

“Esri arms city
leaders with real-
time data and
insights that help
them take action
in the fight against
opioid abuse.”

David Maloney

Director of Strategic Partnerships and Development, National League of Cities

Executive Summary

Geographic information systems (GIS) and spatial analysis have become the number one tools in understanding and responding to the opioid crisis. Integrating this analysis into your solution can help you be more specific in your approach.

With GIS, you can:

- Organize your data
- Collect new data in real time
- Communicate your findings
- Deploy tactics and allocate resources
- Inform decision makers
- Educate the public and constituents

That's why many government agencies are turning to GIS to map, track and understand the scope of the opioid epidemic in local communities.

It's clear why government needs a new approach. The numbers are staggering and continue to climb. In 2016 alone, more than 64,000 people died from drug overdoses, the majority of which were linked to opioids such as oxycodone, synthetic opioids such as fentanyl, and the illicit drug heroin. Additionally, in a single year, 12.5 million people misuse prescription opioids while another 828,000 use heroin. Today, an average of 100 Americans die each day from opioid overdoses.

That's led the federal government to declare the opioid crisis a public health emergency. State and local governments are also taking action to raise awareness around and combat the issue of opioid addiction. Health and safety agencies are dedicating resources to providing education, prevention and treatment options in their communities.

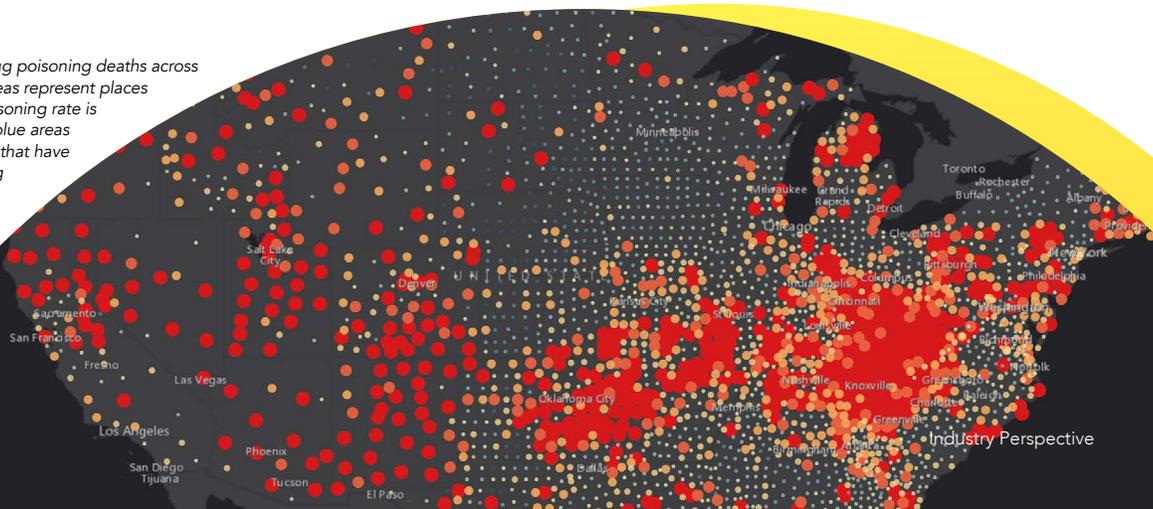
But more must be done to effectively combat the rising misuse of opioids. While one-off resources like prescription drop-off locations or naloxone-dispensing overdose reversal centers are a key first step, they must be strategically created in areas of need. What's more, these resources must be deployed in concert with other resources that combat both the causes and symptoms of the opioid crisis.

In fact, what many local and state governments are coming to realize is that treating a health crisis like the opioid epidemic is no different than addressing any other public safety emergency, such as a hurricane or wildfire. Understanding the geography of the crisis in real time is critical to effectively deploying resources and quelling the escalation of problems.

To learn more about the crisis, GovLoop partnered with Esri for this report about using GIS to tackle the opioid epidemic. This report was informed by interviews with state and local government leaders, as well as conversations with thought leaders from Esri.

Read on to understand how a location-focused approach can help public health, human services, and safety organizations understand and combat the opioid crisis in their communities. We'll explain the use-cases for GIS as well as provide examples of how location-based strategies are already being used to affect the opioid epidemic.

This map shows drug poisoning deaths across the country. Red areas represent places where the drug poisoning rate is very high whereas blue areas represent locations that have a relatively low drug poisoning rate.



A Framework to Combat Opioid Addiction

The number of prescription opioids sold in the U.S. and the number of opioid related deaths have both quadrupled since 1999. Since then, over 165,000 people have died from prescription opioid overdoses.

In an effort to stem this rising epidemic, many government agencies have created programs and resources for local communities to combat and treat addiction. Treatment centers help people manage their addictions, become educated about the crisis or, in worst-case scenarios, offer naloxone to reverse opioid overdoses. Prescription drop-off locations also encourage people to dispose of unused opioids, instead of leaving them susceptible to overuse. Some states have created programs to monitor opioid prescription rates, in an effort to stop medical over-prescription before addictions can occur.

But while all of these efforts have a role to play in combating the opioid crisis, no single tactic is enough to tackle such a widespread, complex epidemic. To effectively quell the opioid crisis, government and community health organizations must strategically orchestrate their programs to make sure resources are appropriately allocated and working in concert.

A location-based strategy can help create that holistic approach. Organizations can use this six-step framework to integrate GIS into their tactics:

Organize your data.

Understanding all the variables that impact the opioid epidemic leads to a framework of understanding. Before directing or creating any new resources, it's critical to understand what's happening in your community today. While the opioid epidemic is a nationwide problem, the causes and symptoms are heavily localized. Whether it's a lack of adequate health or mental counseling or other community support systems, it's imperative that agencies determine what resources are lacking within their community before they begin applying tactics.

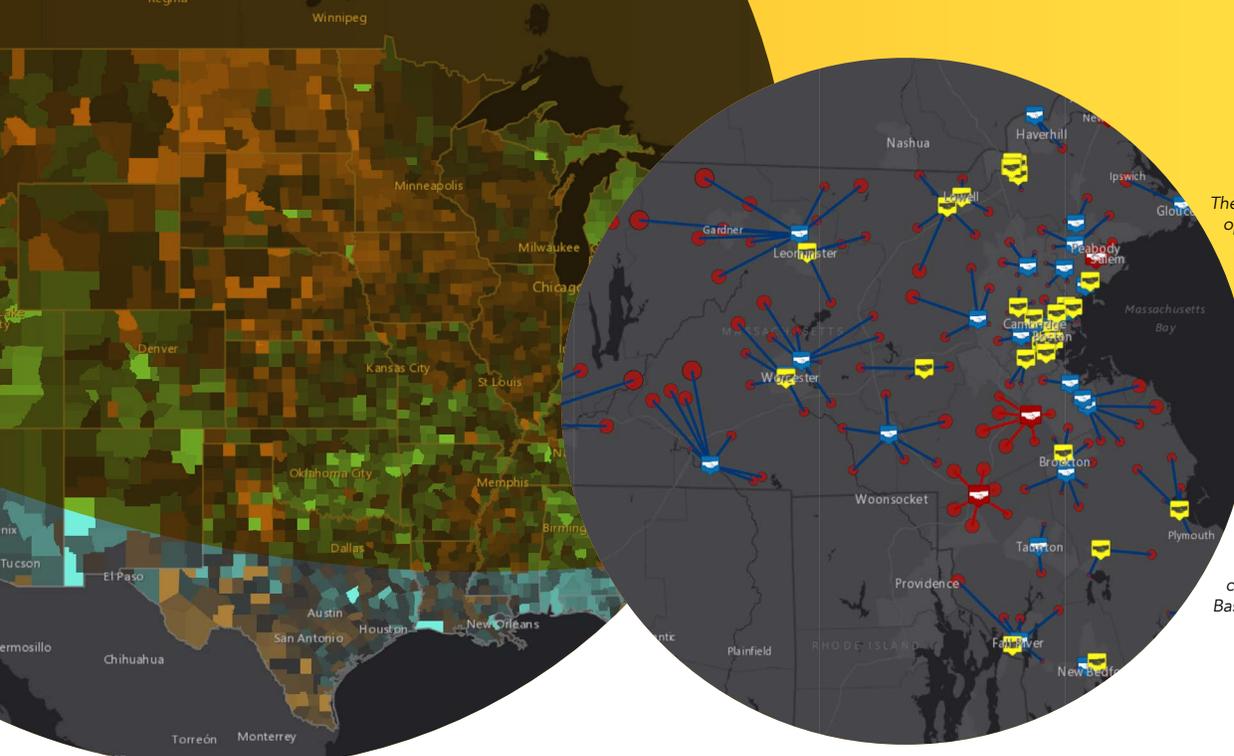
GIS allows community leaders to gain an accurate picture of how and where overdoses and over-prescribing are occurring, as well as the impact opioids are having on those areas. Public health officials, human services, law enforcement and volunteers can gather information from disparate data sources, geo-tag that information and then combine it in a single dynamic map to understand the effects.

Collect new data in real time.

Moving from static data to a data-driven policy approach requires collecting and organizing "ground-truthed" information. In addition to data that is already collected, many organizations will find it necessary to create more data to inform their efforts. Using Esri mobile solutions, staff can easily collect additional field data such as overdose data, Narcan distribution, and not for profit program locations/ events to build a more complete picture of their community.



Mapped here are the changes in opioid prescription claims. Counties in purple experienced an increase in the percentage of opioid claims from 2013 to 2014 while counties in green witnessed a decrease.



The map on the far left shows opioid prescription claims. Blue areas represent places where the percentage of opioid claims is higher than the national average whereas orange areas represent locations that have lower than average percentage of opioid prescription claims. To the left is a map of the Medically Assisted Treatment network in Massachusetts, including Methadone clinics in yellow and Office-Based treatment in blue.

Communicate your findings.

Collaboration between programs and agencies reduces redundancies and improves overall efficiencies. As data is collected and analyzed, the information can be placed into an operational dashboard. The Operations Dashboard for ArcGIS provides a view into data drawn from GIS, finance, accounting, customer relationship management systems, and enterprise resource planning tools, among others, to begin monitoring and better understanding of your progress.

Staff at all levels must continually track changing community dynamics, as well as the success of their prevention and response tactics to ensure ongoing success. Operations Dashboard for ArcGIS can offer dynamic, real-time views of every component of the strategy in a single place.

Deploy tactics and allocate resources.

Once a full view of community-specific opioid epidemic rates and resources is created, staff can use maps to quickly decide on a course of action. Optimizing and allocating resources based on need and location maximizes limited resources. For instance, with all information on a single map, they could quickly identify areas where activities are concentrated, current resources are located, and where to add additional services such as clinics, medical services, drug drop-off boxes, and other resources.

Inform decision makers.

GIS is an excellent tool for public relations managers to provide briefings to elected officials and government executives. Operations Dashboard for ArcGIS can be used to present information on the state of the crisis, financial allocation based on communities, and progress of tactics so that swift decisions can be made in real time.

Educate the public and constituents.

Understanding the state of the opioid crisis and what is being done about the issue is important for the public to understand. Here, Esri Story Maps can provide a context that is easy to understand and relatable to where your constituents work, live, and play. Story Maps let organizations combine authoritative maps and data with narrative text, images and multimedia content to paint a picture of the crisis. They can better understand the health risks and effect on neighborhoods as well as better realize why and how funding and assistance is being applied to keep their community resilient.

Finally, for those not-for-profits and volunteer-oriented citizens, the same tools can be used to collect information and direct persons experiencing addiction and their families to available resources to improve their lives.



Solutions to the Opioid Crisis

Public health, human services and public safety organizations can leverage [multiple Esri GIS applications](#) to treat health crises like the opioid epidemic in their communities. With GIS, agencies can:

Educate the Community

[Opioid Awareness Maps](#) allow public health and safety staff to produce overdose and death maps that communicate the severity of the opioid epidemic. They include a series of tasks to import existing incident data or geocode new data, as well as share a series of reporting layers with key stakeholders. In cases where incident information only exists in hard-copy medical examiner or public safety reports, Opioid Awareness Maps can be used to automate this information and create awareness maps for the community.

Track Naloxone Deployments

Understanding where naloxone was used and how many doses were administered helps guide opioid response activities and inform treatment providers. A [Naloxone Deployment Reporter](#), created with the ArcGIS Survey123 application, can be used to inventory where naloxone was used to treat an opioid overdose during an emergency incident.

Report Drug Activity

With a [Drug Activity Reporter](#), law enforcement agencies can work directly with the public to monitor, report and react to opioid use in the community. The solution includes a [survey](#) for reporting suspected drug activity from any location or device, a [management application](#) to monitor reports, and an [operations dashboard](#) for more in-depth analysis of activity trends.

Measure Drop-Off Effectiveness

Using a [collection of maps and applications](#), public safety staff can promote prescription drug drop-off locations to the public. They can also use [Insights for ArcGIS](#) to inventory unused or expired prescriptions, analyze drop-off rates and determine whether more prescription drop-off resources might be needed.

Promote Treatment Options

In addition to locating prescription drop-off locations, government agencies can create maps using Web AppBuilder for ArcGIS to help constituents [find addiction treatment providers](#), [pain management options](#) and other health resources.

Monitor Opioid Response

Finally, agencies can combine their disparate initiatives and data into a single location. With an [Opioid Response Dashboard](#), officials can not only monitor individual metrics like overdoses, deaths, prescription and treatment locations; they can also holistically analyze how different response activities interact to form a cohesive opioid addiction prevention strategy.

GIS in Action

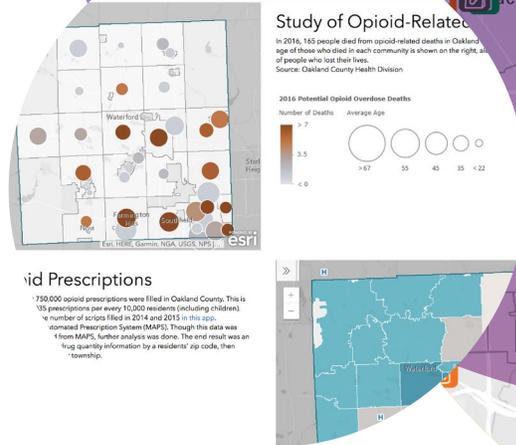
Cities, counties and states are already leveraging the power of GIS to combat opioid crises in their communities. Read these case studies to learn how.

Case Study: Oakland County, Michigan

In 2016, almost 750,000 opioid prescriptions were filled in Oakland County. That's equivalent to 6,035 prescriptions per every 10,000 residents (including children). In that same year, 165 people died from opioid-related deaths. The Oakland County Health Division had a plan to combat these alarming statistics.

The Oakland County Sheriff's Department had a program called [Operation Medicine Cabinet](#) in place to provide locations for people to bring medications for disposal. The health department used GIS to map those locations for residents, as well as deaths related to opioid abuse, as part of a larger [Opioid Open Data Initiative](#). Since then, the Health Division has expanded the number of resources it highlights in online maps to include addiction prevention, recovery programs and treatment centers. They are also working on an alternative treatments map, which will be crowd-sourced from the community.

To inform these maps, the Health Division partnered with a number of other organizations in Oakland County, including law enforcement, pharmacists, schools, local judges and other county agencies. This partnership not only allows the division to access necessary data for opioid maps; it also enables partners to gain a variety of perspectives on which maps would be useful for current and future health crises. Moreover, the health department uses the partnership to raise awareness in the community and even push more resources into local areas by having partners use those maps in their own efforts.

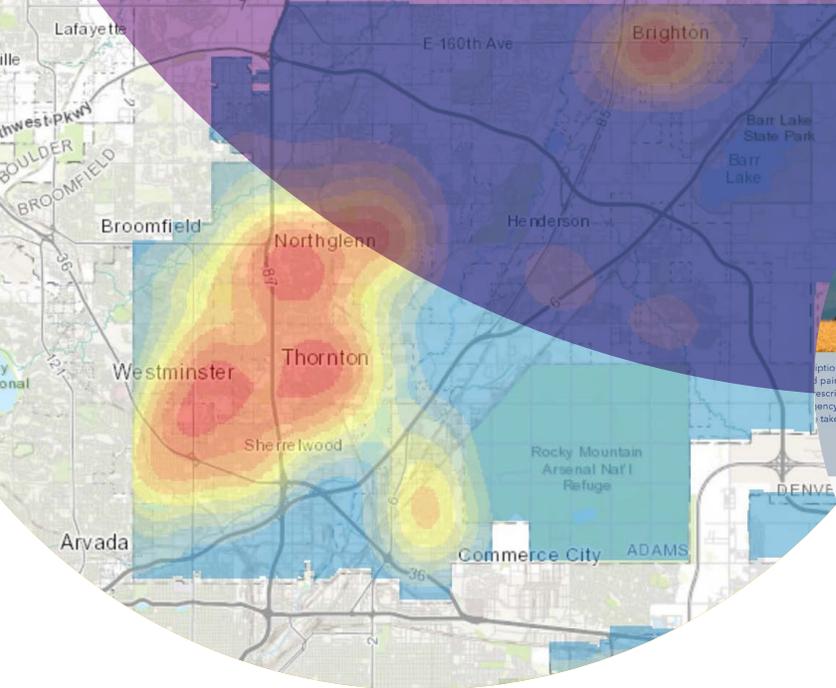


To further empower these partners, the Health Division is currently working on elevating its data access. While public-facing data can only be presented on city, village or township levels to ensure privacy compliance, partners such as a drug enforcement agency could access more granular information if the appropriate access controls are in place. The Health Division is creating an internal, secure login system to that end.

For Oakland County, GIS has been a key factor in quelling the opioid epidemic and its role is only growing.

"GIS has really expanded our view on public health. We tend to live in the world of, charts and line graphs, and it has really been able to show the intensity and the location. Now, we're at a point now where we're taking out these maps and showing them to our partners who are the people on the ground."

Trisha Zizumbo,
Public Health Education Supervisor, Oakland County Health Division



Opioids: Prescription Drug & Heroin Crisis

Tri-County Health Department

Opioid drug misuse and abuse is a serious problem both nationally and here in Colorado. Each year, hundreds of our fellow Coloradans die from prescription drug overdose. Such deaths are now more common than alcohol-related traffic fatalities. The Centers for Disease Control and Prevention (CDC) reports that prescription drug overdose deaths are one of the four most serious epidemics facing the nation and the President has declared the opioid crisis as a national emergency. Enough opioid painkillers are dispensed by pharmacies in the United States to supply each and every American citizen with enough painkillers to take one every four hours, around the clock, for a month.



Data and Resource Web Maps

The webmaps below visualize data around opioid and heroin overdoses from 2010-2016 and resources available throughout the community.



Case Study: Tri-County Health Department of Colorado

Tri-County Health Department (TCHD), one of the largest local public health agencies in the country, serves over 1.4 million residents across three of the Denver, Colorado, metropolitan-area counties. Similar to many other communities across the country, TCHD's jurisdiction has seen a growing problem with the recent opioid crisis.

TCHD needed a tool to clearly communicate complex data about the opioid crisis to various audiences. But collecting and publishing opioid usage data for Colorado was challenging because it is protected health information that requires additional consideration for confidentiality. Additionally, existing data related to drug abuse prevention and programs was being dispersed in different formats to partner organizations. TCHD needed an easy-to-use interface to quickly communicate relevant and accurate information that could be utilized by all the department's community members.

That's why it turned to Esri's ArcGIS Open Data solution to achieve all of the department's data-sharing, visualization and communication goals. TCHD created an [open data site](#) to combine disparate data sources in a single location and then published that information in an easy-to-understand visual format.

The new website houses a number of data and resource maps, including maps on overdose deaths, drug take-back locations, naloxone retailers and addiction treatment facilities in the tri-county area. It also publishes information on the TCHD's prevention tactics and partnerships, fact sheets about individual county opioid rates and targeted resources on addiction treatment and prevention.

Since the creation of the TCHD Opioid Crisis site, there has been a dramatic increase in both the information available to the public and the community's understanding of the opioid crisis. The site has received over 9,000 visitors so far, and that number is growing. TCHD's partner agencies have been able to use the site to identify communities in greatest need related to the opioid crisis and to share maps, graphs and opioid abuse data. This site has also helped generate discussion around naloxone use and syringe disposal locations, setting the stage for next steps in the campaign against opioid addiction in Colorado.

"The success of using this platform as a tool to interact with the data, both internally and with our community, has helped to shape the future of how our health department communicates and shares data moving forward."

Adam Anderson,
Tri-County Health Department Greenwood Village, Colorado

Getting Started

GIS is a powerful tool for responding to the opioid epidemic, but unlocking the power of mapping will take time and planning.

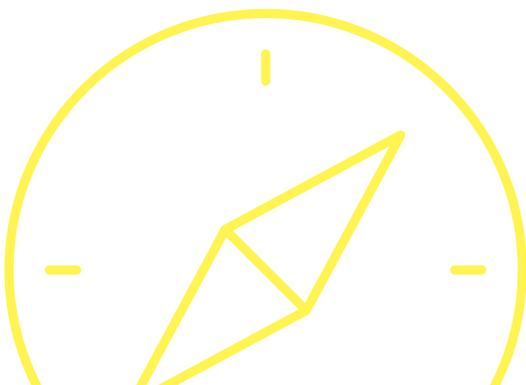
Agencies must gather and geo-enable data, including public health, health care, law enforcement and human services records, and other disparate sources. They can also combine that data with demographic information like population density, morbidity, age, income and mortality. This demographic data will help community leaders understand how a specific population is interacting with the opioid epidemic.

Once all data is consolidated and mapped, agencies can begin looking for patterns to understand what is contributing to local opioid abuse and where resources would be best allocated to address those causes. That mapped analysis can also help inform and engage other stakeholders, organizations and even the public about the community dynamics and needs.

But before agencies take any of these steps, they must decide how they will approach the technology and strategies associated with location-based tactics. For organizations just starting to use GIS, there are three options to consider:

Do It Yourself.

Organizations with access to the Esri platform, as well as strong technical resources and the domain knowledge of dealing with opioid issues, can implement the approaches described by simply using their own in-house staff and resources. The solution sets are based on out of the box functionality and the community maps and applications. The ArcGIS Solutions Deployment Tool allows users to browse a catalog of ArcGIS Solutions and begin configuring the templates to easily start mapping opioid overdoses, resource centers and other relevant data points.



Explore a Technology Jumpstart Package.

This is for organizations that are looking to execute the maps and apps quickly but are short on technical staff, resources, and experience in building applications. It may be worth exploring jumpstart packages to fill gaps for the short term.

Jumpstarts provide both GIS software and technical staffing. These engagements are designed to supplement your own staff with Esri professional services or a certified Esri business partner. Jumpstarts are a service that help your staff quickly become self-sufficient in installing, implementing and managing Esri software. They also provide technical knowledge transfer and best practices for the use of the ArcGIS Platform.

Engage with Professional Services.

Want to really use the concepts and apps to further your mission? Consider a full engagement with Esri Professional Services or an Esri Business Partner to provide consulting and implementation services for an optimal return on GIS investment. These professional services engagements can help transform an organization through advice and hands-on help from GIS experts, industry specialists, developers and designers.

GIS is rapidly becoming a critical component to solutions that help with better understanding your community and by placing the best resources where they are needed. A smart approach requires a complete approach.

Given the scope and complexity of the opioid crisis today, it's imperative that state and local governments take a smarter approach to providing education, prevention and treatment resources to their communities. GIS is essential to that approach.



The role of geography and GIS is obvious in many community emergencies, like wildfires, hurricanes or flooding. It is no different when it comes to health emergencies like the opioid epidemic. Integrating health data with geographic information gives health service managers an understanding of where, when and why the epidemic is occurring and who it is impacting. It also lays the foundation for effective policy and decision-making.

With GIS, state and local leaders can quickly understand and begin addressing the opioid epidemic in their own communities. In the same way that they rely on mapping to inform responses to natural disasters, responders can use real-time visual data to effectively combat this drug crisis – and save the lives of countless Americans.

When Esri was founded in 1969, we realized even then that geographic information system (GIS) technology could make a difference in society. Working with others who shared this passion, we were encouraged by the vast possibilities of GIS.

Today our confidence in GIS is built on the belief that geography matters - it connects our many cultures and societies and influences our way of life. GIS leverage geographic insight to ensure better communication and collaboration.

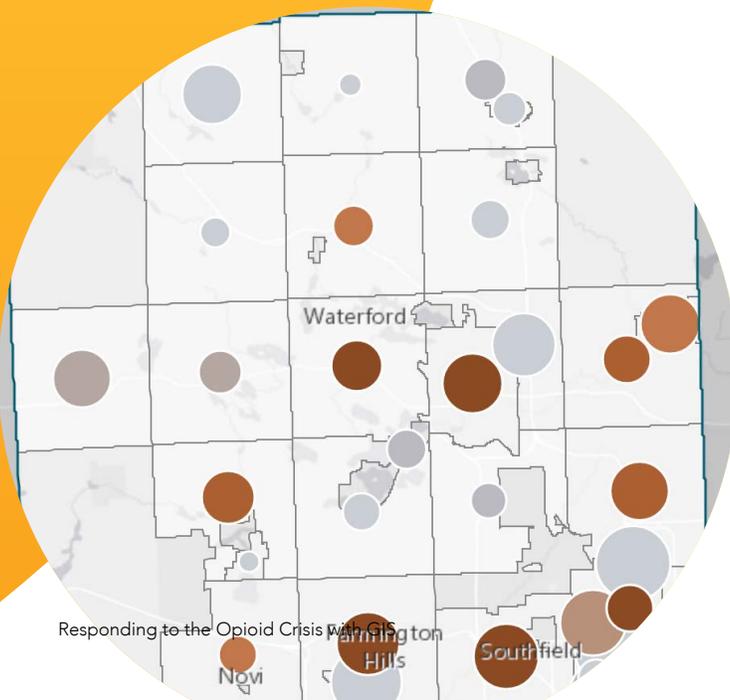
Explore our website to discover how our customers have obtained the geographic advantage by using Esri software to address social, economic, business, and environmental concerns at local, regional, national, and global scales. We hope you will be inspired to join the Esri community in using GIS to create a better world.

[@esri_health](https://go.esri.com/RespondingToOpioids)

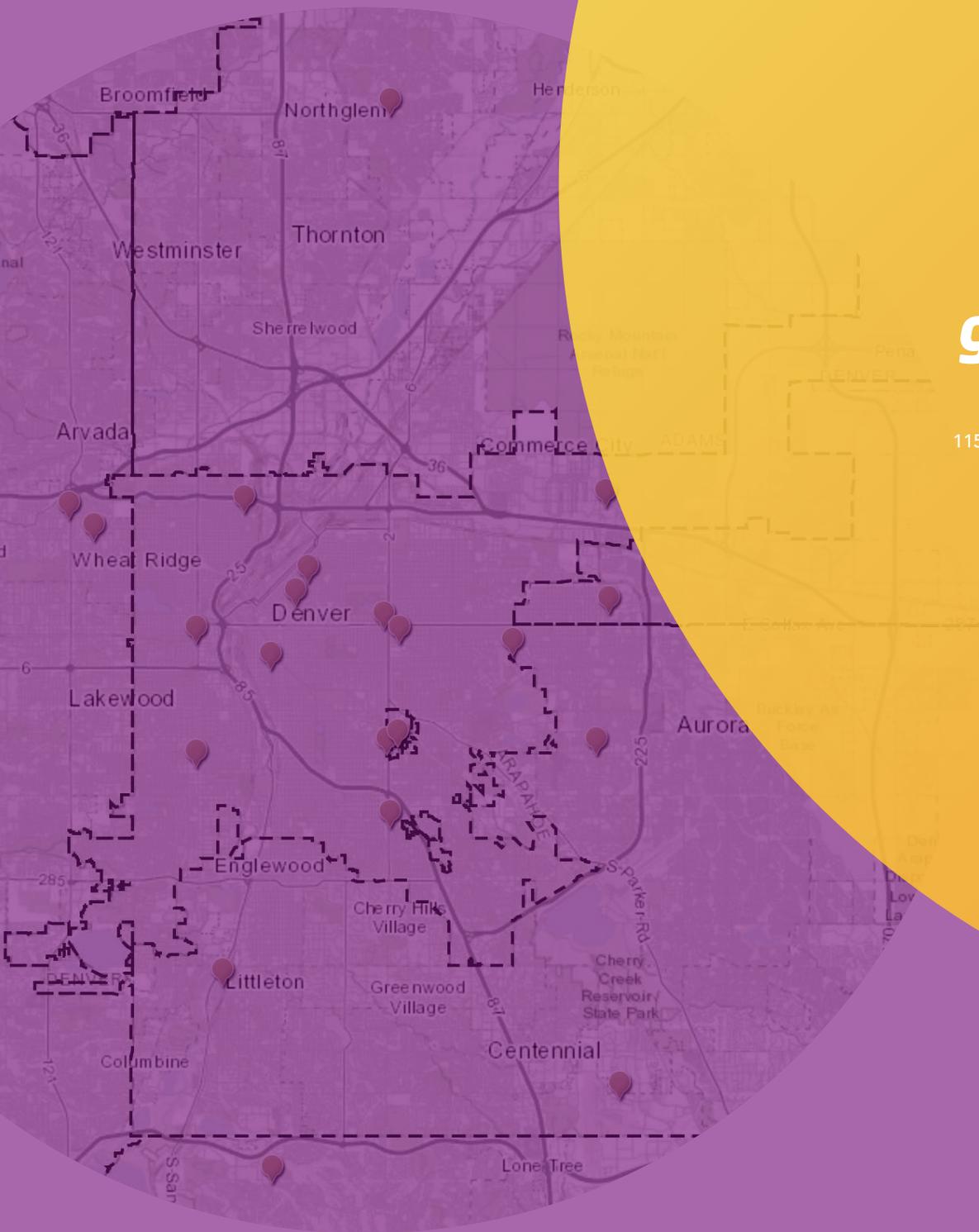


GovLoop's mission is to inspire public sector professionals by serving as the knowledge network for government. GovLoop connects more than 270,000 members, fostering cross-government collaboration, solving common problems and advancing government careers. GovLoop is headquartered in Washington, D.C., with a team of dedicated professionals who share a commitment to the public sector.

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