Where do people have Medicaid/means-tested health care?

Maricopa County, Arizona
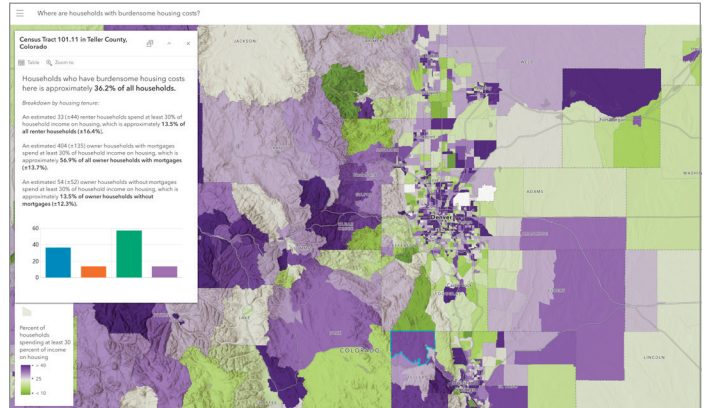Where are households with cable, fiber-optic, or DSL internet?

Denton County, Texas
Where are adults who are bilingual and understand English and any other language?

San Diego County, California
What percentage of adult males are veterans?

Teller County, Colorado
Where are households with burdensome housing costs?
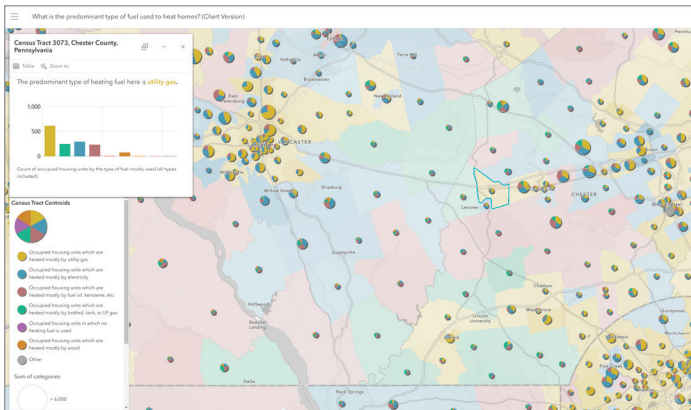
Chester County, Pennsylvania
What is the predominant type of fuel used to heat homes?
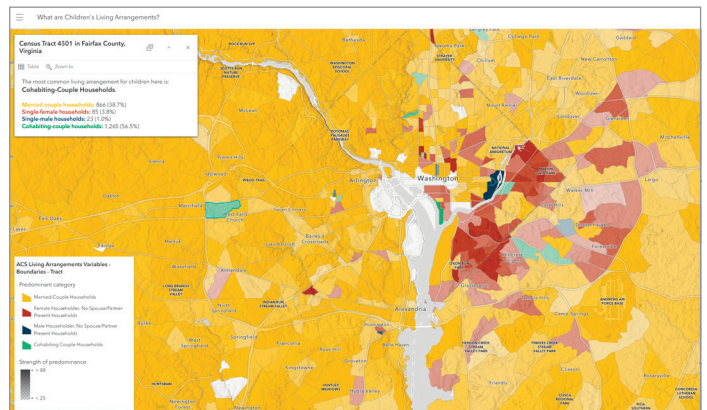
Fairfax County, Virginia
What are children's living arrangements?
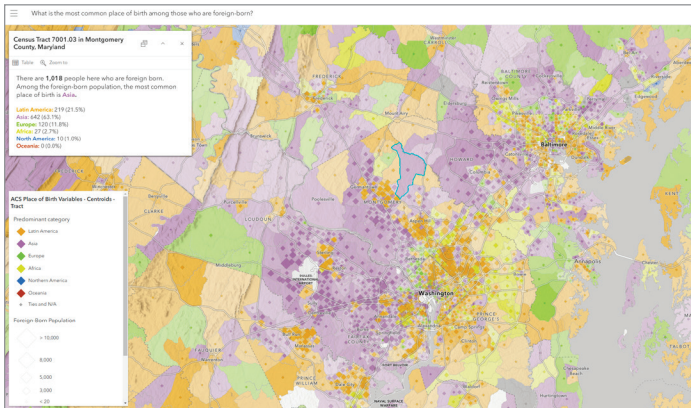
Montgomery County, Maryland
What is the most common place of birth among those who are foreign-born?

Montgomery County, Pennsylvania
Where are households with more cars than people?

Access the rest of the ACS layers within ArcGIS Living Atlas.

Saint Louis Metro Digitizes Bus Stop Maintenance with Mobile GIS Solution

Improving Bus Stop Inspection with Digital Tools

The parent organization of Metro Transit, Bi-State Development, is a unique economic development organization in Saint Louis, Missouri. Bi-State Development is responsible for a number of the region's diverse transportation assets. Through a federally approved interstate compact between Missou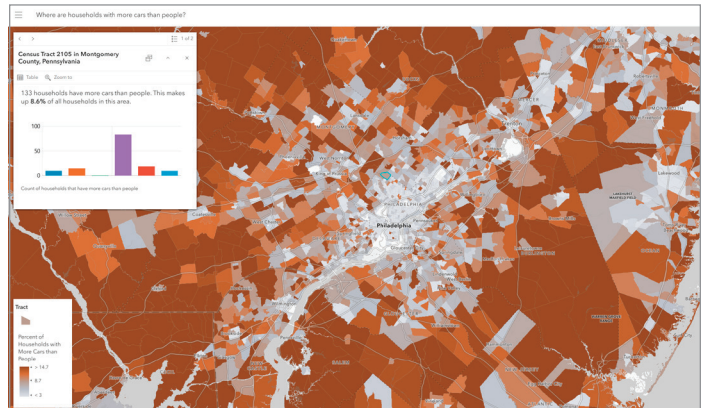ri and Illinois, it has broad powers across a six-county area, and operates enterprises that include the Gateway Arch Riverfront, Metro Transit, St. Louis Downtown Airport, and the St. Louis Regional Freightway. The organization's goal is to further the overall economic development of the region. For an organization of its size and complexity, information is critical to Bi-State Development's success.

For Metro Transit, which has over 10,000 active and inactive bus stops spread over its service area, accurate information is especially important. Metro staff needed a way to effectively collect and maintain information about those stops, including their compliance with the Americans with Disabilities Act (ADA) and amenities such as benches, shelters, garbage cans, and so on. Accurate stop information is, for most public transit agencies, the basic building block around which most other information is connected.

Metro staff turned to ArcGIS Survey123 for their field collection application. They worked with various groups within Metro for roughly six months to design and implement the application, which went live in March 2023. Key aims were to enable faster, more uniform field inspections that would facilitate maintenance and asset management and validate information already recorded in the agency's stop database.

A key to the success of the application was the strong involvement from Metro Transit's Planning Department. This helped to ensure that all necessary aspects of an inspection were included, such as ADA compliance, and that the flow of work for on-site personnel using the app would be logical and intuitive.

The application can pull information about every stop in the field simply by typing in the stop ID. Once entered, the application populates with the stop name(s) and all the associated amenities listed in the database. Any maintenance requirements identified in the field, such as the need to move signage to improve visibility or replace broken shelter panels, can be entered in the service request field.

Similarly, site changes such as a stop's precise location, or the absence or addition of amenities, can easily be updated the corporate stop database. Previously, Metro staff did not have a well-established workflow for maintaining the constant currency of their database.

Faster Inspections with ArcGIS Survey123

Using a tablet-based process, and all in a matter of minutes, an inspector can arrive at a stop site, record latitude and longitude, run through the drop-down menu questions, and take pictures of inbound and outbound routes.

From launch to May 2024, 1,000 stops were assessed and recorded. For comparison, Steve Hughes, a Bi-State Development programmer and analyst and the primary administrator for ArcGIS Enterprise and ArcGIS Online environments, estimated that achieving the same number of inspections using the clipboard-and-camera approach of the old paper-based regime would have taken six to eight months longer.

"It's become possible to collect information on up to 50 stops in a day," Hughes said.

"With the paper-based regime, an inspector would have to conduct surveys, then return to an office to clean up the information gathered and perhaps create a new checklist. All of that information would then go into a box somewhere. There was no immediate access, and it was difficult to keep track of the status of assessments over time. ArcGIS and Survey123 give us things that we've not been able to capitalize on in the past."

The response from mobile crews to the Survey123 application has been very enthusiastic. Staff have become very accustomed to the drop-down menu. Their work is further simplified by the use of cascading. For instance, in a shelter cleaning form, crews can select zones and routes and be given specific locations to visit without having to scroll through hundreds of locations.

Staff work is further streamlined when cleaning contracts go out to tender; the successful companies also download the Survey123 app and use it as part of their contracted work. "They have to agree to use it, but it's proven to be very popular with vendors as it enables them to capture data electronically and to monitor their teams' performance over the day," Hughes continued.

Monitoring Progress and Data Consistency

Two separate dashboards support the bus stop assessment application. One lists all the inspections done and allows editing of notes and comments after the fact. This feature has been used as a constant check on the consistency and uniformity of the data. Although the drop-down menus reduce the amount of

St Louis Regional Freightway Interactive Map
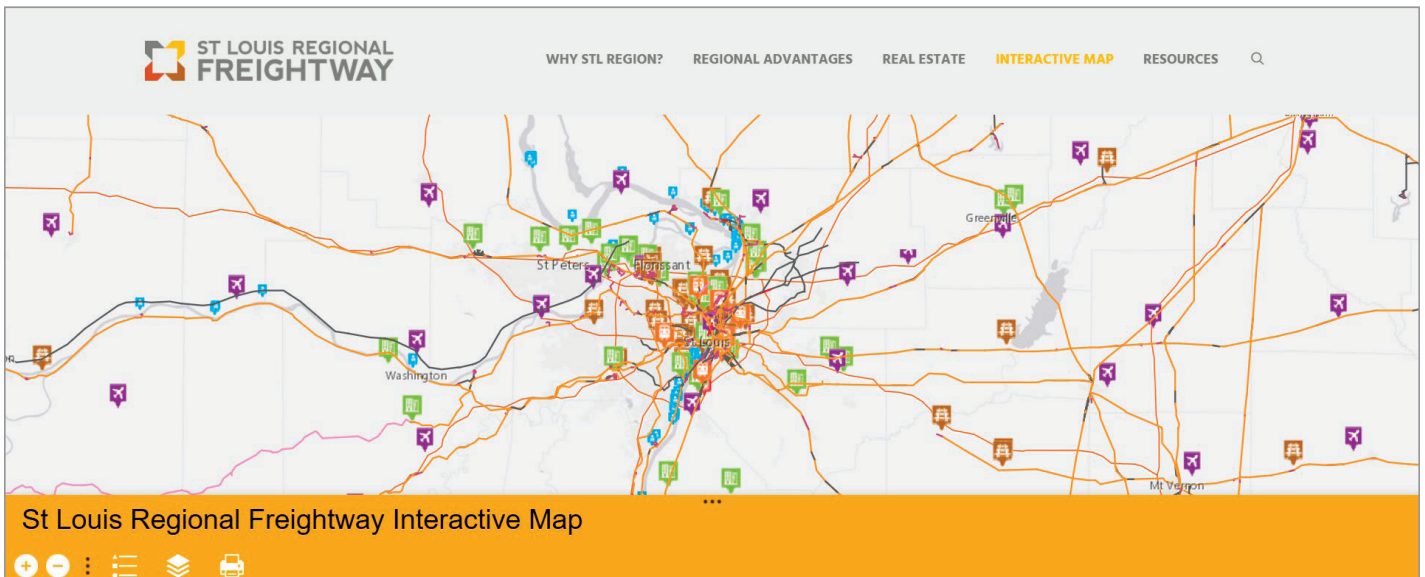
↑ The St. Louis Freightway Interactive Map communicates locations of rail distribution services, rail lines, air cargo services, and more.

"wiggle room" available to inspectors, it is still useful to be able to check whether individual interpretations remain within acceptable bounds and to safeguard compliance.

The other dashboard reports scoring of individual bus stops. Scores are driven by the condition of the stop, ADA compliance, and the absence or presence of amenities. The data is combined with information from ArcGIS Living Atlas of the World to show how funding for improvements can be targeted where it is most needed.

Wider visibility is provided by an internal asset management site using ArcGIS Hub. On the Hub site, a web map application shows all stop locations and structures maintained by the agency. This includes bridges and tunnels, retaining walls, culverts, and more. The Hub site enables an overlay of proposed capital projects onto these existing structures so that their impacts can be seen. It is available to upwards of 2,000 employees.

A publicly accessible map provides information about the St. Louis Regional Freightway, including locations for river terminals, airports, storage, and warehousing, among other things.

ArcGIS Survey123— The Big Enabler

Metro Transit continues to use ArcGIS Pro and ArcGIS QuickCapture to create apps that support real-time needs. These include, for example, passenger counts (boarding and alighting locations) and power pole locations for the historic streetcar, which serves the Delmar Loop entertainment district.

However, Hughes describes ArcGIS Survey123 as "continuing to do the heavy lifting" for his organization, with the Public Safety Department being one of his biggest internal customers.

All told, for the public safety department, around 20 web and mobile applications support activities such as hazard reporting, vehicle inspections, vulnerability assessments for bus and light-rail stops, construction project progress reporting and safety pledges, and bridge inspections and damage assessments.

The public safety department has incorporated the technology into their agency-wide safety management system. It includes both written text and a QR code that takes users to Survey123. There, users can input their safety concerns and request further action.

This Survey123/QR code approach is also used for non-geographic

applications. An example is employees reporting their use of prescription drugs, which may affect their performance at work. Individuals can now submit forms to the agency's drug and alcohol program manager in the time it takes to complete an online form. Before, the paper process could take a long time to move information through internal distribution.

The technology will be utilized further to improve public engagement and gain travelers' input/feedback on service performance and other issues. A particular example is the Secure Platform project. Currently, the light-rail facilities operated by Metro Transit are all open. For safety and security reasons, security gates are being added at all 38 stations. Survey123, in combination with QR codes, will enable the organization to build a communications platform that the public will find easy to use.

In this and many other ways, Metro Transit is pushing paper to the dust bin of their workflows and fully embracing more efficient processes.

Envision a New Age of Transit
Learn more at go.esri.com/ GIS4Transit.

Marin County Creates New Hub Site to and Promote Racial Equity Projects

Marin County, located in the northwestern part of the San Francisco Bay Area, ranks among the healthiest and wealthiest communities in California. However, several equity indicators show that communities of color in Marin County are experiencing significant disparities in areas such as affordable housing and economic mobility, making it the third-most racially disparate county in the state.

To address the growing racialized disparities, the County of Marin created the Office of Equity. The primary mission of the Office of Equity is to promote an antiracist and multicultural workforce in the county, with a commitment to accountability, community engagement, and transformational change. A key initiative that embodies this mission is the launch of the county's first-ever participatory budgeting (PB) process, in which community members decide how to spend a part of a public budget.

This dynamic process invests in community-driven ideas to advance racial equity and focuses on engaging communities typically left out of government decision-making and budgeting processes. The Marin County Board of Supervisors allocated $2.5 million in American Rescue Plan Act funds for the pilot PB cycle.

Jamillah Jordan, director of the Office of Equity, says, "Marin County boldly reimagined how to make public spending more equitable and effective by adopting the framework of giving people real power, over real money through its inaugural PB process."

In partnership with the county's Information Services and Technology (IST) Department, the Office of Equity created a hub site to collect ideas, accept grant proposals, and gather votes from the public. IST's data/GIS team developed the site with ArcGIS Hub, a community engagement platform powered by GIS. The site has garnered positive feedback and allowed the team to work with residents more easily to help advance racially equitable ideas.
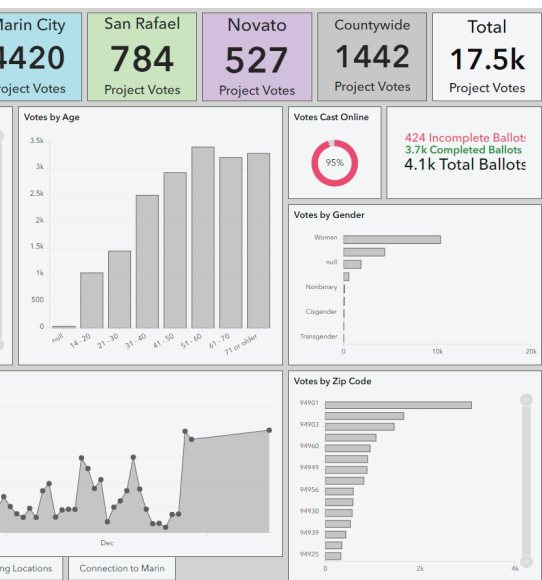
New Funding Initiative

Launched in 2022, Marin County's Participatory Budgeting process included a multiphase plan to engage
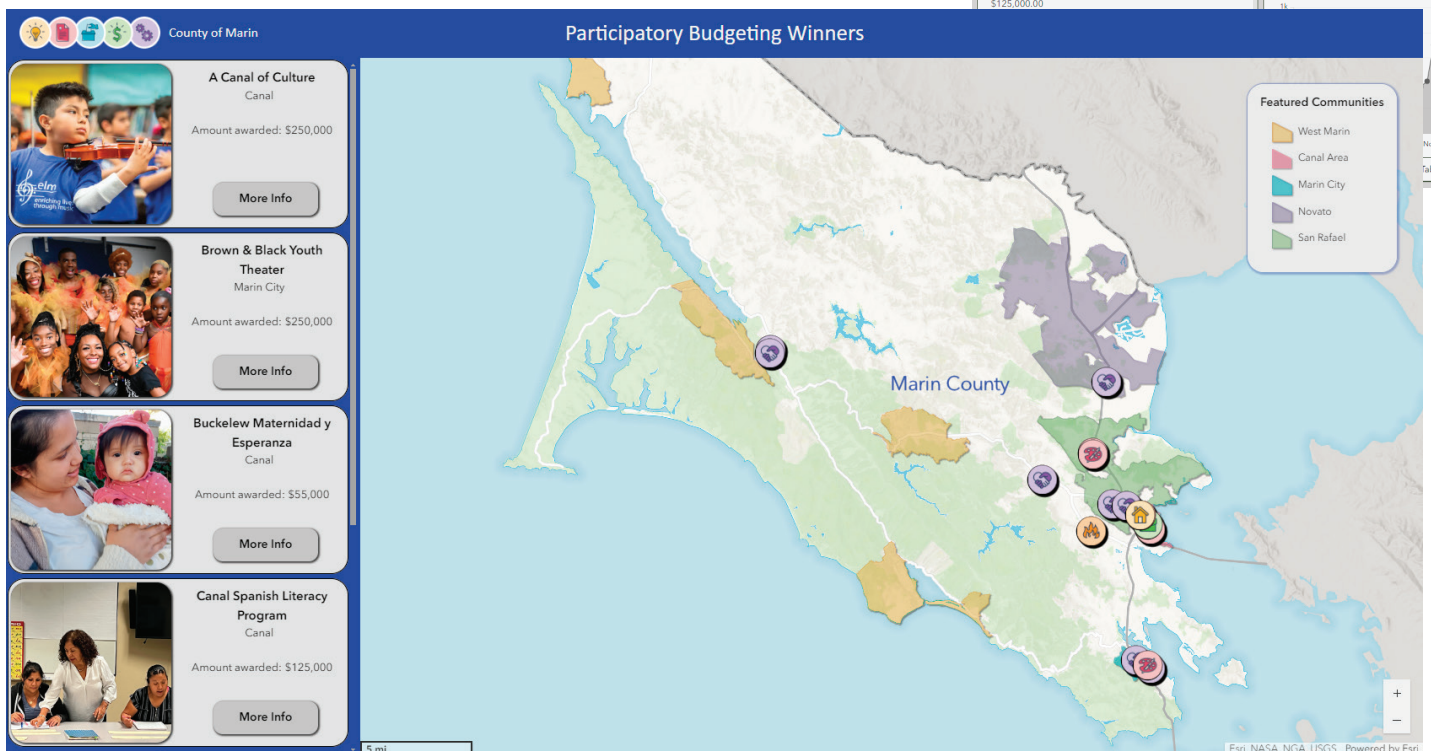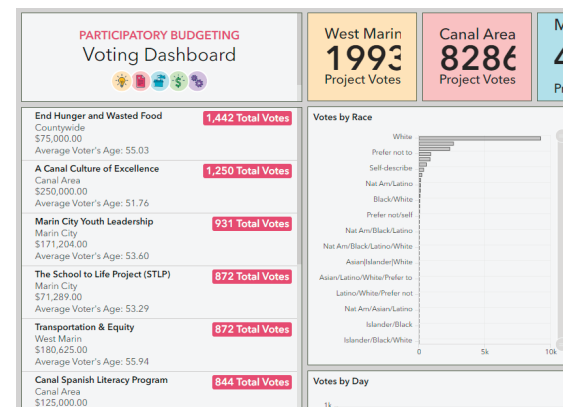
↑ The Marin County map of participatory budgeting voting winners includes images and details of winning projects on the left and a color-coded key on the right.

community members in deciding how to spend $2.5 million to improve the quality of life and advance equity for all who live, work, and learn in Marin County.

The first phase involved asking the community for ideas on how to spend the funds to advance racial equity in the county. The ideas were focused on four key communities where notable racial disparities exist: Marin City, Novato, West Marin, and the Canal neighborhood in San Rafael. Hundreds of thoughtful ideas—including creating disaster preparedness programs, building community gardens, creating affordable homeownership opportunities,

Marin City	San Rafael	Novato	Countywide	Total
4420	784	527	1442	17.5k
Project Votes	Project Votes	Project Votes	Project Votes	Project Votes

Votes by Age

Votes Cast Online
95%
424 Incomplete Ballots
3.7k Completed Ballots
4.1k Total Ballots

Votes by Gender
Woman
null
Nonbinary
Cisgender
Transgender

Votes by Zip Code
94901
94903
94960
94949
94956
94930
94939
94925

Voting Locations   Connection to Marin

↑ The participatory budgeting internal voting dashboard shows a project list; voting broken down by items such as area, race, age, and gender; and a pie chart indicating that 95 percent of the votes were cast online.

and developing youth enrichment classes—were submitted.

After the county received ideas, the second phase entailed inviting community partners such as nonprofit and community-based organizations to submit grant proposals. Grants from $10,000 to $250,000 were awarded to the finalists. A diverse committee of community members of different ages and socioeconomic backgrounds was assembled to review and evaluate the 104 proposals received.

"Our community partners were instrumental in codesigning the process with us to ensure that we centered the needs and perspectives of community members at the margins of our system," says Jordan.

The committee evaluated proposals based on feasibility, need, and intended outcomes. The proposals were narrowed down to 24 ideas, which were then placed on a ballot for county residents to vote on. All community members aged 14 years and older who lived, worked, or attended school in the county were eligible to vote, regardless of immigration or criminal justice status.

With the goal of meeting people where they were, voting took place online and in person at several locations throughout the county. Over 3,600 votes were cast and the 16 projects with the most votes received the grant money.

Integrating Technology

The multiphase PB process led the Office of Equity—partnering with the IST Department's data team, led by IT manager Marina Raskin—to develop creative solutions to make the process as accessible as possible. Raskin and her team had previously worked with the Office of Equity to create a website with ArcGIS Hub.

"It was a very natural next step to create an initiative for participatory budgeting on the same platform," says Raskin. "Initially, we were looking at Hub because it is user-friendly, and it provides a modern look and feel."

Raskin says she arranged for a presentation with Esri for her team and the Office of Equity to get an overview of the features of Hub. This helped both groups decide to use ArcGIS Hub as a platform for the PB website because it had the functionality needed for the project. Raskin also liked that premade templates were available, which allowed her and her team to brainstorm different web page elements and layouts and visualize the page.

"There was already work that has been previously done using ArcGIS Hub technology, and we were building upon that work. Building a participatory budgeting website was easy from that perspective," says Raskin. "We already knew what layouts and page elements to use."

The ability to integrate surveys, maps, data, and other tools into the hub site was another benefit provided by ArcGIS Hub. She also notes that Hub made communication with residents easy, which helped foster community engagement.

Building the Site

Raskin and Jordan began creating the site by discussing the goals of the project and the features needed to support them. One important feature was delivering content in different languages. The IT and Office of Equity staff delivered materials in English, Spanish, and Vietnamese to support an inclusive experience. Other features were added to ensure that the site was digitally accessible.

Jordan explains, "[Accessibility] was a critical lens that we applied throughout the entire process, with the goal of making sure that all of our tools were accessible for a range of diverse audiences and community members."

Raskin adds that digital accessibility was among the reasons why ArcGIS Hub was selected for this project. "We already knew how to make ArcGIS Hub pages digitally accessible to meet the standards of our digital accessibility program."

The Participatory Budgeting solution, an ArcGIS Solutions offering, includes a configurable application that allows users to submit problems or observations. Raskin notes that the solution was easily integrated into Hub.

Following voting for the final 24 grant proposals, the data/GIS team led by Raskin created a map of the winning proposals that was also displayed on

Marin County Creates New Hub Site to Promote Racial Equity Projects

the hub site. Raskin says this project was challenging and involved a lot of trial and error, but she and her team were enthusiastic about the work.

"What was exciting is that it was all new, and we had to develop tools," says Raskin, adding that she and her team had to "think innovatively every single step of the process."

Advancing Equity in Marin County

Community engagement for the PB process was very high, with a total of 350 ideas being shared and receiving 2,675 likes on the hub site. Using ArcGIS Hub assisted the county in efficiently communicating information and getting residents involved.

"The main goal was to be able to collect the information from the public, especially the ideas, and present the information back to the public," says Raskin. "So, Hub was very useful for presenting the information."

The county's hub site features a page for each winning project with a description of it and its milestones. There is also a map of winning projects, and each project has a pop-up with a link to the hub site's project page, a convenient feature provided by Hub.

Raskin and her team have trained other departments in Marin County, including the Office of Equity, to make updates to hub sites such as changing content or images. For example, the projects map is fully editable so that projects can be updated as they evolve.

"This is one of the features of ArcGIS Hub that we like. It's intuitive enough and easy enough for a nonprogrammer to come in and make these changes and keep the site up to date," says Raskin.

The feedback received on the hub site has been positive, and Jordan says Marin County residents liked the look of the site and appreciated the multilingual aspect of it. Jordan wanted the site to be
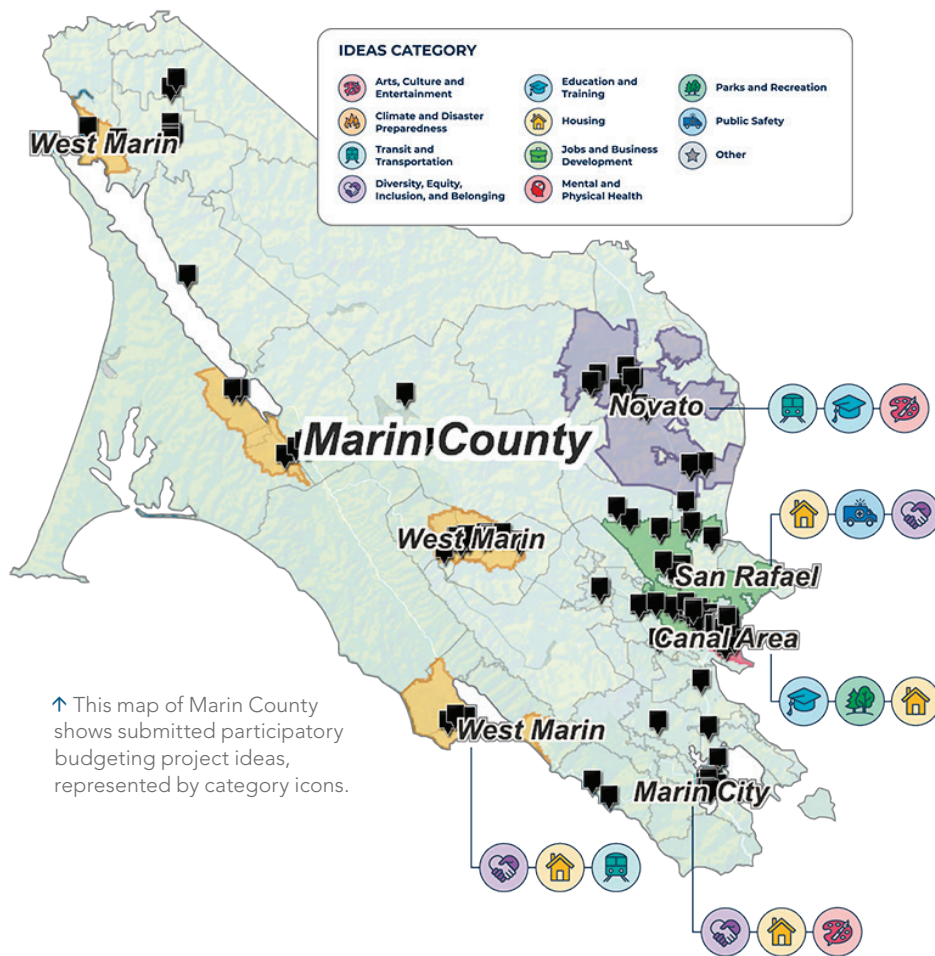
↑ This map of Marin County shows submitted participatory budgeting project ideas, represented by category icons.

user-friendly for community members of all backgrounds and abilities to connect with the overall goal of advancing equity in the county.

"Our goal was to appeal to a wide range of audiences and community members. We were very intentional with the design of our tools, [including] the multilingual features, digital accessibility, and avoiding jargon in our content," says Jordan. "The site is a powerful way for us to tell our story of how PB can transform the way governments share decision-making power and engage with community members."

To access the complete Esri Equity and Social Justice Map Booklet, please scan the QR code.

Longmont, Colorado: Building a Better Climate Future with Maps

By Betsy Gardener, Data-Smart City Solutions Editor

On October 8, 2019, Longmont, Colorado's city council declared a climate emergency, unanimously passing a resident-initiated climate emergency resolution. Building on community advocacy and interest, this resolution turbocharged sustainability and climate work on the city level and led to the development of a climate action task force. Composed of residents, city staff members, technical advisers, and representatives from business and education, the task force focused on building a resilient community that can prepare for, react to, and recover from climate change. Alongside the task force, the Just Transition Plan Committee—a group of frontline community members convened by city staff—developed equity recommendations to be applied to climate action recommendations. Together, the work of these two groups comprises the city's Sustainability Plan and Climate Action Recommendations Report, which was approved by Longmont City Council in July 2020.

According to Longmont sustainability manager Lisa Knoblauch, who coordinated and convened the task force, much of the past climate work was centered on mitigation. And while that long-term vision was important, residents were already facing the impacts of climate change, which pushed the group to include a focus on adaptation and resilience. "Looking at how to accelerate our work around climate change," said Knoblauch, "really surfaced the need to focus more on the adaptation and resilience component and do that through an equity lens."

Given her background working on sustainable community development projects, Knoblauch was already used to working closely with the city's Community and Neighborhood Resources Division, making sure that the Longmont Sustainability Office's work was rooted in community needs. This was also an important factor for the task force, as the members decided to prioritize understanding the public health impacts of climate change.

One of the first steps was to conduct an assessment to understand what climate risks the community was actually facing and—perhaps most importantly—where those climate risks were felt unequally. "We know that not everybody is impacted in the same way," said Knoblauch, "and we wanted to really understand who is most impacted and what factors are influencing that." Establishing a baseline and having leaders working toward shared goals would then allow staff to move forward and address those issues. According to Knoblauch, they decided to do this with a mapping tool because of the power of the visual format.

Building the Team

Knoblauch has been with the City of Longmont for nearly a decade and currently works in the Department of Strategic Integration, founded three years ago to help support broad organizational alignment around city council priorities and goals. Conveniently, the city's GIS team is housed in the same department, along with data and analytics teams.

Enter Eric O'Brien, Longmont's GIS manager, who was a technical adviser as the data visualization work began on the Climate Risk Mapping Tool. According to O'Brien, whose department
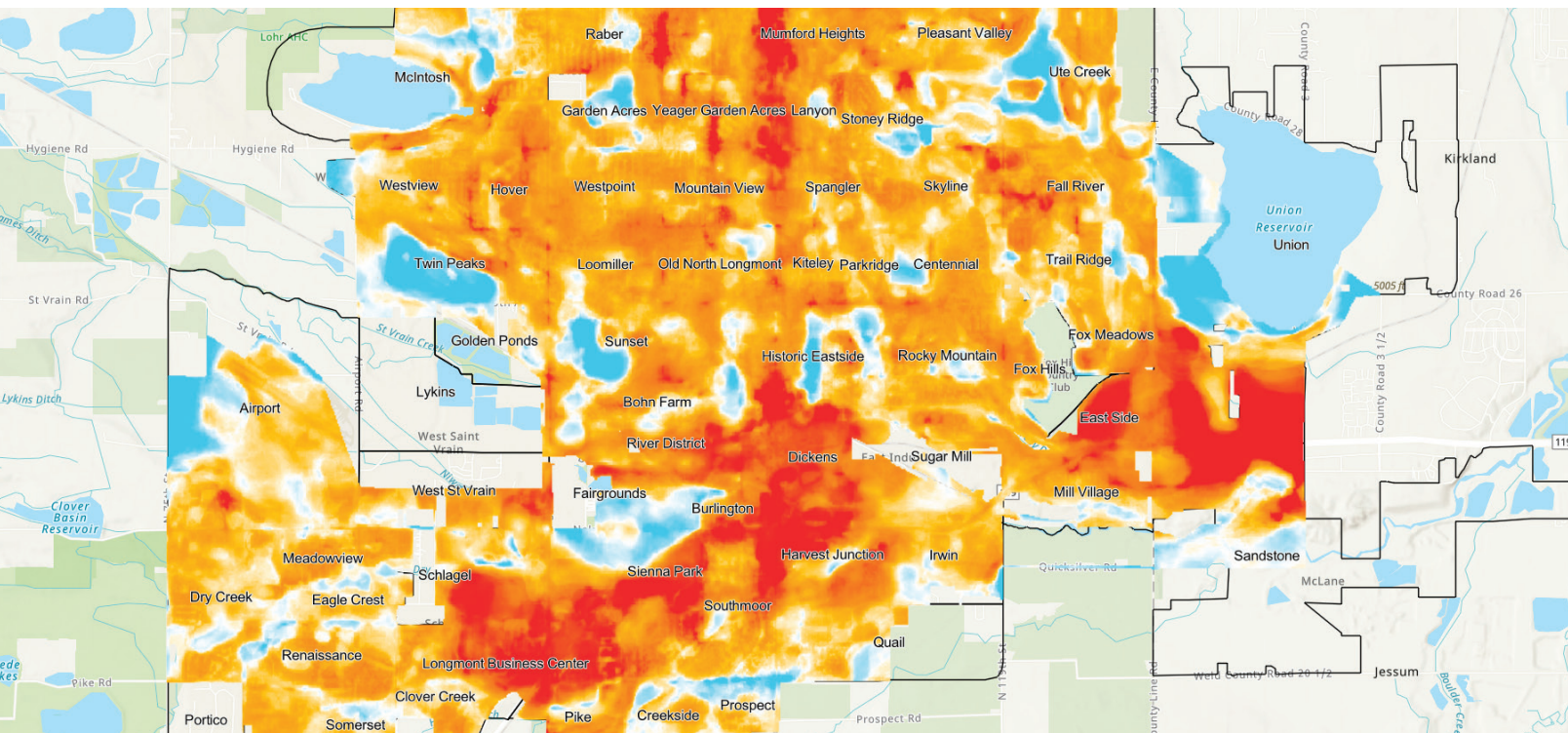
provides internal support for fellow city staff, his role was to look at everything from reviewing the scope of work to determining what technology should be used to helping draft requests for proposals (RFPs). Thanks to the structure of Longmont's government, which places GIS in a central space with other cross-agency offices, connecting on this project and getting from ideation to RFP was streamlined.

The RFP went out in April 2021, and by June 2021 the organization RTI International was selected to codevelop the data visualization tool. One of their first projects was to conduct a literature review,
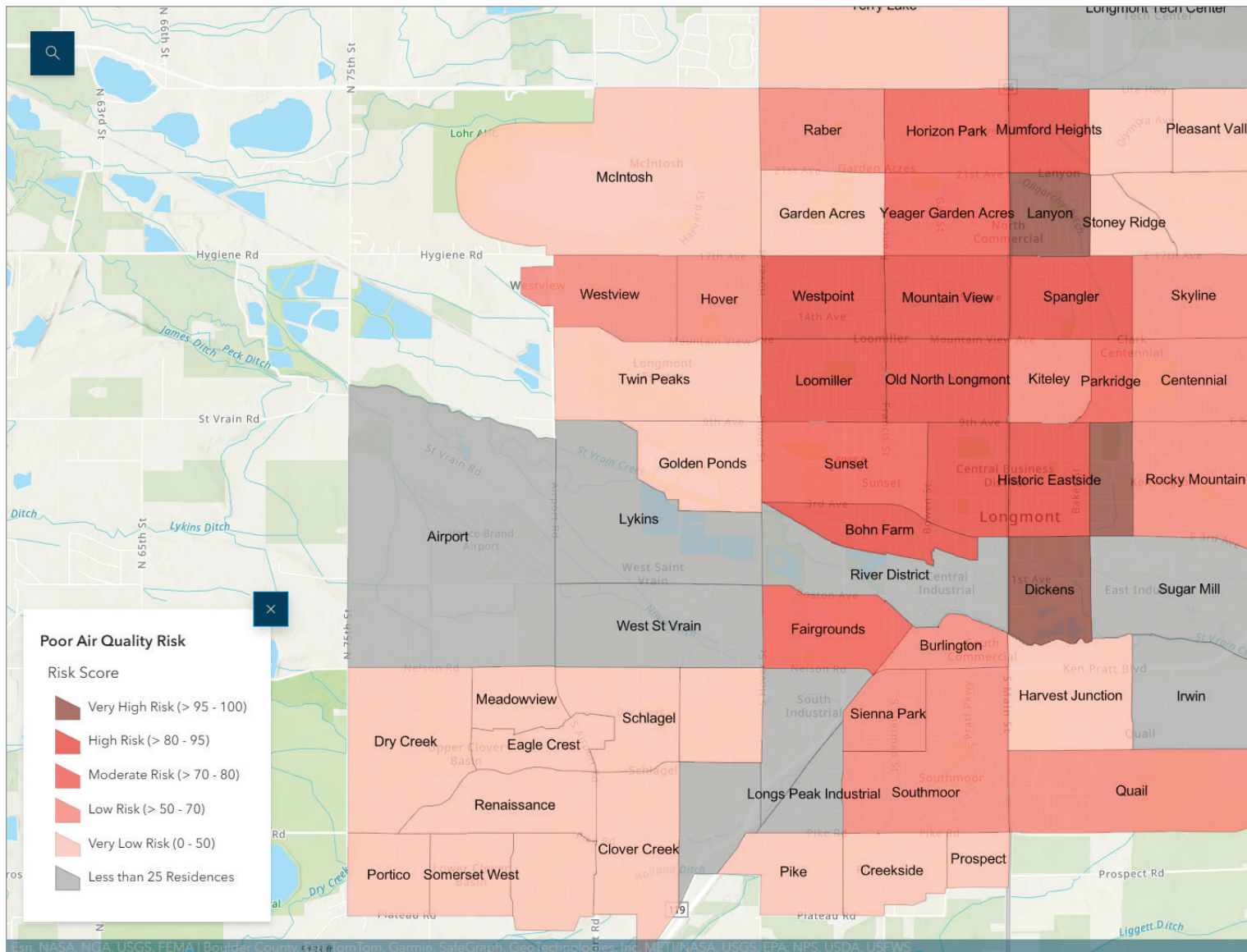
looking at how other cities had developed climate risk scores based on different hazards and determining what should be analyzed to create a risk score for dangers like extreme heat, poor air quality, or flooding. This review led the RTI team to recommend looking at data beyond economic, social, housing, and health vulnerability—which Knoblauch described as standard—and including infrastructure characteristics like impervious ground surfaces and building stock.

RTI also had to consider the unusual temperature variabilities of Longmont; both extreme heat and extreme cold are concerns. There was also a significant

focus on environmental hazards—in particular, air pollution.

Building the Tool

Once Knoblauch and the RTI team, led by engineer Diane Bridger, established metrics, it was time to gather all the data. This required bringing together information from the planning department, the neighborhood resources team, folks from Longmont Power and Communications, the forestry and wildfire experts, and engineers to help inform key pieces. By uniting massive amounts of data into a single visual tool, RTI was able to bring together insights from city staff

Poor Air Quality Risk

Risk Score

- Very High Risk (> 95 - 100)
- High Risk (> 80 - 95)
- Moderate Risk (> 70 - 80)
- Low Risk (> 50 - 70)
- Very Low Risk (0 - 50)
- Less than 25 Residences

members whose data may not have been connected before.

Initially, the tool was a large interactive map; Knoblauch and the RTI team brought in a community group to test the tool and offer feedback. The Just Transition Plan Committee, now known as the Equitable Climate Action Team (ECAT), is a city-led group of frontline community members "who volunteer their time and lived experiences to help the city understand the equity implications" of climate work, according to Knoblauch. This community engagement was critical, as the ECAT members identified several issues with the tool's usability. However, having just one large map wasn't easy to understand,

nor was it intuitive for nontechnical users. Additionally, folks from ECAT wanted to see more stories from the community, so they asked that the data be more humanized. City representatives also gave presentations to the Neighborhood Group Leaders Association, which comprises nearly 60 registered neighborhood groups.

From this feedback, the team went back to the user interface and design and developed an ArcGIS StoryMaps story in addition to the interactive map. Now, individual stories are incorporated with the technical aspects, there are easy-to-understand instructions, and videos explain how to use the ArcGIS StoryMaps story.
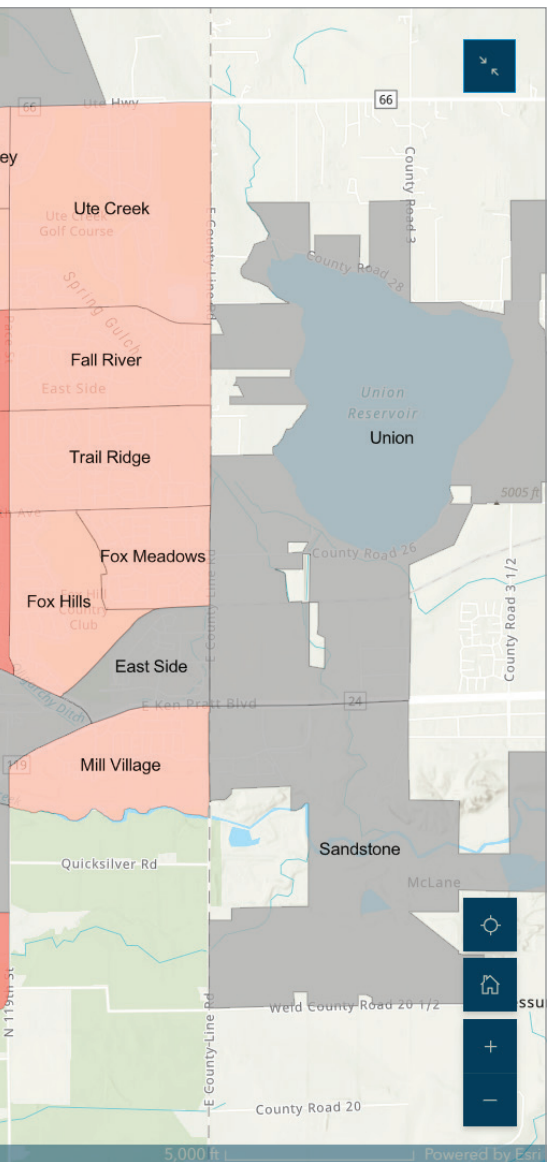
Building a Better Future

Over the last few months, Knoblauch and her team have been doing what they call "internal road shows" to introduce their work to other city staff and show how the tool can be used across different departments. "That's really the purpose of [the tool]," said Knoblauch. "We want people to use it to take action." She's currently working with transportation and public art staff to overlay transit infrastructure and extreme-heat maps to determine where to place artistic shaded bus stops that can provide shelter, beautification, and educational displays.

Both Knoblauch and O'Brien shared tips for other city leaders, hoping to inspire other local governments:

- Start with "enterprise GIS." One of the big things that helped [our project] be successful" was bringing in enterprise GIS at the very beginning of it, said Knoblauch. While the department's organization helps facilitate close connection among various staff, others should start this work by identifying GIS and data folks within their city and engaging them right away.

← This map displays the overall poor air quality risk score for each neighborhood district. This risk score was developed by combining the ozone data, several vulnerability scores, and particulate matter data. (PM2.5).

- Plan for a handoff and have the tool set up so that the city can run it. In addition to helping in the early project planning and hiring stages, O'Brien's team made sure that the handoff from RTI was straightforward and that the city could maintain the tool.
- Invest in a GIS tool. In a resource-constrained environment, investing in a GIS tool helps target funding and resources appropriately. Through the Boulder County Environmental Sustainability Matching Grant program, Longmont received funding that Knoblauch utilized to build out the tool. She acknowledged that, generally, "Longmont is pretty resource constrained," so a tool like this helps the city get the biggest return on its investments—plus, it doesn't put the burden on particularly impacted communities to ask for funds or know how to get access to grants.
- Have good partners. In addition to O'Brien's team, Knoblauch gave a lot of credit to Bridger and the RTI team, as they had a highly collaborative relationship. Additionally, Longmont residents were an important partner; summing up that relationship, Knoblauch reiterated that the work is by the city, informed by the community.

About the Author

Betsy Gardner is the editor of Data-Smart City Solutions and the producer of the podcast *Data-Smart City Pod*. Previously, Gardner worked in a variety of roles in higher education, focusing on deconstructing racial and gender inequality through research, writing, and facilitation. She also researched government spending and transparency at the Lincoln Institute of Land Policy.

Needleseye Park: GIS Helped Forge This Climbing Spot, from Discovery to Construction

Employees in Oak Hill, West Virginia, are using maps, imagery, and mobile apps to track the development and organization of Needleseye Park, providing stakeholders with greater transparency about the park's progress.

Nestled among West Virginia's rolling hills, Needleseye Park is a 300-acre recreational haven. Ancient boulders, towering cliffs, and scenic trails weave through verdant forests, inviting outdoor enthusiasts from all corners of the country to hike, bike, and seek adventure.

But it wasn't always this way.

For most of the 20th century, an Appalachia-based land management company known for its mining operations owned the land.

Early explorers discovered the climbing opportunities at Needleseye, but later, ownership of this land concealed its climbing potential from all but a small group of locals.

The park's formal development traces back to 2015, when the City of Oak Hill annexed the neighboring town of Minden and redrew its map. That's when Marvin Davis, Oak Hill's GIS coordinator at the time, noticed something special. On a 3D map informed by lidar data, Davis saw an impressive two-mile series of boulders and cliffs that looked perfect for outdoor recreation.

The map caught the attention of key stakeholders, including city manager Bill Hannabass, who called for on-the-ground exploration. That eventually led to the acquisition and development of what is now Needleseye Park.

From the first 3D map to data gathering and planning efforts, the Oak Hill team has been guided by GIS technology.

"GIS helped make Needleseye a reality from the start," Davis said.

Visualizing What Needleseye Park Could Be

Before exploring the idea of creating a park, the city needed a system to record survey trips and share the information. So, Davis created a mapping solution using the city's enterprise GIS technology. "It encouraged collaboration," he said. "We could share data with multiple stakeholders to get their buy-in and secure funding."

The opening between two boulders creates a feature known as the Needleseye, the namesake of a new park.

Davis, Hannabass, and their teams
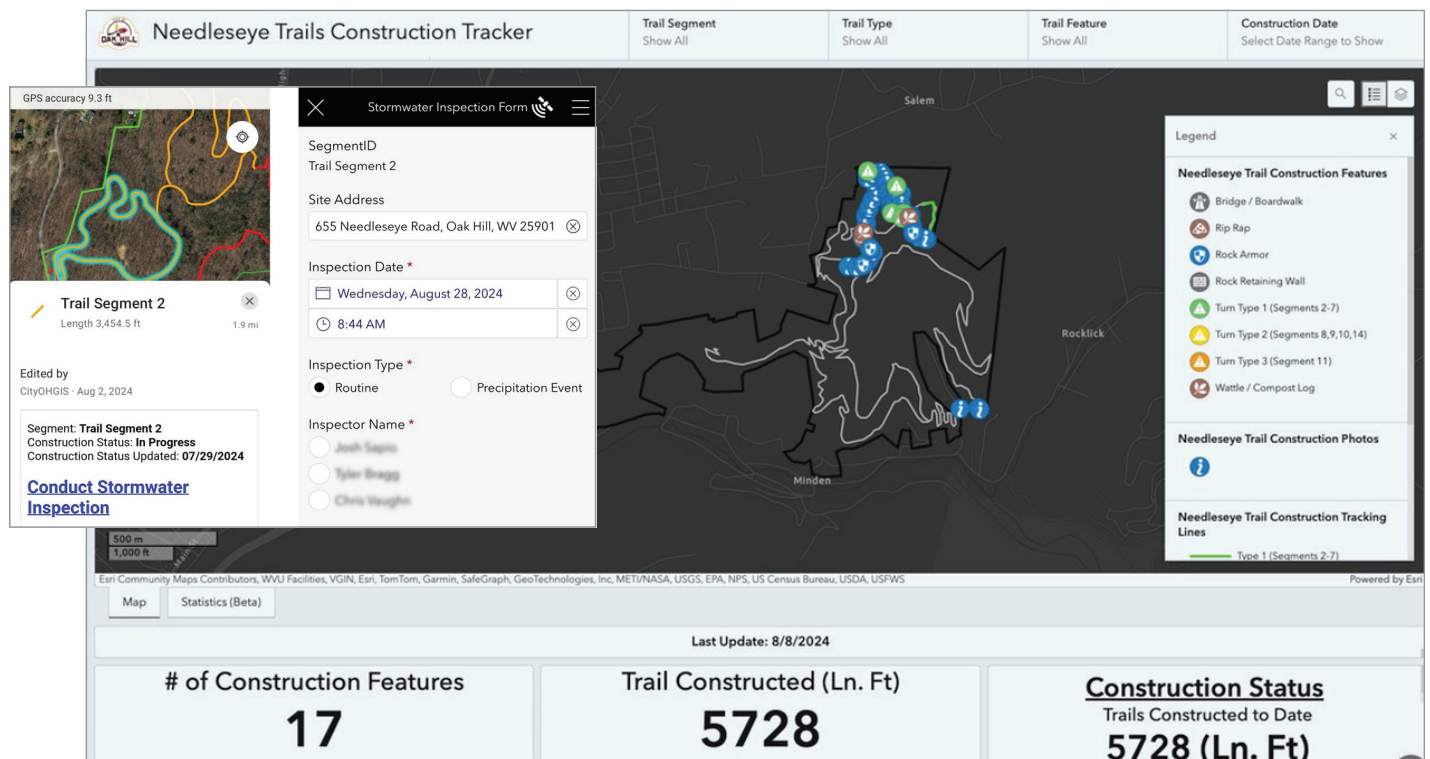
↑ The Needleseye Trails Construction Tracker gives stakeholders a comprehensive view of ongoing work.

↑↑ Inset: A stormwater inspection app was created with ArcGIS Survey123 to evaluate any issues of trail damage or erosion after a storm.

collected field data and photographs for various park features, including cliffs, boulders, crags, and a cave. This data, layered on a GIS map, supported planning discussions. They worked with community experts such as professional climbers to determine suitable trails, rate the difficulty of climbing routes, and scout locations for trailheads and facilities. Davis also created a geospatial digital twin, a digital replica of the park that can support planning and operations.

The digital twin helped Oak Hill secure funding to conserve the park through the West Virginia Land Trust.

Foundational Tools for Park Construction

Needleseye Park opened to the public in 2019 and is still a work in progress. But Tyler Bragg, the City of Oak Hill's GIS coordinator, said geospatial technologies are supporting nearly every aspect of the park's development.

Bragg and Josh Sapio, Oak Hill's inaugural parks and recreation director, have been utilizing GIS tools to gather data and oversee development. Each week, they collect data from contractors about the work they have completed. The team then uses a GIS data collection app and a Global Navigation Satellite System (GNSS) receiver to record the exact location and details of new trail segments. This data flows into a GIS dashboard almost immediately, allowing all stakeholders to monitor trail construction progress.

The streamlined process helps ensure that contractors are adhering to project timelines. The team also uses GIS to verify data in the contractors' reports, recording what each contractor is owed for features such as rock armor and retaining walls.

The Needleseye Trails Construction Tracker gives stakeholders a comprehensive view of ongoing work.

Part of the park's construction management involves stormwater inspection surveys every four days or after every quarter inch of rainfall. Bragg digitized the process using ArcGIS Survey123, a mobile survey app. The survey includes details such as inspector names, site addresses, and inspection types. Once the survey is completed, the app automatically generates and shares a report.

"If I can save somebody 10 minutes in their day, then that makes me feel like I've done something productive," Bragg said.

As projects develop, Bragg collects images for points of interest along with precise construction data. All this information, collected inside GIS, will be used to create the final trail map. Bragg also plans to create a climbing guidebook and a virtual trail network to help people preplan their visits.

"The mindset going into this is not just collecting data to get by right now, but, 'How can I use it later?'," Bragg said. For instance, Bragg used GIS to create a road development plan and Sapio used the data to create an evacuation plan in case of emergency.

GIS is also a collaboration tool, and Bragg said it is helping groups work together on shared park spaces. For instance, when the Fayette Trail Coalition received funding for a new trail, they designed a stacked loop for hiking and biking at different difficulty levels. At the same time, another group proposed a disc golf course. Bragg mapped both proposals and shared the map with the groups to find overlaps and make changes.

Bragg emphasized that the park's development is a collaborative effort between municipal staff and local volunteers. The New River Alliance of Climbers (NRAC), for instance, has been integral to the early stages of planning and site development.

"They provided critical knowledge of quality climbing areas within the park and continue to play a major role in the development of climbing and bouldering management policies," Bragg explained.

He added that NRAC has spearheaded volunteer efforts within the park, including the construction of the primary hiking trail to access the popular climbing areas. The group is also collaborating with Bragg and Sapio on developing of the climbing guidebook.

"As the park develops, it is critical that the city also maintain the conservation easement placed on the park to ensure the most optimal and sustainable wilderness setting possible. Doing so will allow generations to come to enjoy the park," Sapio said.

Establishing a Framework for Needleseye's Future

Throughout its journey from undiscovered treasure to popular climbing spot and local recreation attraction, Needleseye Park has proved that simple maps can reveal great stories.

Bragg says maps will continue to guide the park's operations. He intends to use GIS tools to plan signage and keep an inventory. Similar workflows will guide the creation of climbing routes, and also support collaboration with the National Park Service to connect Needleseye via hiking trail to New River Gorge National Park and Preserve.

For Sapio, the park has offered a unique opportunity for the City of Oak Hill to bring additional recreational activities to the region within a municipal park setting.

To learn more about GIS for parks and recreation, please go to go.esri/GIS4SmartParks.

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