Esri News
for State & Local Government
Winter 2019

Optimizing Elections

Using GIS Improves Preparation and Execution for County

By Monica Pratt, Esri

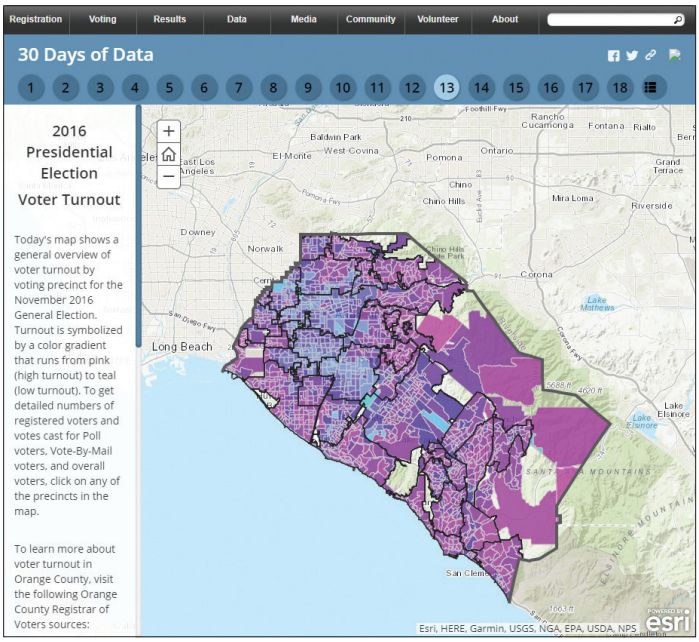
The burden of administering elections falls primarily on local government. The legal framework and some oversight for elections are provided by the federal and state governments, but counties do all the work of running every election. The enormity and complexity of this task are typically underappreciated. Local governments are responsible for elections held for administrative areas that range from the local to the federal and cover school districts; special districts such as water, sewer, storm, sanitation, and community service areas; and municipal and county districts.

Ballots must be tailored based on where each voter lives, which is why the task of verifying voter addresses and precincts is so critical to the operations of a county elections office. In many cases, ballots must be provided in other languages in addition to English. The Orange County Registrar of Voters (OCROV) provides translated ballots in Spanish, Vietnamese, Chinese, and Korean, and facsimile ballots in Tagalog and Farsi (Persian). For each voter, the county elections office must identify the federal, county, state, municipal, and school district and any other jurisdictions in which that voter resides; determine how many of each type of the ballot to print; and distribute the ballots correctly.

OCROV is using GIS to improve how the county handles the complex tasks associated with running elections. In the 2018 General Election, it provided the appropriate ballot to every one of its 1.6 million voters. To that end, 385 ballot types were created.

The mission of OCROV is "To provide election services for the citizens of Orange County to ensure equal access to the election process; protect the integrity of votes; and maintain a transparent, accurate, and fair process."

The individual at the helm of the OCROV is its registrar Neal Kelley. The process of optimizing OCROV efficiency and improving the voting experience has been championed by Kelley, who joined the county as Chief Deputy Registrar of Voters in 2004 and was appointed Registrar of Voters in 2006. Despite only having a staff of 65, the office tries to be at the forefront of elections departments at the state and national level by working with agencies such as the California Association of Clerks and Election Officials (CACEO), Department of Homeland Security (DHS), and the Federal Bureau of Investigation (FBI).



↑ An Esri Story Maps app, "30 Days of Data for the 2018 Primary Election" (www.ocvote.com/data/30-days), maps a wealth of information about how elections are held and on voter characteristics and behavior.

Smoother Operations

Since 2016, OCROV has greatly expanded the use of GIS in its operations and planning for elections. The widespread use of GIS to improve election management, piloted in the 2016 election cycle and refined in the 2018 cycle, has greatly enhanced the speed and efficiency of many operations at OCROV including verifying addresses.

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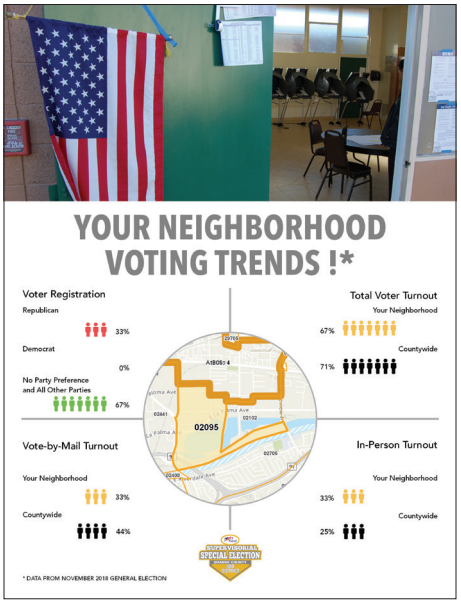
In 2016, the OCROV GIS team was tasked to modernize all voter addresses by geocoding them and verifying the location of precinct boundaries in advance of the 2016 presidential election. This was not a trivial task.

Although some digital mapping of precincts had been done previously by OCROV, the list of voter addresses was based on paper reports. In the past, it could take months to review and verify voter addresses. By cross-checking voter addresses with address data maintained by the water department and assessor's office, OCROV could verify that addresses were both valid and correct. Currently, OCROV maintains more than 800,000 addresses, and now the process of verifying them takes weeks, not months. This process has ensured OCROV would not face the problems other county registrars have experienced caused by inaccurate addresses that can lead to the nullification of election results.

In addition to assisting with verifying voter addresses, an internal ArcGIS Online tool identifies polling places that need volunteers and which polling places need language support. Other ArcGIS Online tools help OCROV track the delivery and return of equipment used at polling places. These tools allow OCROV staff to spot deficiencies and misallocations of resources.

GIS has been especially beneficial when OCROV is working under the time constraints imposed by special elections, which require preparing maps and materials for a subset of the county's voters. In February 2019, OCROV needed to modify half the county's precincts in just a three- to four-week period. OCROV quickly accomplished these tasks for 300,000 voters—tasks that would have previously taken months.

GIS has improved not only the preparation for elections but also the county's execution on election night. In pre-GIS days, OCROV verified that precincts had reported via phone, which was a staff-intensive process that took a significant amount of time. Time is something that OCROV does not have on election night, since all ballots must be returned to OCROV on election night. The return of ballots following the closing of the polls on election night is mandated by law.



↑ Using spatial analysis, OCROV produces posters showing voting trends by neighborhood.

Now, instead of having every precinct call in, Operations Dashboard for ArcGIS is used to verify the status of polling places and track the return of machines containing electronic ballots known as Judge's Booth Controller boxes (JBCs). JBCs are the control unit of the Hart InterCivic eSlate Voting System. A combination of Survey123 for ArcGIS, ArcGIS Pro, and some Python scripting is used to accomplish this.

Operations Dashboard lets Kelley see the status of all aspects of an election. GIS tracks the location of JBCs in real time, verifying that election night procedures are being followed. A series of milestones are recorded—polling place closure, JBC en route, and JBC received and processed—documenting that JBCs are being returned. Throughout this process, the locations of all vehicles simultaneously returning JBCs from polling places are tracked. During the 2018 General Election, 984 JBCs were tracked. The Orange County Sheriff's department works with OCROV to ensure the secure return of JBCs from the collection centers to OCROV.

OCROV uses GIS not only to better run elections but also to inform the public, encourage voter participation, and provide easier access to election results. Using spatial analysis, OCROV produces posters showing voting trends by neighborhood. An Esri Story Maps app, "30 Days of Data for the 2018 Primary Election" (www.ocvote.com/data/30-days), maps a wealth of information not only about how elections are held but also on voter characteristics and behavior.

The Your Voter Registration page on the OCROV websites uses GIS behind the scenes to provide voters with the correct polling place, information on the districts in which they reside, and information about their elected officials. Voters can also use the site to apply for a vote-by-mail ballot, download a sample ballot, or opt out of receiving a sample ballot. These outreach efforts have had a positive effect: the turnout for the 2018 midterm election hit a historic high of 71 percent.

Meeting New Challenges

More challenges continually arise for OCROV. In 2016, the county conducted an Early Vote Center pilot program and in 2018 increased the number of these centers with a mobile pop-up Early Vote Center. In the March 2020 Presidential Primary Election, absentee ballots will be mailed to all voters, and the county will open full-service Vote Centers in many more locations that will operate on weekends and extend the period to cast a vote in person beyond the traditional one day of voting on Election Day.

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Using GIS to Build "Highways in the Skies" in the City of Taylor, Michigan

By Michael Healander, Airspace Link

The Federal Aviation Administration (FAA) works hard to secure our national airspace, maintaining over 5.3 million square miles of domestic airspace for the United States. In Michigan alone, more than 2.7 million residents and 283 cities or townships live and operate under controlled airspace. One such community, the city of Taylor, is home to 62,000 residents and operates completely within federally controlled airspace.

Nestled just east of the Detroit Metro Airport, 20 percent of the city of Taylor is blocked by the FAA from being able to fly drones. No commercial or recreational drone operation may occur within the city without getting authorization by the FAA or Detroit Metro Airport Air Traffic Control (ATC). These types of restrictions, along with other standing FAA regulations, create confusion for both residents and community officials to know when and where drone pilots may safely operate.

Challenge

To help meet the demands of drones in local airspace, the FAA has introduced the UAS Data Exchange, a partnership between government and Airspace Link facilitating the sharing of airspace data between the two parties. Under this umbrella of cooperation, the first program available to drone pilots today is known as the Low Altitude Authorization and Notification Capability (LAANC).

In the United States, the LAANC program is intended to directly support the integration of unmanned aircraft system (UAS) vehicles into national airspace. Regulators are interested in supporting technology innovation while still providing air traffic professionals with visibility into where and when drones are operating.

Local governments play an important role in supporting this industry and remain the strongest resource for the most up-to-date, on-the-ground information and enforcement of the use of drones within each community. The GIS data already

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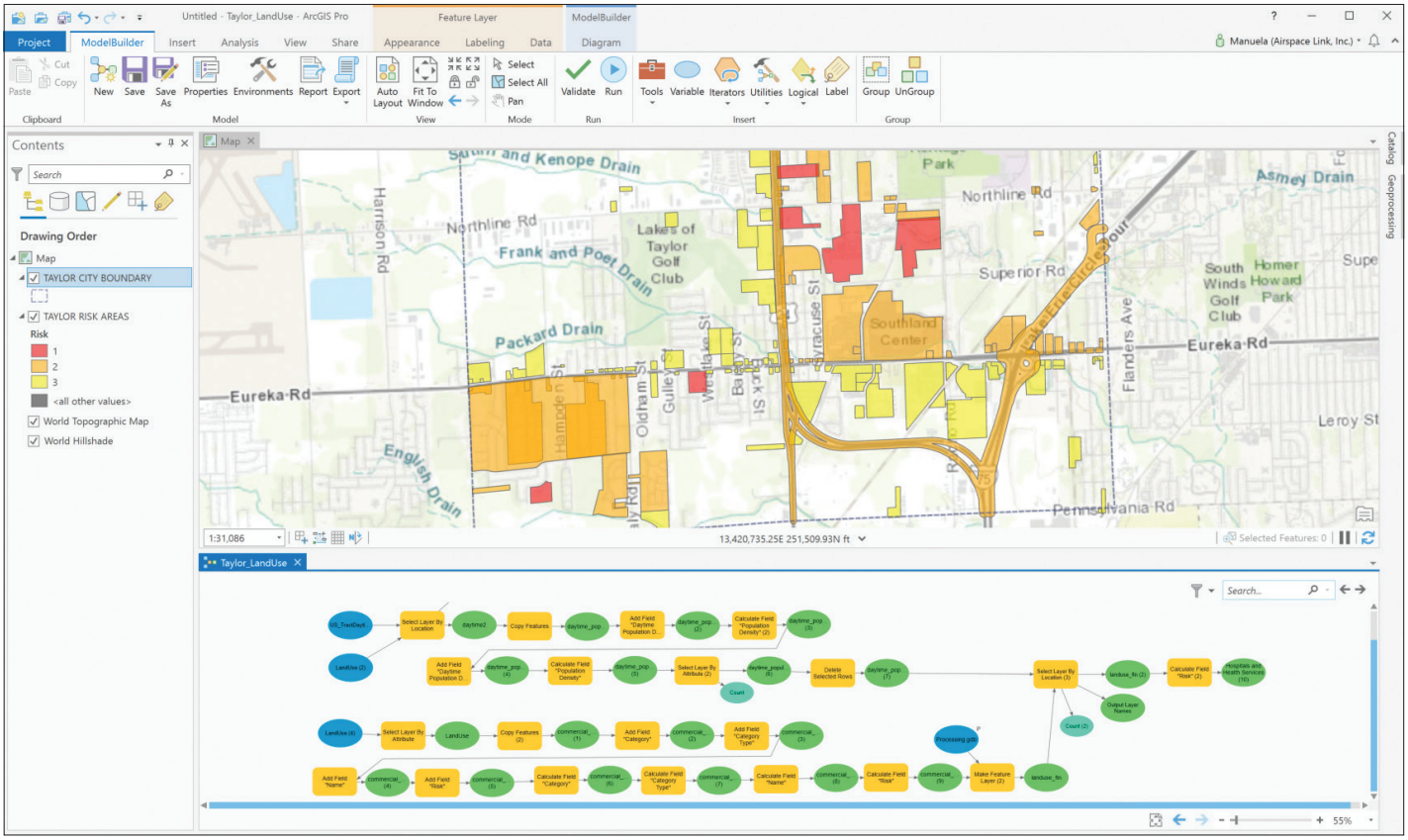

↑ Existing GIS data layers are used to quantify and calculate ground-based risk. Data is gathered from a wide variety of datasets maintained by cities.

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Using GIS to Build "Highways in the Skies" in The City of Taylor, Michigan continued from page 4

being maintained by the city of Taylor will pave the way for the construction of new UAV infrastructure.

Solution

Airspace Link's AirHub for Government is the first-ever communication tool from local government to the drone industry. Airspace Link facilitates the sharing of ground-based data between the FAA, State of Michigan, Taylor, and the UAS industry, aggregating dozens of data sources to inform operators about potential risk factors and advisories during operational planning. This includes GIS data such as schools, hospitals, government buildings, helicopter pads, airports, stadiums, land use, zoning, population density (different times of the day), road rights-of-way, rules, regulations, and ordinances.

Taylor now clearly maps FAA data with local government regulation and ordinance data in a single platform, more easily communicating with the drone industry on scheduled and unscheduled advisories in the area.

As Taylor builds flight advisory areas, Airspace Link provides tools to assess the impact to recreational and commercial drone operations. The township can simulate the impact of having too many advisory locations, protecting the growth of the drone industry.

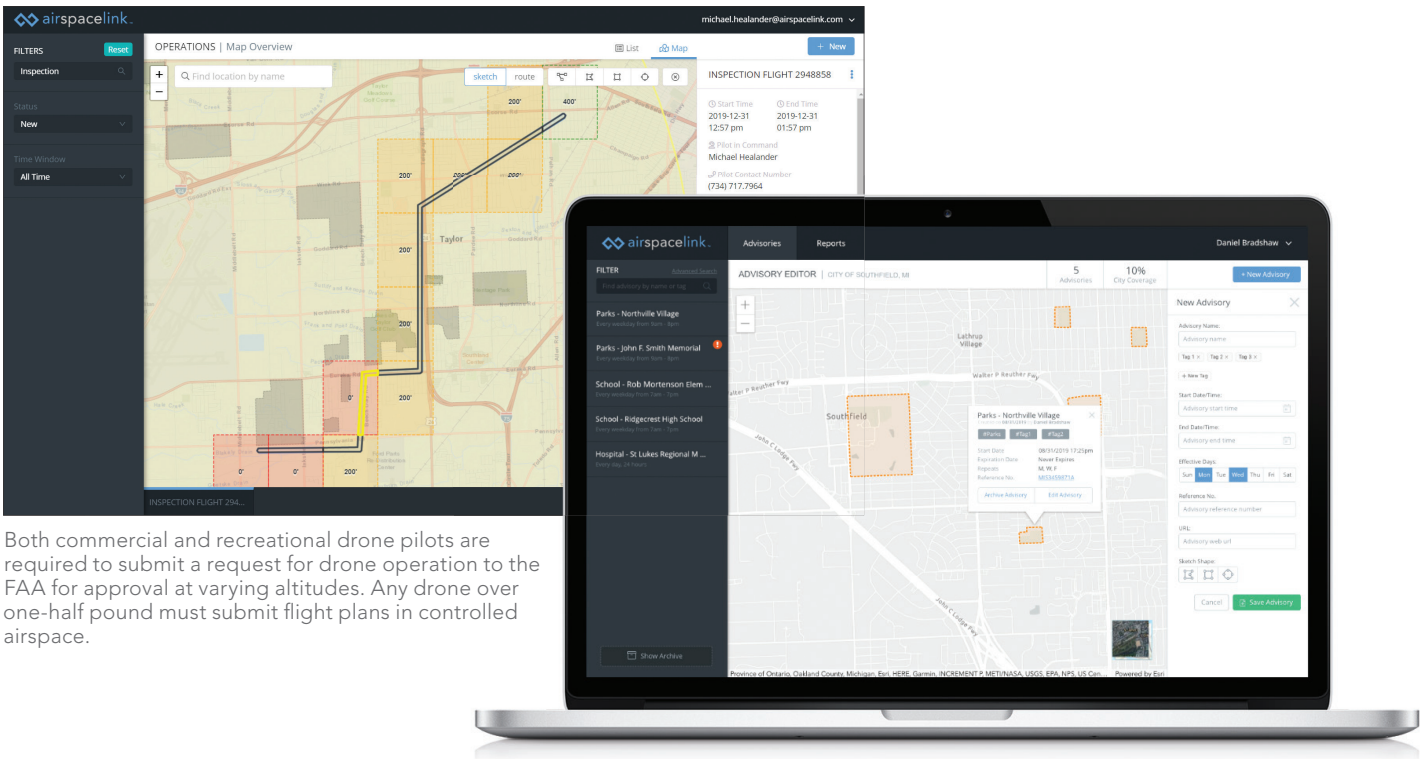
Future (What's Next)

As the industry continues to evolve, emergency managers will utilize GIS tools to make UAS Volume Reservations (UVR)—a capability granting authorized drone service providers the ability to issue notifications to drone operations regarding air and ground activities relevant to their safe operation—and share it with multijurisdictional stakeholders. The National Aeronautics and Space Administration (NASA) is already hard at work proving many of these concepts, and cities are preparing by working with private industry to implement solutions to manage these types of airspace reservations.

Aside from safety, urban designers are also often concerned about sound levels in neighborhoods. Mechanical buzzing doesn't fit with anyone's idea of a pleasant community. With the appropriate application, GIS can be put to work within communities to track the number of flights intersecting subsections of the city and "deactivate" airspace for a predetermined cooldown period. In the future, urban airspace designers will construct drone corridors using a combination of risk and noise pollution factors.

Conclusion

As technology advancements push innovation into the skies, city managers can lean on GIS data already being generated within their communities to prepare themselves for the Jetsonian future. Don't wait until unmanned vehicles begin operating before considerations are made on how to participate in drone integration and innovation. For more information on how Airspace Link can help you integrate drones into your community safely, visit **go.esri.com/AirspaceLink-Partner**.



Both commercial and recreational drone pilots are required to submit a request for drone operation to the FAA for approval at varying altitudes. Any drone over one-half pound must submit flight plans in controlled airspace.

More Judges for Riverside and San Bernardino Counties—Thanks, in Part, to Policy Maps

A good policy map clearly highlights where there are opportunities to intervene, and the maps in the "Scales of Justice" story do just that.

Riverside and San Bernardino Superior Courts' need for judges are unlike those of any other counties in California. Due to large increases in population in the Inland Empire, the Riverside Superior Court currently experiences a deficit of 36 judges, while the San Bernardino Superior Court has a deficit of 38 judges, according to an assessment conducted by the Judicial Council of California.

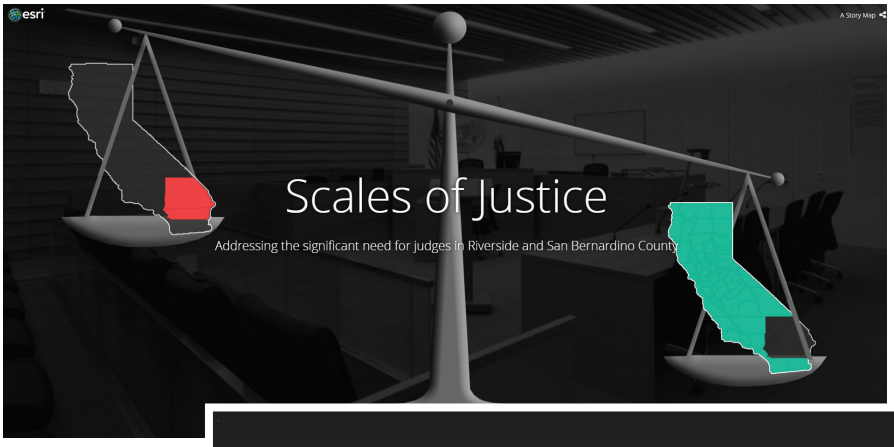
This chart reveals that San Bernardino and Riverside Counties require half of all the additional judges needed for the entire state.

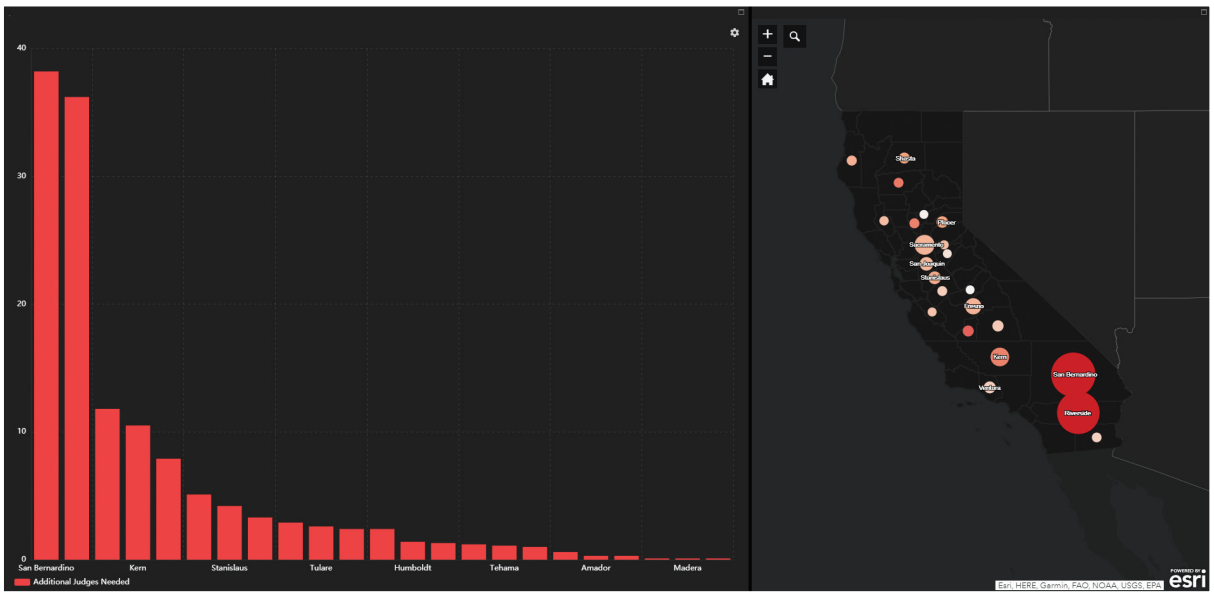
This overburdened justice system impacts the constitutional rights of people in our communities, as judges have less time to spend on critical matters involving children, families, the elderly, those with substance abuse and mental health issues, and those with property and business disputes.

To address this shortage, the Monday Morning Group, an organization of leading business and community members and advocates in the inland Southern California region, partnered with Esri, the global market leader in GIS, to create the "Scales of Justice" story that includes narrative, policy maps, and charts that shine a light on the judgeship shortage in the Inland Empire.

Equipped with compelling stories of judicial need, senator Richard Roth presented the "Scales of Justice" story to state elected officials to bring awareness to the issue. The result was significant, new funding for the Inland Empire in the recent California budget, which includes **$36.5 million per year in funding for 25 more judges and their staff for the state**.

The "Scales of Justice" story is just one of an ever-growing collection of policy maps, story maps, and apps that can be found in Esri Maps for Public Policy, a site dedicated to raising the level of spatial and data literacy in public policy. To learn more, visit **go.esri.com/scales-of-justice**.





↓ This chart reveals that San Bernardino and Riverside Counties require half of all the additional judges needed for the entire state.

Smart Communities Happen When Governments Focus on Civic Inclusion

Governments that prioritize civic inclusion understand their community makeup, which neighborhoods are at risk, where resources are needed, and how to achieve social equity for all.

To see how you can achieve civic inclusion, visit **go.esri.com/SmartCivicInclusion**.

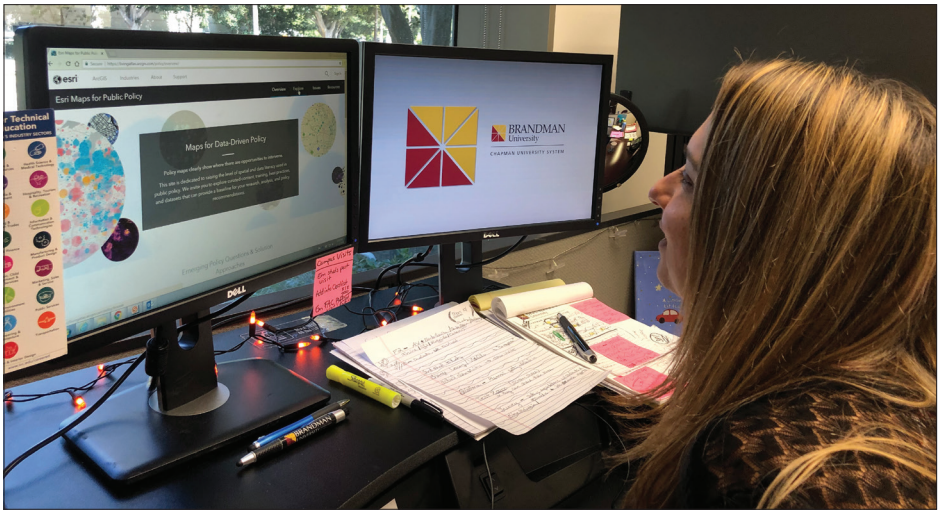
Deeper Spatial Thinking—The Value of Esri Maps for Public Policy in the Classroom as a Gateway Tool

By Dr. Sheila Lakshmi Steinberg, Brandman University Faculty President and Professor of Social and Environmental Sciences, and Dr. David Gonzalez, Jr., Assistant Professor of Public Administration and Organizational Leadership, Brandman University, Irvine, California

Everyday people engage in spatial thinking as they go about their daily patterns and routines. We find our way to work, navigate to the coffee shop, to the gym, to school to pick up our kids, and circle back home again. This is simple but effective spatial thinking, which is what we do on a daily basis to find our way from point A to point B in the most effective manner or to meet certain needs along the way. But deeper spatial thinking is necessary to understand and solve complex problems that exist in community life.

At Brandman University, we teach adult learners applied problem-solving skills using GIS. We are the first spatial university that is weaving GIS into our entire curriculum and creating new programs built around the power of GIS and data analytics. We believe that GIS is a tool that needs to be in business, social sciences, health, education, nursing, and nonprofit management.

The Esri Maps for Public Policy collection is an easy-to-use tool that Brandman University has incorporated into our latest courses and plan to weave into curriculum across our 27 campuses and diverse geographies. Why? Policy maps offer a wonderful way to introduce students to the power of spatial thinking and analysis in a simple, hands-on, and accessible manner. In our new GIS Research Methods course—designed as part of the new Master of GIS and Data Analytics program—we introduce students to identifying problems and solving issues in their own communities using GIS. Policy maps open the door to a new way of looking at things such as crime, poverty, homelessness—challenges and issues that plague every community. As with all issues, the ability to visualize data in an interactive map format helps students clearly understand context, space, and place and furthers interest in the topic under study. When you see data using colors and symbols in a quick-to-use manner (ZIP code or city name produces results), it reveals patterns with a place that perhaps you did not know existed.



↑ A student from Brandman University's GIS Nonprofit Certificate program uses Esri Maps for Public Policy.

At Brandman University, we take seriously Esri's message "See What Others Can't" through teaching our students how GIS relates to their everyday work environments and can help each of them do their jobs better in the long run. For instance, the fire captain can use policy maps to identify the communities that are at risk from fire, and the social services worker can identify where the poorer communities live and have challenges that need to be met in the best way possible. "We hook students into deeper spatial thinking through assignments like our hands-on Policy Maps paper. In this assignment, we advise students to visit the Esri Maps for Public Policy site and use the data to provide deeper analysis and understanding of their potential topic. Leveraging data from Esri Maps for Public Policy allows the students to examine easy-to-access spatial data on their home area. The real goal here is place-based storytelling with maps and images; if you can visualize data, you can understand and act on it. In other words, Esri Maps for Public Policy significantly helps our adult learners get the context for a problem or issue under study quickly and without hassle. With no special access needed, they serve up GIS information in a very palatable manner. Through using this tool, students become empowered to then move on to using other Esri online tools such as ArcGIS Insights and ArcGIS Business Analyst. But the policy maps collection is the gateway tool.

Our Master of Public Administration (MPA) program is a wonderful example of putting spatial thinking into action for society.

Public administration as a practice and study is all about serving the public good, solving problems for communities at all levels of government. Sometimes

"There are very few simple or tame problems in public administration. The discipline itself owes its development to the complex challenges that come with attempting to [create] or extending public value or good. From the earliest attempts at applying the time studies of Frederick Winslow Taylor, to Herbert A. Simon's 'satisficing,' we've all been working hard to apply the best methods from science to the people's work in order to help solve public problems. Policy maps as a tool has opened up possibilities for that process to support more precise and deeper solutions."

—Dr. David Gonzalez, Jr.
Assistant Professor of Public Administration and Organizational Leadership

that good is peace, safety, healthy air, and clean parks. As a matter of fact, that is one of the difficulties in articulating a problem to be solved in public administration: what is "good" can mean different things to different people. By its very nature, public administration responds to problems that impact a given group or cluster of groups. From fire and police services to social services to designing and maintaining roads, understanding a problem and its nature is a complex undertaking. It requires being able to understand the contributing factors and identifying achievable goals and solutions. Now, consider the accepted reality that with complex problems, all we can hope to do is mitigate the damage caused by the problem, decrease the number of occurrences of the problem, or move the problem—and by extension, its consequences—elsewhere. It is very important to the creation of solutions for public problems that government has the best methods and tools available to support public policy processes.

Recently, in an effort to equip present and future public leaders with the knowledge and skills needed to understand and attack big public problems, Brandman University redesigned its MPA degree, and in doing so, GIS was introduced. What is missing from the theories and methods of yesterday are capabilities to understand more points of data or information in relation to a given problem and the impacted community. Simon's points were that we are all subject to a bounded rationality and will never be able to capture, observe, or understand all the variables, and we will always be restricted by time in a given phenomenon. So the best we can ever do is move forward at some acceptable level of satisfaction (a form of "good enough").

Esri's technology and data challenges that concept and bring an extraordinary dimension to solving issues for the public good completely. They allow researchers and practitioners to visualize information and data that were either not previously available or at least not synthesized together to show a less bounded picture of an issue and its contributing factors. Our MPA students learn about the powerful lens that GIS can be with respect to the public policy analysis process in order to arrive at alternatives that improve public value and serve the greater good.

Overall, Brandman MPA students are practicing the knowledge, skills, and abilities needed for effective governance aimed at improving lives in our communities by using innovative thinking and ideas. For more information on Brandman University's MPA program and curriculum, visit **go.esri.com/BrandmanU-MPA**.

To explore curated content, datasets, and best practices that can provide a baseline for your research, analysis, and policy recommendations, visit **go.esri.com/Brandman-Policy**.

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OCROV is making extensive use of the spatial analysis capabilities of ArcGIS Pro to help OCROV meet these new requirements. Analysis of available structures means the county will not have to consider all possible locations when locating Vote Centers—just the ones that meet the 14 state-mandated criteria under Senate Bill 450, which is also known as the Voter's Choice Act (VCA). Since OCROV must give reasons why it picked each of the Vote Center locations, this analysis provides the rationale for OCROV's choices. Utilizing GIS will continue to provide data-based analysis to inform the OCROV operations planning and assessments.

To learn more about Orange County's election information and voter turnout and behavior, visit **ocvote.com/data/30days**.

To learn how to implement a GIS-enabled election information system similar to OCROV's, visit **go.esri.com/OC-Elections**.

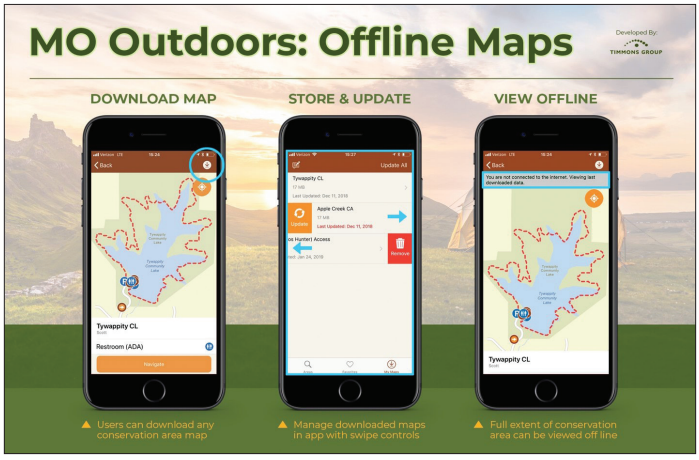
Missouri Department of Conservation App Encourages Users to Have Fun Outdoors

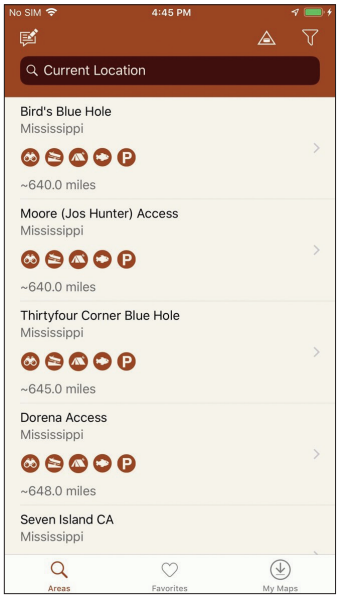
The Missouri Department of Conservation (MDC) administers more than 975,000 acres located throughout the state, with a mission of protecting the state's natural resources while helping Missourians connect with their native heritage. To continue encouraging Missourians to enjoy outdoor activities while it promotes the stewardship of the land, the department needed a way to make information about the state's conservation areas readily available to the public.

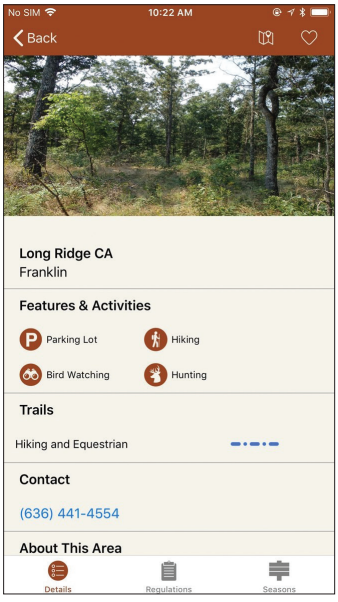
Staff at MDC, a longtime Esri user, knew geographic information system (GIS) technology would be at the core of the MO Outdoors app, but they needed help with implementation. So they turned to Timmons Group, a longtime Esri partner. Timmons Group is a national geospatial consulting and implementation firm. MDC had previously partnered with Timmons Group in developing other successful mobile applications, like MO Hunting and MO Fishing, so the firm was an obvious choice.

Prior to the MO Outdoors app, MDC had used Esri GIS to refine the department's data management processes and to deliver pertinent information about its products and services through its Find Places to Go in MO website. This work provided the foundation for the development of a native app that provides the additional functionality that users requested, such as navigation to conservation areas and interactive and offline mapping with GPS.

Using ArcGIS Runtime SDKs, Timmons Group developed a public-facing mobile application for iOS and Android. The application pulls in data from ArcGIS Online basemaps to provide information about the more than 1,000 conservation areas in the state. MO Outdoors allows users to quickly and easily find outdoor activities based on their selected filters. The mobile application provides information on points of interest and activities, such as nature centers, camping sites, hiking trails, fishing areas, and shooting ranges. Users can now easily get regulatory and hunting and fishing information, hours of operation, and parking details right from their mobile device. The app allows them to designate their frequently accessed locations as favorites and to download maps for offline use.







> "This app is helping us connect people with the outdoors to enjoy all the beauty and outdoor activities our state has to offer. Folks that have lived here their entire lives are telling us that they are discovering new trails and places they'd never visited before using the app."
>
> **Alex Prentice,**
> IT Project Manager, Missouri Department of Conservation

The real-time updates on area closures, activities, seasons, and regulations make it easier for users to enjoy all the wonderful and diverse natural resources Missouri has to offer. MO Outdoors helps MDC meet its goal of getting more Missourians and visitors to enjoy the beautiful outdoors within their state. In the first six months since its release, the app had over 24,000 downloads, and the number continues to grow. To stay informed on how GIS can strengthen and grow your agency's customer service capabilities and provide a better experience to visitors, visit **go.esri.com/MO-Outdoors-App**.

The Best Time to Plant a Tree

By Brent Jones, PE, PLS, Global Manager, Land Records/Cadastre, Esri

According to a Chinese proverb, the best time to plant a tree was 20 years ago. The second-best time is now.

Like planting a tree, the best time for your organization to expend the time and money to make a major change is sometime in the past. Now is the second-best time.

An article I wrote in the spring issue of *ArcUser*, "The High Cost of Low-Hanging Fruit," observed that transformation is disruption that you do to yourself.

Although technology causes a lot of disruption in our daily lives, it's not a single technology in isolation that enables large disruptions—it's a combination of technologies, data, and other elements. Enabling technologies—such as a good street network, maps, GPS-enabled smartphones, cloud computing, and online payment—contributed to the disruption of taxis by Uber. However, the availability and capabilities of the Uber app were critical to Uber's success. Average folks needed to be able to use the app and make payments through it.

This sounds simple, but do you remember when you were skittish about entering your credit card number online? Although the iPhone was released in 2007 and an Android smartphone in 2008, it took several years for people to get used to downloading and using apps.

Now smartphones are owned by 62 percent of the global population and nearly 80 percent of Americans, and these percentages are growing rapidly.

Because new enabling technologies appear every day, defending against disruption is an ongoing process. You probably own technologies that enable disruption and transformation, but you may not use them to their full extent or in a way that transforms your organization.

GIS is a disruptive technology. It continues to be a disruptive technology by leveraging other emerging and evolving disruptive technologies. A few of the key ones are associated with computing infrastructure, data, and GIS innovation.

The cloud, software-as-a-service (SaaS), and mobile and distributed computing are improvements to the computing infrastructure that deliver answers faster and in ways that are more accessible.

From weather, traffic, and real-time sensor data to imagery, demographics, and scientific measurements, the data available today enables new and better types of analysis that improve decision-making.

GIS is rapidly innovating with advanced analytics, smart mapping apps, and robust and readily available SDKs and APIs for developers that help deliver rapidly evolving capabilities that can be accessed and used by non-GIS professionals and GIS professionals alike.

The combination of these technologies delivers Web GIS, an emerging disruptive technology. ArcGIS has transformed (self-disrupted) into Web GIS, which is driving transformation in many organizations. Web GIS enables organizations to move from sequential to simultaneous workflows with integrated operations that share data and services and totally change how the organization works.

And there's more technology coming, enabling more and larger disruptions more quickly.

This process won't stop.

Just when you think you're safe, more enabling technologies will combine to disrupt your work. You can't afford to be complacent. Staying current with technology and beginning your own transformation are your best defense against external disruption. Complacency is fatal in these times of rapid technological advances and disruption.

Now is the time to look more closely at your GIS and discover how you can use it to enable your transformation by asking some of the following questions:

- Are you using dashboards to have the information you need at your fingertips?
- Are you leveraging location analytics to see what your data is trying to tell you?
- Are you using external datasets to augment your operational data?
- Will artificial intelligence and machine learning improve your operations?
- Have you investigated how to standardize or automate some of your work?

Simply put, will using all the benefits of GIS improve your organization and aid in transformation? It's difficult to imagine it won't.

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For more information on how GIS can help transform your organization and eliminate workflow inefficiencies, visit **go.esri.com/plant-GIS-now**.

How Assessors' Offices Can Use Dashboards to Aid Decision-Making

By Daniel Fasteen, Thomson Reuters

Many local government organizations are searching for quick, cost-effective ways to get more out of their data. Dashboards are a great tool for presenting operational, analytical, and other kinds of data. But while they are becoming more popular across various industries, local governments appear to be adopting them at a much slower rate. That is because impediments—such as lack of staff resources, budgetary constraints, having too many other priorities, and a shortage of expertise—oftentimes slow the growth of technological innovation at the local government level.

With local governments collecting ever-increasing amounts of data, however, there needs to be an easy way for managers and officials to see this information so they can stay informed and make critical decisions. Dashboards do just that, providing officials with access to data in real time or near real time so they can drill down into it quickly and effectively.

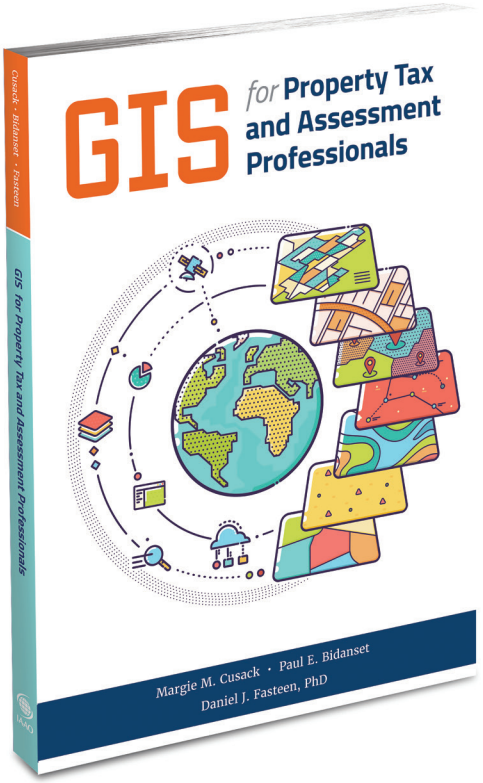
The property tax assessor's office—which identifies, lists, and values all the properties within its jurisdiction in a fair and equitable manner—amasses an especially large amount of data. Although GIS is still an emerging technology in many of these offices—particularly when it comes to contextual solutions that make assessors' jobs easier—using dashboards can help with a range of processes, from collecting data and conducting analysis to streamlining workflows and ensuring compliance. What's more, dashboards can be deployed quickly to help property tax assessment professionals better understand how their assessments are performing compared to actual sale prices via industry-specific metrics.

Two types of dashboards in particular—operational dashboards, which provide a high-level glance at information, and analytical dashboards, which furnish more in-depth analysis of valuation trends—can together help property tax assessors better understand their data.

Operational Dashboards Help Guide Managers, Appraisers, and Administrators

Operational dashboards, such as those made using Operations Dashboard for ArcGIS, are often very illuminating. They can provide assessors with important contextual information about how their assessments are performing, the efficiency of their workflows, the rates at which appraisers are doing inspections, and more. They also usually convey these details in real time or near real time.

For example, to stay on top of heavy workloads, assessors' offices often track the number of property appraisals and appeals they need to process in a given day, week, month, or other time frame. Using Operations Dashboard, staff in an assessor's office can visualize all these metrics and more in one place and then create a to-do list to better identify everyone's workloads and determine where to concentrate efforts.



↑ *GIS for Property Tax and Assessment Professionals* provides an in-depth look at how professionals in the property assessment and tax administration field can use GIS.

At the managerial level, an operational dashboard can provide metrics on the distribution of staff workloads. For instance, if one appraiser has 500 appraisals left to do and another one has none, a manager can redistribute some of those outstanding inspections as the deadline for finishing them approaches. These kinds of managerial dashboards can also be used to see the number of building permits the assessor's office has to process or how current assessments in particular areas are performing (i.e., how equal or uniform they are).

For appraisers and administrators, an operational dashboard can provide them with a breakdown of their individual workloads. For example, an appraiser could see how many inspections they have to do in each neighborhood, or an administrator could keep track of how inspections, sales, and building permits are spatially distributed within the appraisers' respective areas.

All this data, visible in an easy-to-understand operational dashboard, can help decision-makers allocate resources appropriately and foster continual improvement.

Analytical Dashboards Allow Deeper Data Dives

Analytical dashboards enable staff members to gain an understanding of the distributions and relationships among their datasets. When it comes to making sense of business intelligence data, these kinds of dashboards equip analysts to draw concrete conclusions, give good recommendations, and make better decisions.

Assessors are often looking for information to analyze how well their assessments are performing at various levels of the spatial hierarchy, as in certain market or submarket areas or neighborhoods. Assessment inequity, or dissimilarities among assessments of similar properties, can be caused by many factors, such as field appraisers miscoding a property's features, or outlier sales that aren't representative of an entire neighborhood. This can play into how data analysts define assessment models and draw market areas.

ArcGIS Insights can help property tax assessors evaluate business intelligence data in several different ways. For example, assessors need to understand how property assessments compare to existing sales prices—a metric known as the sales ratio. Sales ratio studies are used throughout the industry to measure the overall level of assessment and uniformity, both of which show how accurate assessments are. The International Association of Assessing Officers (IAAO) provides industry standards for evaluating assessment level and uniformity throughout a jurisdiction. Additionally, in the United States, most states have their own regulations to ensure the level and uniformity of assessments.

Using Insights, assessors can visualize sales ratio studies at different levels of aggregation—by the market, submarket, or neighborhood level, for instance. This helps assessors see where they are performing well and where assessments may need to be shored up or reevaluated.

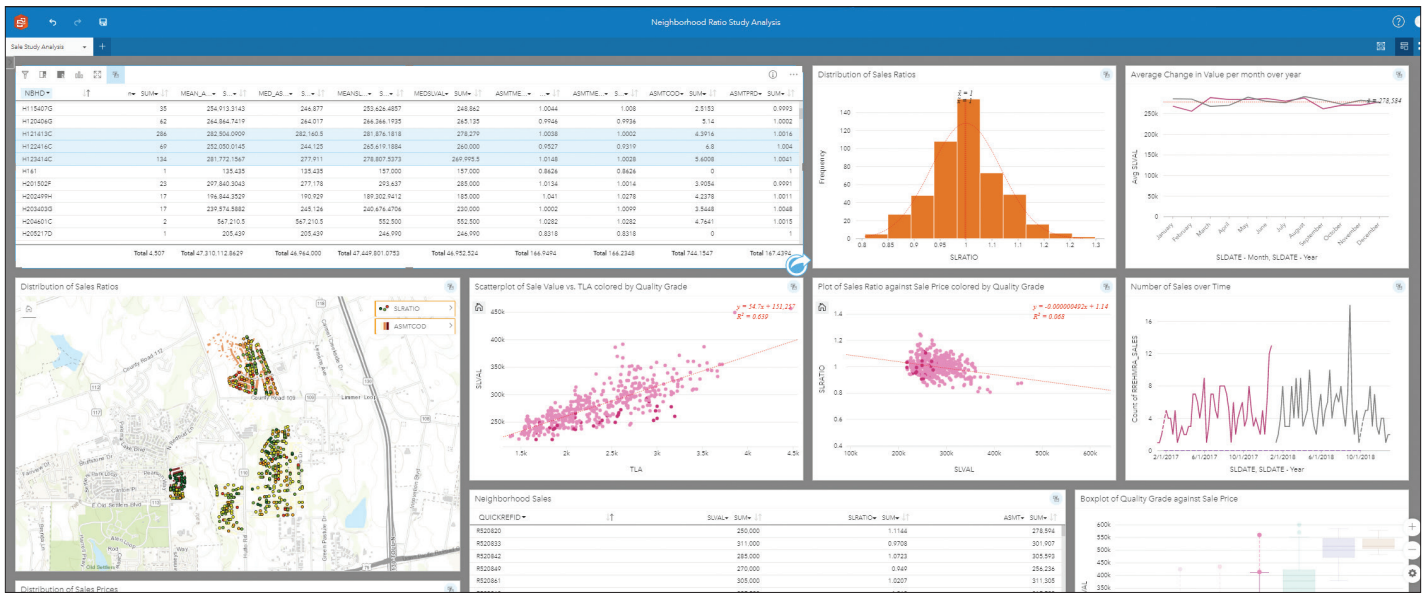
Insights is easy to deploy and use. Assessors can select property data and drag it onto a card to visualize it as a map, chart, or table. The cards can be linked, which makes digging deeper into the data quick and easy. To concentrate on one data selection, such as market area or quality of construction, users can pick that row in a table to automatically change the maps, charts, and graphs in Insights so they center on that data selection.

Analytical dashboards, like the interactive maps, charts, and tables available in Insights, can help keep analysts apprised of performance metrics throughout their jurisdictions and remain compliant with IAAO standards and state regulations.

Resources for Implementing Dashboards

The IAAO recently published a book called *GIS for Property Tax and Assessment Professionals*, which provides an in-depth look at the use of GIS within the assessment field. The book was written with two audiences in mind: GIS professionals looking to understand the technology's role in the assessor's office and assessment professionals who want to enhance their analyses and workflows using GIS.

In addition, there is the annual GIS/Valuation Technologies Conference, presented by the Urban and Regional Information Systems Association (URISA) and the IAAO. The conference shows professionals in the property assessment, tax administration, mapping, and information technology fields how GIS and other integrated technologies can help with valuation and assessment. The next conference, in Louisville, Kentucky, is March 23–26, 2020. To register for the conference, visit **urisa.org/valtech**.



↑ ArcGIS Insights can help property tax assessors evaluate business intelligence data in myriad ways.

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