# Enabling Mobile Data Collection for the Love Your Heart Event

The County of San Diego Health and Human Services Agency (HHSA) provides residents with services supporting the vision of a healthy, safe, and thriving community, a movement called Live Well San Diego. Every February, HHSA hosts an event called Love Your Heart, held at sites throughout San Diego and Mexico. There, HHSA and its partners provide free blood pressure screenings and talk to participants about how the results relate to their overall health. Within five years of its inception, the event expanded into Los Angeles, Texas, and Massachusetts.

The Challenge

The Love Your Heart event was conducted at over 200 locations, including libraries, convenience stores, and health

"Compared with other methods, staff found the Survey123 application to be much more user-friendly. The ease of downloading the app and the survey template will make it very easy to encourage our partners to use it, which will greatly enhance our data collection efforts for Love Your Heart."

Giang Nguyen
Love Your Heart Coordinator
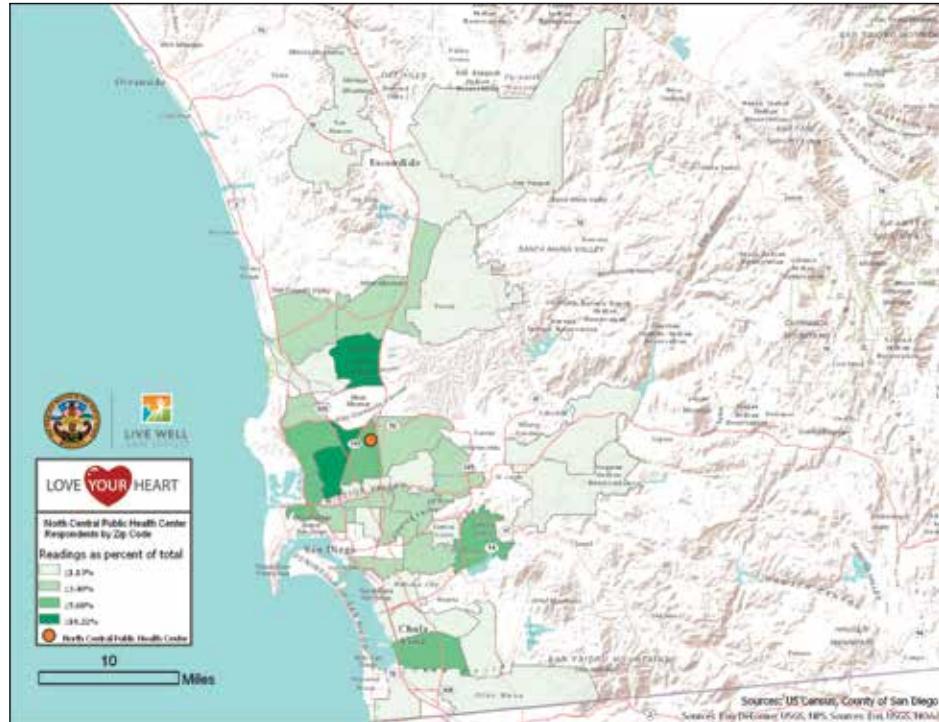
centers, and served more than 31,000 participants in one day—17,000 people in San Diego alone. Along with the blood pressure reading, specific information about each participant needed to be recorded such as gender, age, blood pressure stage, and ZIP code and whether blood pressure medication was being taken. Prior to 2016, volunteer nurses or staff recorded this data by hand. Once the data was collected, it was sent by email or fax, which necessitated that all documents be double-checked by staff members, costing roughly 9 hours a

week over the course of 12 weeks as the data was turned in.

The Solution

As the event attendance grew, HHSA leadership realized that the data collection process needed to be more efficient. Already a user of ArcGIS, HHSA decided to use Survey123 for ArcGIS. It provided the benefits that staff considered necessary to be successful including the ability to work offline, autopopulated questions based on responses, ease of use, and the

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capability to be replicated for each site as needed.

At the 2016 event, one site was chosen to test the application against the hand-recorded data. The volunteers found that not only was the app quick and easy to use but also the results were visible in real time. HHSA leadership was able to see the survey results broken down into many different types of diagrams, including bar graphs, column graphs, pie charts, and overall percentages for each answer.

The Results

There are multiple ways that Survey123 for ArcGIS helped the County of San Diego save time and money. Surveys are now easy for the county's geographic

information system (GIS) team to build and maintain, and end users found the app to be effortless to operate. The return on investment was significant and seen immediately after the application's implementation. By eliminating hand recording of data, it is projected that staff time saved at next year's event will surpass 164 hours.

In addition, the ability to clean, aggregate, and push out the data to show results the next day was invaluable to

quickly determine the overall health of the community and support Live Well San Diego. As a result of the application's implementation, community leaders can make faster, more informed decisions and communicate positive changes that contribute to a healthy, safe, and thriving San Diego region.

For more information, visit go.esri.com/Heart.

↓ Blood Pressure Screening outside San Diego City Hall at Love Your Heart 2016

Moving Beyond Anecdotal Information

By Richard Leadbeater, Global Manager, State/Provincial Government Industry Solutions

In spring of 2016, recognizing the growing epidemic of opioid abuse, the National League of Cities (NLC) and National Association of Counties (NACo) convened the National City-County Task Force on the Opioid Epidemic. The task force brought together 24 elected officials representing cities and counties to better define the problem, identify programs and collaboration opportunities, and—most importantly—discover how to scale existing collaborations and solutions nationally. This discussion and ones at the subsequent meetings and events on this issue that I've either attended or tracked were both of great value and enlightening. But I'm still a little frustrated, for there wasn't enough emphasis placed on perspective. Most of the information provided or shared was anecdotal, at a national scale, or—worse—three or four years out of date. While most public officials know that data measuring overdose deaths—and, in particular, opioid-related deaths—was collected by their jurisdiction, they often didn't know that they had access to the data, commonly assuming it's protected by the Health Insurance Portability and Accountability Act of 1996 (HIPAA). Yes, data about named individuals or data that can be traced back to individuals is covered by HIPAA. But data that is useful to the development of policy and needed to support analysis and understanding of the opioid problem is available. Most importantly, data that is required to measure the need for policy and programs and is vital to prove the value and worth of programs to stem and circumvent addiction is not being exploited, used, or collected at anywhere near the level that we collect and use data about road safety and auto accident deaths.

At the NLC/NACo task force meeting and from content provided by the National Governors Association, the Council of State Governments, and other
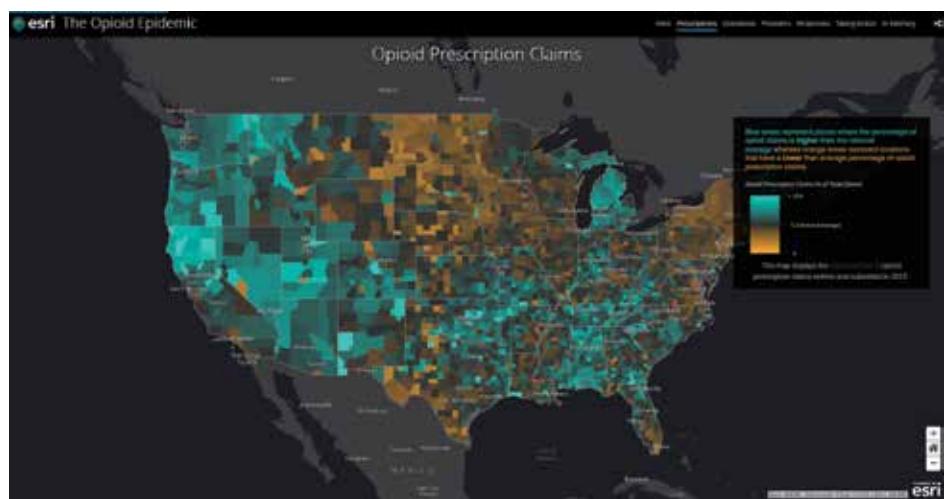
groups, I learned two facts:

- Those at highest risk include people between 35 and 54 years old. One report found that deaths from just opioids in this age group have exceeded those from firearms and car crashes.
- In 2014, Opioid addiction accounts for 18.893 overdose deaths related to prescription pain relievers, and 10,574 overdose deaths related to heroin.

Compare the 29,467 opioid-related deaths to the 32,675 deaths on our highways and roads.

Knowing that the best way to communicate with humans is through stories and that most people are visual learners and love to look at maps, I wanted to create a map to help explain some of the information that we could obtain, and add some geographic context. Working with both NACo and NLC, the following map was created. The data is not perfect; we learned how difficult it is to find and collect any meaningful data at a nationwide level. But the purpose of the story map is to start a conversation. With an issue that is this important, we need to deliver more and more information to as wide an audience as possible.

The Opioid Epidemic Story Map: go.esri.com/ OpioidBlog

Web Maps and Apps Accelerate Disaster Assessment, Recovery

Wisconsin Emergency Management Leveraged ArcGIS Online Following Destructive Floods

By Chris Diller, Wisconsin Department of Military Affairs

In the early morning hours of July 12, 2016, heavy rains began to fall in northern Wisconsin, with a storm stretching from Douglas County, just northwest of Minneapolis, to Ashland County, south of Lake Superior. Some areas received 8 to 12 inches of rain, which caused flash flooding, and faced strong winds that damaged public infrastructure, including many roads and all-terrain vehicle trails. The Canadian National Railway line between Ashland and Glidden, Wisconsin, had to be closed. Numerous bridges got washed out as well, and Saxon Harbor, along the south shore of Lake Superior, was destroyed.

Even though the storm hit a very rural part of Wisconsin, the impact on local communities was immense. The Bad River Indian Nation in Ashland County took the brunt of it. At one point, there was no road access into the Bad River Reservation, and electricity, natural gas, and the water treatment plant were all knocked offline. The Wisconsin National Guard (WING) had to be called in to assist with lifesaving services at the reservation, mostly to fly dialysis patients to nearby hospitals via helicopter.

GIS played a significant role in supporting the state and local response to this destructive storm. And while GIS has been used to support government operations for nearly 10 years, the State of Wisconsin employed ArcGIS Online in this capacity for the first time. It delivered magnificently.

When Paper Maps Were Prime

Wisconsin Emergency Management (WEM) and WING—both divisions of the Wisconsin Department of Military Affairs—first used GIS prominently during the Midwest floods that inundated Iowa and Wisconsin in 2008. That event caused $500 million in damage to public and individual property in Wisconsin, and 33 counties received federal disaster assistance.

At the time, emergency and relief operations relied heavily on paper mapping products created with ArcGIS Desktop. During the more than two weeks that the State Emergency Operations Center was active, responders used more than 350 custom (paper) mapping products, such as simple incident maps, infrastructure status maps, landing zone maps, reconnaissance planning maps, and map books for the governor.

A lot has changed since 2008.

Testing Out ArcGIS Online

When WEM was introduced to ArcGIS Online a few years ago, the agency immediately began evaluating how the software could be incorporated into its response activities. The GIS team, which started off as one person and expanded to three, spent a lot of time figuring out the types of Esri Story Maps and other apps users might want to see and how they would interact with them.

This was a major game changer. With paper maps, the GIS staff only has to decide what goes on the map, which

↑ Saxon Harbor, on the south shore of Lake Superior, was destroyed by the July 12 floods.
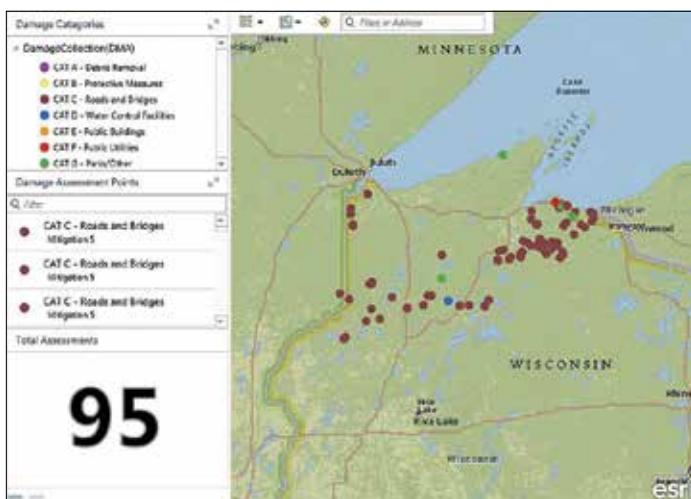
↑ Decision-makers at Wisconsin Emergency Management (WEM) and the Federal Emergency Management Agency (FEMA) used Operations Dashboard for ArcGIS to see the damage cost assessments as they came in from the field.

↑ Using aerial imagery from the Civil Air Patrol, it took the GIS team only a few hours to build a Story Map Tour app of the flood damage.

cartographic styles would be the best fit, and what the paper size should be. Incorporating ArcGIS Online, however, required that additional decisions be made regarding user experience, such as which fields should display pop-up windows, what the visibility range for different map scales should be, and which tools users should have available so they can adapt the map to their needs.

With support from senior leaders at the Department of Military Affairs, both WEM and WING decided to test out how to operationalize ArcGIS Online. In June 2016, the two agencies conducted a full-scale, weeklong exercise called Miles Paratus to measure GIS readiness; evaluate the sharing capabilities of ArcGIS Online; test how imagery from the Civil Air Patrol could be integrated into a Story Map Tour app; and evaluate how the WING Joint Operations Center could better manage its resources before, during, and after an event. The exercise comprised 2,500 military and civilian personnel at the federal, state, and local levels to assess interagency coordination and readiness.

The results were impressive. Participants in Miles Paratus provided positive feedback about the story maps, the Civil Air Patrol was excited to see its imagery used in a different way, and GIS staff members in the State Emergency

Operations Center were able to learn valuable workflow lessons that would—unknowingly—benefit them greatly a few short weeks later.

A Rapid Response When Disaster Strikes

When the July 12 storm hit and the State Emergency Operations Center was activated, GIS staff were ready. Almost immediately, local counties started asking for assistance, so the GIS team swiftly developed plans to produce web maps and apps using ArcGIS Online—just like it did during Miles Paratus the previous month.

After the storm, the Civil Air Patrol and other air assets deployed to capture 35 mm still aerial photographs of specific points of interest, such as flooded areas and washed out roads and bridges. Once the aircraft landed and the imagery was uploaded to a central repository, GIS staff got to work making the Story Map Tour app. Although it took some time for GIS team members to evaluate each photo for its usefulness, annotate the images, and publish them for consumption, it only took a few short hours to put the story map together.

The GIS staff also created an incident viewer in ArcGIS Online as a catchall for data layers. The map included road closures, detours, critical facilities, stream

gauging stations, geotagged photos, and the state-of-emergency status for each county. This information was updated hourly and became the principal mapping source that kept decision-makers and the public informed about what had happened and how the situation was changing.

Speeding Up Requests for Assistance Things were going so well with ArcGIS Online that, not long after the storm, WEM decided to conduct a preliminary damage assessment in the field using Collector for ArcGIS so that the agency could electronically request assistance from the Federal Emergency Management Agency (FEMA), speeding up the process. Having tested out Collector before, members of the GIS team felt confident that they could configure the app quickly and train WEM staff to use it right away.

The GIS team started by downloading the Damage Assessment solution from the ArcGIS for Local Government solutions page. This special configuration of ArcGIS Online and Collector makes it easier to administer damage assessments in the field and determine whether damage costs exceed state or federal declaration thresholds. From there, GIS staff customized the program so that it contained only relevant fields

Prioritizing River Restoration in Oregon

The Freshwater Trust partners with municipalities, utilities, agencies, and private businesses to offset environmental impacts on rivers and streams, evaluate habitat and water quality conditions, and optimize conservation investments. Since 2011, the organization has been working with the City of Medford, Oregon, to plant trees along the banks of the Rogue River to mitigate the effects of the warm water that is discharged into the river by the wastewater treatment plant. The nonprofit uses ArcGIS to identify the areas along the Rogue River that are best suited to restoration. The watershed encompasses approximately 3.3 million acres and is home to more than 200,000 people. Despite its role as a critical wildlife corridor, the watershed has undergone a dramatic decline in populations of native fish species in recent decades. Due to high temperatures, bacteria, and runoff, most of the fish have been categorized as "species of concern" or considered threatened under the Endangered Species Act.

The Challenge

Upon treating sewage from the fourth-largest metro area in Oregon, Medford's wastewater treatment plant discharges an average of 17 million gallons of clean—but warm—water into the Rogue River every day. The historically cold Rogue River is already warming due to climate change, and the water the facility is returning to the river could increase its temperature by approximately 0.25 degrees Celsius. While such an increase is indistinguishable to humans,
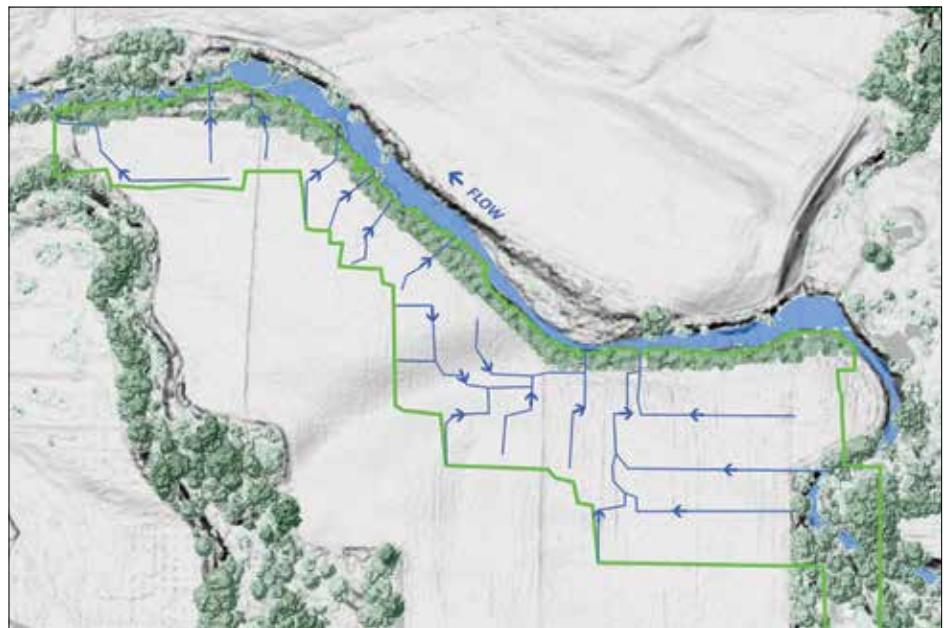
it can seriously affect the salmon and steelhead that call the river home. Warmer rivers have less oxygen and cause eggs to incubate earlier, decreasing survival rates. To comply with the Clean Water Act, the City of Medford had to counteract the negative effects of its warm-water discharge. Typically, cities achieve compliance by building a cooling tower or holding pond, examples of gray infrastructure that are often expensive for taxpayers and provide few environmental benefits. The Freshwater Trust offered a natural solution: plant trees along the river to generate the amount of shade needed to cool the water and make it more hospitable to fish. To make this work, the trust not only needed to be able to calculate the thermal benefits from increased shade but also to scout the watershed to identify the places where the right amount of shade could be produced.

The Partner

The Freshwater Trust is a group of bold problem solvers designing and implementing data-driven solutions that protect and restore America's freshwater. Using science, technology, policy,

and finance, the nonprofit builds and manages solutions that improve water quality and quantity. Staff call themselves pioneers of a new approach to conservation. Quantified conservation is about using data and technology to ensure that every restoration action taken translates to a positive outcome. First, they identify and prioritize restoration opportunities to maximize benefits for a watershed. Then they work with willing landowners to restore habitat in key places, to adapt practices, or to keep more water in rivers and streams that need it. Along the way, staff track the outcome of every action taken. The Freshwater Trust believes that only through strategic action and a laser focus on results can the scale of freshwater problems in this country be matched to a timeline that is most effective.

The Solution

Planting trees would end up saving the city more than $8 million and provide large-scale benefits for the watershed as a whole, including sequestering carbon, filtering pollutants, and providing critical habitat for wildlife. Shade generated from the trees is quantified and expressed as credits that the City of Medford purchases to meet its

permit obligations. The Freshwater Trust is charged with generating the credits, which means that its staff has to figure out where to plant the trees. To identify and prioritize a potential restoration site, the trust uses multiple geospatial datasets, including lidar and orthoimagery, with the ArcGIS Analysis and Spatial Analyst toolboxes to identify sites that have good restoration potential. The results of the spatial analysis are used to quantify the potential shade benefit from planting trees. This work evaluates possible planting sites based on a number of factors, including credit-generating potential, environmental benefits, and effect on endangered fish habitat. With results in hand, staff contact landowners that have properties with good restoration potential and propose planting projects. Landowners then sign leases with The Freshwater Trust and are compensated for their involvement in the program.

The Results

The Freshwater Trust's program with Medford, Oregon, is a novel regulator-approved water quality trading program. In 2012, the program received recognition from President Obama during the White House Conference on Conservation. "It worked for business; it worked for farmers; it worked for salmon," he said. The program will generate approximately 100 acres of restored streamside forest, reducing phosphorus by 37 pounds a year, nitrogen by 245 pounds a year, and sediment by 83,900 pounds a year. All of this will mean cooler, cleaner water for Chinook salmon and steelhead trout, two quintessential Pacific Northwest species. ArcGIS took the guesswork out of freshwater restoration. Using twenty-first-century technology, the Freshwater Trust is able to be more strategic and effective in its actions—something the organization says is desperately needed throughout the entire field of conservation.

Web Maps and Apps Accelerate Disaster Assessment, Recovery

and affected counties. WEM reached out to the Esri Disaster Relief Program as well to get some extra assistance with configuring Collector. And GIS staff set up Operations Dashboard for ArcGIS so decision-makers at WEM and FEMA could see the total damage costs come in as they were being collected. This helped WEM report damages more quickly, saving days—if not weeks—of time.

The whole setup worked so well that Wisconsin governor Scott Walker mentioned GIS and Collector in the letter he sent to then-US president Barack Obama to request federal assistance for disaster recovery, indicating that the technology assisted greatly with the overall response.

Not Completely Out with the Old

While ArcGIS Online was certainly extremely valuable in doing damage assessments and beginning the recovery process after the July floods, GIS staff did still produce static PDF and paper products like in 2008. Emergency Operations Center managers still needed emergency declaration maps; helicopter pilots still needed landing zone maps; and senior leaders, including the governor, still needed political district maps—and they wanted them on paper.

WEM initially wanted to brief the governor in a helicopter using ArcGIS Online, but the Internet connections in those remote areas of the state were questionable. So the GIS team re-created the briefing book that had been put together eight years earlier. It was easier this time, however, because GIS staff were able to print out the map along with many of the images from the Story Map Tour app and place them in the three-ring binder.

In fact, the story map proved to be the most sought-after GIS product during the flood assessment and recovery period. Being able to connect a picture to its location on a map offered context, helping people better understand the size and scope of the disaster. The National Weather Service's Duluth office and Ready Wisconsin both published the Story Map Tour app and the incident viewer on their websites.

Subsequent Disasters Get Expanded GIS

When western Wisconsin experienced a small flooding event in September, the GIS team again used many of the techniques it learned during Miles Paratus and the July disaster.

Currently, the Wisconsin Department of Military Affairs is planning to expand its use of ArcGIS Online and build an ArcGIS Open Data portal. WEM recently began working with the ArcGIS Extension for WebEOC as well to ensure that emergency responders have good access to GIS data. And the WING Joint Operations Center has contracted with Esri's defense team to build out new, customized tools for Web AppBuilder for ArcGIS.

While nobody ever wants disaster to strike, the GIS staff at WEM and WING like knowing that GIS—and especially ArcGIS Online—are key to managing emergencies when they occur.

About the Author

Chris Diller is the GIS coordinator for the State of Wisconsin's Department of Military Affairs.

New Mexico Connects Departments with Their Communities

Supplying community data and health statistics is the stock-in-trade of the New Mexico Community Data Collaborative (NMCDC). But this statewide data repository doesn't just provide information to anyone on demand or in any haphazard manner; the NMCDC adheres to fine-tuned procedures and principles in supplying data and training to the users of its data warehouse.

The Challenge

There was a need to create a central, collaborative data service to support the state's many health advocacy efforts. It was recognized that not only was a centralized data warehouse essential, but consolidating GIS services, as part of the collaborative, would improve quality, increase data standardization, and apply geospatial formats to many databases for ease of use. This type of data warehouse would also come with many requests for data from multiple organizations throughout the state. In addition to protecting and anonymizing individual data, geocoding addresses, and pushing out data that was safe for public sharing and mapping, analysts were also being sent many requests for datasets, maps, and shapefiles.
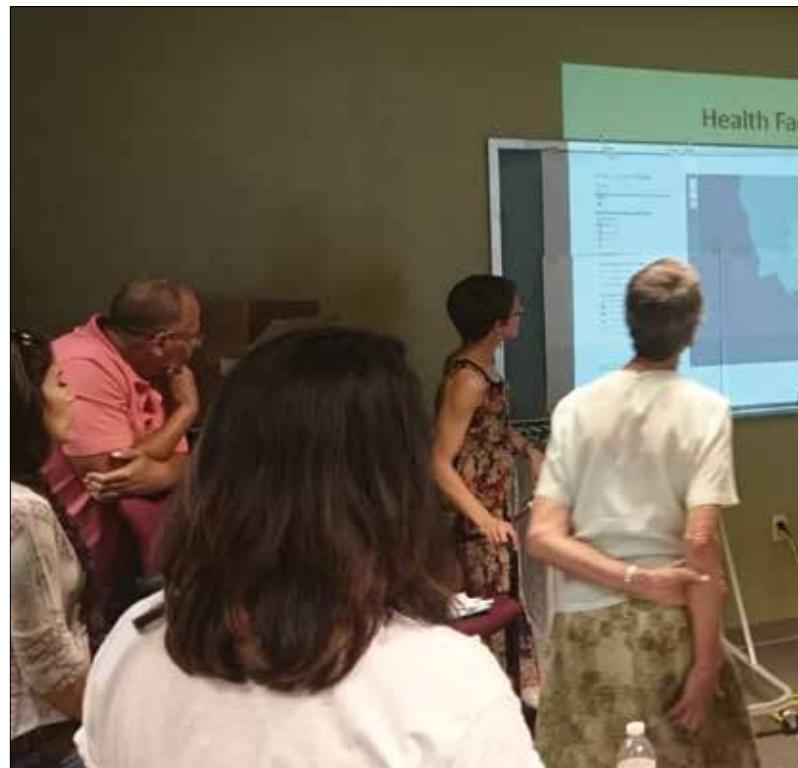
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MichelleLujanGrisham Retweeted

UNM PRC @PRC_UNM · Jan 27

Andrea Cantarero shows @RepLujanGrisham's team how to access data maps @ #NM #PublicHealth Day @NMLegislature #NMleg

The Solution

Interested in empowering and engaging its communities, NMCDC was created to have one central data warehouse that provides data at the subcounty neighborhood level so that decisions about local services and resource allocation, as well as identification of health disparities, can be made more accurately.

Having not only health data but also other datasets—such as income, crime, education, and service data—is essential to recognizing the root causes that result in health outcomes. GIS helps analysts see the relationship between these datasets, which leads to a clearer understanding.

To easily share data with those stakeholders who needed it, the collaborative found the ArcGIS Online services ideal. But NMCDC wasn't just interested in sharing these resources with its community partners and other departments; it also wanted to teach users how to explore and interpret their community indicators using ArcGIS Online organizational resources.

The Results

NMCDC is a network of more than 50 active public health advocates and analysts from more than three dozen state agencies and nongovernmental organizations. Since NMCDC went online in November 2011, collaborators and staff have organized more than 80 workshops, attended by more than 600 people, which has helped them to strategically plan interventions, target limited resources, and change policy. On the website, there are more than 75 maps, apps, and galleries, with several hundred shared shapefiles being opened more than 100 times a day.

Open your data:
go.esri.com/Open
Nmcdc.maps.arcgis.com

"NMCDC functions under a new paradigm for public data services. As our guiding principles explain, a collaborative model implies sharing. Esri's ArcGIS Online services provide the ideal medium for sharing."

Thomas N. Scharmen, MA, MPH, New Mexico Department of Health's Albuquerque Metro and NW Regions, Public Health Division

Researching Parcel History in Seconds

County in Minnesota Uses App from ArcGIS Marketplace to Easily Store, Retrieve Property Records

Parcels of land have their own history. When a parcel is subdivided, each new parcel created is assigned its own parcel identification number (PIN) and associated documentation. Often, a parcel is affected by multiple zoning ordinances that have been adopted over the years.

Traditionally, doing research into property abstracts—to find deeds, mortgages, probate records, tax sales, and more—is tedious work. But having these records is critical for making for zoning decisions.

Most cities are behind in digitizing their paper land records, so a typical cadastral database rarely contains comprehensive digital archives. This means that uncovering a parcel's ancestry can require conducting long and often inconclusive research in the filing cabinets at the local registrar.

To address this common challenge, Clay County, Minnesota, speeds up parcel investigations and improves the county's property, zoning, and planning decisions by using Parcel Lineage, an app available from the ArcGIS Marketplace. The app, developed by Esri partner Pro-West & Associates, displays the entire PIN history for any recorded piece of land.

Parcel Lineage provides parcel information that correlates to historical zoning ordinance dates, meaning that parcels can be analyzed according to historical boundaries to establish which ordinance should be referenced for the request. The same process is applicable to floodplain ordinance adoption that affects historical parcel divisions, as well as to other issues such as billboard and cell tower siting requests.

"Traditionally, Clay County provided the data for abstractors to research property information in person or through a subscription service," said Mark Sloan, the Information Services director at Clay County. "The Parcel Lineage tool empowers abstractors to do that work
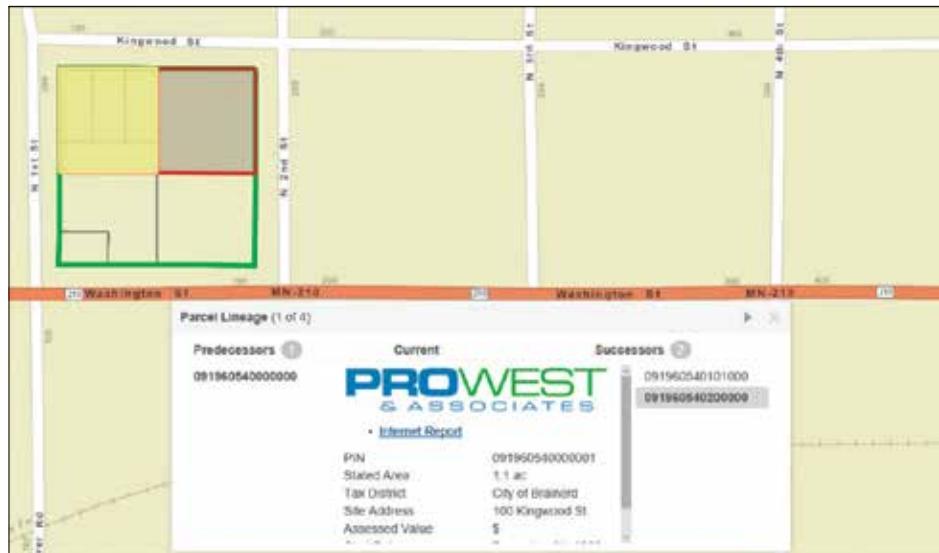
↑ Clay County staff can visually navigate through a parcel's history to research splits, joins, and legal transfers.

themselves by opening the app."

The parcel fabric, a model that Esri introduced in 2010 to simplify parcel editing, makes it easy to track changes to a parcel over time. The parcel fabric is made up of key feature classes including the Parcel History layer, which contains the history of all boundary changes made to a parcel.

"By publishing the full Parcel History layer as a feature service in ArcGIS, that history can be brought into any web map and incorporated into the Pro-West Parcel Lineage app," said Sloan.

Additionally, if a county has older digitized records that exist in document imaging systems (such as Laserfiche), those records can be easily linked and displayed within the app alongside the rest of the history.

Clay County receives requests for building permits and to create new subdivisions all the time. Requestors have high expectations when they visit a county recorder's office to get information.

Previously, Clay County's staff had to look through tract indexes, assessors' sketches, old subdivision plats, and

deeds to reconstruct any underlying divisions of the property. Staff often had difficulty fulfilling simple document and image requests.

But now Clay County uses Parcel Lineage to find that information. The app has proven valuable in speeding up the county's customer service. Recorders can simply open the app for the requestor, search for a PIN, and print out documents and images on the spot.

"Before the app, people who made requests for historical parcel information became frustrated being sent around from department to department to find a simple document," said Sloan. "This app accesses information right away, since all of our real estate documents are indexed by PIN."

Use of the app has been so successful that Pro-West and Clay County foresee greatly expanded use.

"It has huge potential for our land records staff," said Sloan. "Its consistency with the rest of our online mapping applications will let them get started using it and achieving value from it very quickly."

Follow Esri Public Safety on Social Media

Our public safety team is active on a number of social media platforms to keep you updated on the latest trends, technical advancements, and best practices for using GIS for law enforcement, fire, emergency medical services (EMS), and national security. Join the discussion on the following accounts to stay up-to-date, and hear from industry experts on the role that GIS plays in public safety agencies:

- **LinkedIn:** Esri Public Safety
- **Twitter:** @GISPublicSafety
- **Facebook:** Esri GIS for Public Safety

Follow the Esri Disaster Response Program on Social Media

When disaster strikes, Esri's Disaster Response Program (DRP) is here to support you 24/7. Join the following accounts to see how GIS supports all phases of emergency management and helps customers around the world when they need it most:

- **Facebook:** Esri Disaster Response Program
- **Twitter:** @EsriDRP

Keeping the Rain out of Kansas City Sewers

Although rain is generally a good thing, when storm water makes its way into the separate sewer system for Kansas City, Missouri, the impact can be devastating. Excess storm water creates an average of 6.4 billion gallons of wastewater overflow each year in Kansas City's more than 1,700 miles of sewer system. The city is one of more than 700 communities across the United States that must comply with regulatory standards for wet weather sewer overflows.

In 2010, Kansas City entered into a federally mandated agreement with the United States Environmental Protection Agency (EPA) to reduce sewer overflows by investing in the city's aging sewer infrastructure over a 25-year period. Kansas City's $4.5 billion Overflow Control Program will capture and treat 88 percent of combined sewer flows and eliminate sanitary sewer overflows during heavy rainfall events.

To leverage each dollar of the investment, Kansas City is asking homeowners to help reduce the overflow problem by voluntarily removing improper plumbing connections from the city's sewer mains. The program, called Keep Out the Rain KC, can help Kansas City save millions of dollars in future capital improvements. Kansas City adopted this targeted approach because private plumbing connections are believed to be responsible for more than half of the rainwater that enters the sewer system.

"Our sewer system is designed to collect and convey wastewater to one of our six wastewater treatment plants," said Andy Shively, chief engineering officer for Kansas City Water Services. "When rainwater gets into the sewer system, it can overwhelm our pipes, which, in turn, can cause overflows and basement backups. Once rainwater enters the sewer system, it must be treated, driving up maintenance and treatment costs."

"Kansas City is committed to achieving the requirements of the city's federally mandated consent decree in a way that improves neighborhoods and reduces program costs for our residents," said Shively. "ArcGIS is helping Kansas City to effectively manage the Keep Out the Rain program and report improvements to the Environmental Protection Agency and to our residents."

Meeting Project Challenges

To create the Keep Out the Rain KC program, Kansas City first turned to existing GIS data to pinpoint areas where wastewater from improper plumbing connections on private property might be entering the city's sewer mains. The city found 55,000 properties for which simple, cost-effective plumbing corrections could help make a big impact on reducing the city's overflow control issues.

Those 55,000 properties with improper plumbing connections were located in an area of more than 300 square miles. To get a high level of voluntary participation in the program, the city needed to effectively communicate the value of the program to the public. To perform a thorough evaluation in the field, the city also needed to share a large amount of data to coordinate and track the work being done by a team of city staff members and contractors from many different organizations. Finally, the city needed to analyze the effectiveness of the program in achieving its goal of removing
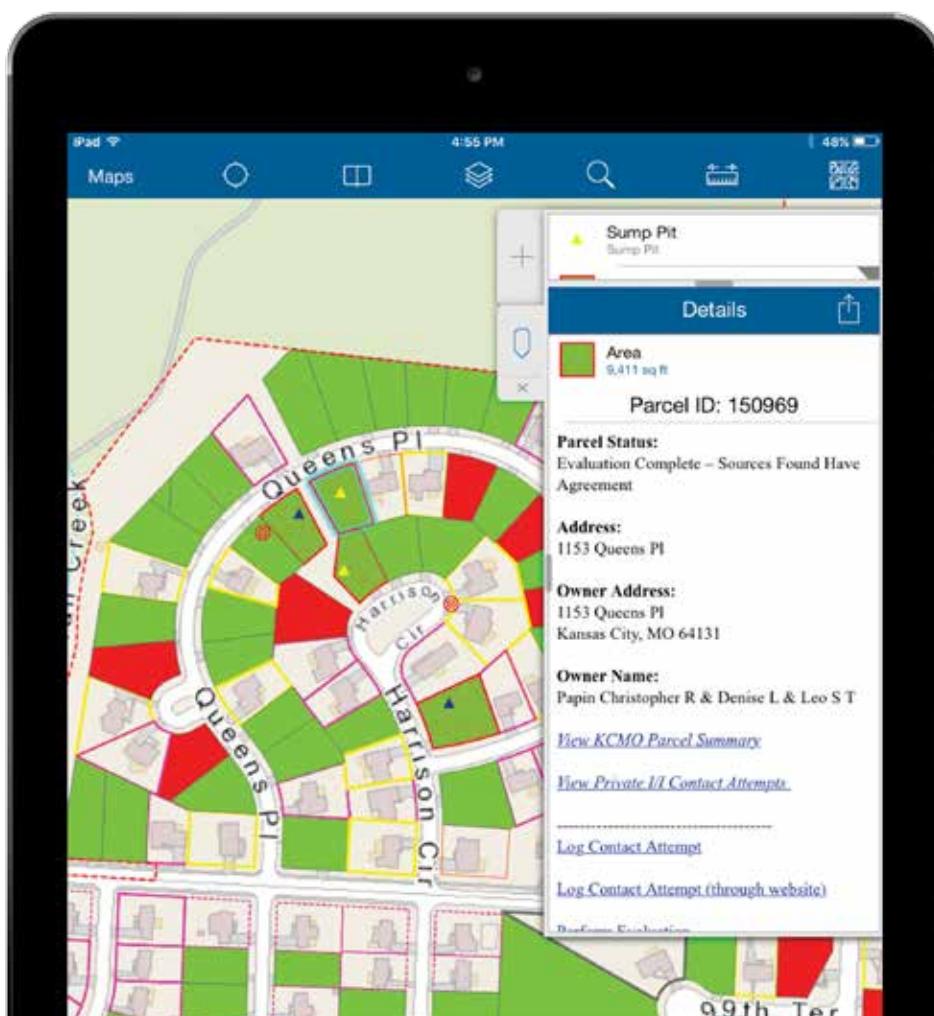
← Collector for ArcGIS showing property status

↑ Keep Out the Rain KC staff having a homeowner sign an agreement to perform a property evaluation

rainwater from specific portions of the sewer system. The ArcGIS platform is being used for public outreach, project coordination, data collection and sharing, and results analysis.

Public Outreach

ArcGIS has been used to generate targeted mailings, based on location, to property owners to get them to sign up for the program voluntarily. By embedding an interactive map in the program website, ArcGIS has also been used to help the members of the public determine if their properties are located in the program area and eligible.

Project Coordination

Using ArcGIS, the project area was subdivided into sections to more evenly distribute the work across the project teams and allow the results to be tracked for a much smaller area.

Data Collection and Sharing

The teams in the field performing property evaluations are using the Collector for ArcGIS app so they can have current information on the location, status, contact information for property owners, and the locations of wastewater and storm water infrastructure for each of their assigned properties. The app can also supply the location of smoke testing observations, which may indicate that there is an inflow [water entering the sewer from inappropriate connections] or infiltration [groundwater entering the sewer caused by defective pipe joints] source on the property.

Collector for ArcGIS has also been integrated with smart digital forms built on the iFormBuilder platform developed by Esri partner Zerion software. This integration makes the process more efficient by eliminating the errors associated with manually entering property information. Once an evaluation is completed, the information is immediately available in ArcGIS Online and the Project Management Dashboard running in Microsoft Azure.

Results Analysis

Using ArcGIS mobile technology and ArcGIS Online allows the project team to see and analyze information in real time. The moment evaluation is completed, that information is available so the entire project team and all program stakeholders can analyze it using the online dashboard. That information is also available for on-demand reports that focus on the program's key performance indicators. Having access to information in real time allows the project team to be agile in its approach. Management is able to see what methods have been successful and capitalize on those while working to address any weaknesses. The richness of data being collected in the Keep Out the Rain KC program allows the team to continually improve upon the approaches being taken to accomplish project goals.

To learn more about the Keep Out the Rain KC program and its ArcGIS implementation, contact Brian Hiller behiller@ burnsmcd.co , technology implementation project manager at Burns & McDonnell.

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