

digital communities

BIANNUAL REPORT

Software for the Social Good

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Can technology lead to better policy on homelessness, poverty and other urban problems?

About This Report

The Digital Communities Special Report, which appears twice a year in *Government Technology* magazine, offers in-depth coverage for local government leaders and technology professionals. It is part of the Digital Communities program, a network of public- and private-sector IT professionals working to improve local governments' delivery of public service through the use of technology. The program — a partnership between *Government Technology* and e.Republic's Center for Digital Government — consists of task forces that meet online and in person to exchange information on important issues facing local government leaders and technologists.

By Tod Newcombe

In 2010, the Anchorage, Alaska, Police Department closed 190 homeless camps that were hidden in parks and the woods that surround the sprawling city of nearly 300,000. By 2016, the police closed five times that number — nearly 1,000 illegal camps. The explosion in camps can be attributed to a variety of factors, including the lack of affordable housing in recent years, an extremely low vacancy rate overall and problems with alcoholism and drug abuse. But it adds up to one of the highest per capita rates of homelessness in the country.

Not surprisingly, closing the camps drove many of the homeless into the city's overcrowded shelters, especially in the winter months. Nor did these actions address the mental health and medical issues that affected many of the adult homeless. With so many camps scattered across the city and little information about their location, providing outreach and services to the city's most vulnerable residents was difficult, to say the least, according to Nancy Burke, the city's housing and homeless services coordinator.

But when Burke met with Tina Miller, the city's geographic information officer, they hatched a plan to use digital maps and data to monitor camp locations and to start coordinating services for the homeless as the camps were being closed. Using software from Esri, the mapping company, Anchorage began surveying the homeless population for an accurate count twice a year (1,128 during the latest census in 2017). They created mobile apps for the police and Department of Parks and Recreation to help with pinpointing the location of camps, now in the hundreds, throughout the city. A public-facing app also allows city residents to report camp locations.

More accurate information about the camps and the number of people living

in them means the city can do a better job aligning outreach services, so that the homeless don't keep returning. "I've been working in this field for 13 years, and this was the first time we had access to this information," said Burke. "It's so critical to how we plan safe shelters and housing."

The Struggle to Make Informed Decisions

Anchorage and other cities have struggled to get an accurate, data-driven estimate of their homeless population. Alaska's largest city has had to recruit nearly 200 volunteers to do its point-in-time surveys. What is startling, though no longer surprising, is just how many Americans are homeless. In 2016, the U.S. Department of Housing and Urban Development came up with an estimate of 549,000 homeless in the country, with 68 percent staying in shelters, transitional housing programs or safe havens, while the remainder — 32 percent — were living in camps or on the streets.

But the homeless problem is just one of many social issues that plague counties and cities. Local governments are struggling with problems that range from housing and poverty to food access and a rampant opioid addiction epidemic. Take poverty. In 2016, the official poverty rate was 12.7 percent, according to the U.S. Census. While the figure marked the second consecutive year that the poverty rate had dropped, it still represented 40.6 million Americans, the largest figure in more than 50 years of record-keeping.

While it's possible that an individual or family may suffer just one of these problems, it's probable that they are impacted by several at once. That means several different agencies may be trying to help someone separately, without the other agencies fully aware of what the other is doing. It also means that non-social service agencies, such as the police or

parks department, may be involved as well, as is the case in Anchorage.

Left unaddressed or treated with short-term solutions, social problems can drain any city or county government budget, not to mention the fact that they tear at the human dynamism of any community.

Technology has been used to improve how local government deals with social problems for years. But what's been missing has been the ability to take data from multiple sources and align it to make informed decisions, said Stephen Goldsmith, a professor at the Harvard Kennedy School of Government and director of the Innovations in American Government Program, as well as a columnist in this magazine. He also directs Data-Smart City Solutions, a project that highlights new technologies and analytics in local government.

Goldsmith, who was mayor of Indianapolis and deputy mayor of New York City under Michael Bloomberg, knows a thing or two about using data to drive solutions in cities. When it comes to using data to solve social problems, Goldsmith explained that the first step is to make the data accessible, whether it's for homelessness, child welfare or substance abuse. "Step two is to present the information in a usable way to the person who has to make a decision. Step three is to use the information to help the caseworker predict which type of intervention will be successful," he explained. "We're making progress in the first two steps, but have hardly made progress with step three. There's a long way to go."

As Goldsmith pointed out, technology and policy are combining to make data more accessible and useful to those who have to make decisions. One of these innovative trends involves a new twist on a mature technology. Digital mapping has been around for decades and most large cities and counties have a department devoted to geographic information

DAVID KIDD

Using Data to Solve Social Problems: 3 Steps

Stephen Goldsmith, former mayor of Indianapolis and New York City deputy mayor under Michael Bloomberg, now serves as director of the Innovations in Government Program and Data-Smart City Solutions at the Harvard Kennedy School. He outlined three steps on the path to effective use of data to drive better policy around social issues like homelessness, child welfare and substance abuse.

Step 1:
Make the data accessible.

Step 2:
Present the data to decision-makers in a usable way.

Step 3:
Use the information to choose the best kind of intervention.

"We're making progress in the first two steps, but have hardly made progress with step three," Goldsmith said. "There's a long way to go."

“CIOs need to toot their horns on what they can do and make sure the right process is in place, along with the right tools. Then it’s up to the mayor to expend the political capital to get it to work.”

systems, with a GIS officer overseeing it. For years, GIS at the local level had mostly to do with parcel maps and urban planning. But its purpose has spread, and thanks to smartphones and Google Maps, cities and counties are finding more innovative ways to use geospatial data.

Several years ago, GIS software firm Esri began to see its customers place a bigger emphasis on trying to tackle social issues, such as homelessness, food access and affordable housing. It was new ground for the firm. But as Chris Thomas, director of Esri's government marketing operations, explained, the company had already begun to work with cities and counties on multifaceted issues, like disaster planning and resiliency. For Thomas, using maps and geospatial data to help solve social issues was a natural progression.

"To treat homelessness, you have the involvement of law enforcement, human services and health. Then you get planning involved and it becomes a much bigger thing. Eventually homelessness impacts infrastructure; now that involves public works," he said.

Like a disaster or an emergency, solving a social problem such as

DAVID KIDD

poverty or homelessness follows the same process, according to Thomas. “You need base information, then you need to know which sets of data are changing. Then you analyze where to put resources. It’s all about allocating resources in a timely fashion.”

Locating Food Deserts

The city of Anchorage used Esri’s Survey123 app to create a point-in-time census of its homeless population. It also used Esri’s Collector app to share maps and data on the camps’ locations on mobile devices with the police and parks departments. The Office of Economic and Community Development, which manages the city’s GIS, used other Esri tools to create a camp dashboard and to build a website that allowed citizens to report camps they had seen.

Another use for digital mapping is to connect the dots and understand how an urban community’s food system works and what happens when access to healthy food is limited. In 2015, the city of Baltimore conducted a detailed study of how its population was accessing healthy food. The study was based on mapping data that exposed significant disparities in access to nutritious food, according to income. The report, *Mapping Baltimore’s Food Environment*, found that one in four city residents live in areas identified as a food desert, that children are largely affected with 30 percent living in food deserts and that African-Americans have disproportionately low access to healthy food.

The report defines a food desert as an area where the distance to a supermarket or a similar retail food establishment is more than one-quarter of a mile, the median household income is at or below 185 percent of the federal poverty level, over 30 percent of households do not have a car available and the average Healthy Food Availability Index for food stores is low.

The data that made the findings from the report possible came from the Johns Hopkins Center for the Livable Future (CLF), which promotes research about



the relationship between agriculture, diet, environment and health. In 2012, CLF began mapping the state of Maryland’s food system using Esri’s open data platform, and incorporating federal, state and local data sets into the map, which is publicly available online.

As the number of data sets steadily increased, CLF moved the data into Amazon’s AWS cloud, according to Caitlin Fisher, CLF’s program manager. That has allowed CLF and its food map project to host more than 170 data layers for more than 18,000 annual users. “Our goal is to make data accessible, allow people to use it and to improve the food system,” she said.

Now that the maps have exposed the problem that Baltimore has with its food deserts, city officials are using the maps and accompanying data to plan and advocate for better access in the affected neighborhoods. “Maps are great tools for advocacy,” said Fisher. “They allow people to see patterns and trends within the community. Ultimately the data and maps are about creating long-lasting solutions to the food system in Baltimore and Maryland.”

Already, CLF is seeing evidence that the maps are improving the food system in Baltimore and elsewhere in Maryland. People are requesting more information about urban farming, which is becoming a growing trend in the state. Others are using the maps to assess diet and health in proximity to urban farms.

CLF’s efforts have also brought valuable information about nutrition and education resources to food policy councils around the state. That information, in turn, is shared with local residents. CLF has even worked with emergency preparedness agencies to make sure they include food in their emergency plans.

But as Goldsmith pointed out, accessing and using data to help with decision-making is one thing — using it to predict outcomes is another. For CLF, one challenge lies with accuracy as it works with data of varying levels of quality from different sectors of government. Another is what Fisher calls “ground truthing” data so that it works for the communities that want to use it. A project like this, with multiple players, is “more than just numbers and maps,” she said. “You need to take it to the next level of community

engagement and to really understand what's happening on the ground.”

Model Warehouse

In 1999, in Allegheny County, Pa., the Department of Human Services (DHS) did something few local governments would have considered. It built a data warehouse as a central repository for the county's health and human services data, part of an overarching strategy to deliver integrated support to its most vulnerable citizens. While most data warehouses were oriented toward research or one-shot projects at the time, Allegheny County took a different tack and decided to use it for decision support for a range of social problems: behavioral health, child welfare, homelessness, aging and other disabilities.

The warehouse uses software from IBM and Oracle and has steadily built up the number of data sets it contains. As the data has become richer, the ability to conduct more comprehensive analysis, particularly around gaps in client coverage, has steadily improved. For example, in 2005, DHS developed an algorithm that helped officials spot clients who had multiple needs. The algorithm boosted the number of children in child welfare who received mental health support from 26 percent to 44 percent.

In 2009, DHS signed an agreement with the Pittsburgh Public School District to share data and improve both the education and well-being outcomes of children under its care. Since then, there have been data-sharing agreements established with another 20 school districts.

Last year, DHS began using its data warehouse to conduct the kind of predictive modeling that Goldsmith called the hardest for local governments to establish. The Allegheny Family Screening Tool helps with decision-making when a worker screens a call regarding a child who is at risk of possible maltreatment. It predicts possible outcomes with a fair degree of accuracy by creating a score for intervention based on the integration and analysis of hundreds of data elements. The higher the score, the more likely the

possibility of future maltreatment, giving decision-makers the kind of information they need to intervene and investigate. Studies have shown the tool to be ethically appropriate because it is more accurate than the alternatives currently being used.

Another tool used by DHS is a data dashboard. DHS has been able to help inform health providers whether someone who has died from a drug overdose had recently been receiving mental health or substance abuse treatment. It may sound like a simple correlation to make, but in government that kind of social service data sharing is not the norm, according to Erin Dalton, deputy director for DHS. “It seems straightforward, but there has been historically and funding-wise, real walls between mental health and substance services,” she said.

In the realm of social issues, data sharing can be the most rewarding process, but also the most vexing. “When it comes to hurdles, there are technical aspects to data mining and integration that are fairly complex,” said Goldsmith, “but data sharing is the most important and it's the one issue that can slow everybody down.”

According to Dalton, Allegheny County has had to pay for strong, external legal guidance to manage data-sharing issues. But she believes too many government agencies misinterpret laws so they can

hold on to data rather than share it. “I think it's become pretty obvious that there isn't a legal issue in most cases, but really a policy decision that needs to be made,” she said. “Those kinds of decisions should not be made by relatively low-level bureaucrats.”

Most government officials who are trying to fashion data-driven solutions for vexing social problems would agree with that. What is required are strong data governance practices. A paper from the Ash Center at the Harvard Kennedy School, *Lessons from Leading CDOs*, states that strong data governance fosters interoperability and reuse of data across the enterprise. Data governance also addresses cross-agency sharing of who collects what, and for what purpose, to avoid duplication of data collection in different or competing formats.

An example of the kind of policy decision-making Dalton has in mind can be found at the state level. Indiana set out to improve data sharing in a secure and legal way while removing technical barriers. The starting point was an executive order signed by former Gov. Mike Pence, creating the Management and Performance Hub, where appropriate state data could be held securely and used to drive better government performance through analytics.

The problem the state wanted to address was a troubling health issue:



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Why were some infants dying in their first year of life while others weren't? For years, Indiana had been pursuing a policy that wasn't producing results. It was based on the prevailing belief that infant mortality was caused by pregnant moms who either smoked cigarettes, did drugs or drank too much alcohol.

With Gov. Pence's executive order, policymakers were freed up to share data between multiple agencies. Using analytics and data science, the state was able to uncover the real culprit in its high rate of infant mortality: lack of access to prenatal health care.

Taking down barriers to data sharing at the local level can be just as beneficial in the long term. Dalton's advice is to avoid having to go through a memorandum of understanding agreement every time data is to be shared. While she makes it clear that Allegheny always works within the law, she believes that signed agreements aren't necessary, just good governance and rules for data use. "Once you get into agreement mode, you might as well add three more years to the project," she warned.

Where Are the Analysts?

Like so many communities around the country, Marin County, Calif., is struggling with the fallout from an epidemic of opioid addictions. The county's Public Health Department is trying to get a grip on the problem, and one way to do that is by pulling together data from local law enforcement and public safety agencies, as well as from the state and federal government to help county officials track everything from the number of opioid prescriptions given out to the number of emergency room admissions for drug overdoses.

But the county faces two problems. First, figure out a way to spend more time exploring what the data means, and second, find people who can make sense of it. The answer to the first question is to use one of the new digital tools that can visualize the data. Marin County uses LiveStories. Other local governments, such as Allegheny County, use Tableau, while Esri has an arsenal of tools for teasing out stories from data. As for finding people who are not public health experts to be able to interpret the data, Marin's Public Health Department has had to consider more unconventional approaches, such as using volunteers to help make sense of the data and find correlations that might lead to better outcomes.

For Allegheny County, the situation is a bit different. With Carnegie-Mellon University's Heinz College of Information Systems and Public Policy nearby, the county government has an easy-to-tap

Hiring More CDOs

Alex Engler, program director of Computational Analysis and Public Policy at the University of Chicago, points to the role of chief data officer as a new position that is helping change how government tackles social issues. "The cities that seem to get the most done have a chief data officer," he said. Engler points to Chicago's Tom Schenk as someone who has been a trailblazer when it comes to data-driven policies and practices.

But the role remains relatively new and is still uncommon, especially at the local level. New York City was the first local government to appoint a CDO in 2011. This year, there were a dozen CDOs in city government and three at the county level, according to *Government Technology*.

Recognizing the growing importance of the CDO, in March 2016, Harvard Kennedy School's Ash Center for Democratic Governance and Innovation announced that it had been awarded a grant by the Laura and John Arnold Foundation to establish and support a national peer network of urban chief data officers, who will collaborate on shared projects that advance the use of data visualization and predictive analytics in solving important urban problems related to economic opportunity, poverty reduction, and addressing the root causes of social problems.

Since then, a handful of cities have appointed CDOs. But the role is expected to become more important in the coming years. Gartner is projecting growth of 1,600 percent in CDOs across all industry sectors over the next two years and expects by 2019 that 90 percent of large organizations will have one.



Philadelphia CDO Tim Wisniewski and San Francisco CDO Joy Bonaguro address a panel at Harvard's Summit on Data-Smart Government in November.

MARTHA STEWART

5 Trends Driving Data-Driven Progress

Chris Thomas, Esri's director of state and local government marketing operations, has worked with the public sector for decades and has seen mapping technology evolve to solve myriad problems. Now, he's seeing a similar transformation unfold in the field of social services. Here's his list of five technology trends that are making data-driven solutions for social problems more effective:

- 1. Open data.** Once almost inaccessible, government data that is open and readily accessible is helping a growing number of communities better cope with homelessness and poverty. While most people perceive open data as something for the public to consume, some of the biggest users of open data are government agencies.
- 2. Story maps.** This new concept in data visualization helps communicate what's going on and where the data is. It allows people to interact with data in a better way than having a single person try to explain what's going on to a room full of policymakers and stakeholders.
- 3. Mobile solutions.** Collecting data in the field in a consistent manner so it can be shared easily has had a significant impact on tackling social problems for local governments.
- 4. Dashboards.** This tool has provided workers with situational awareness for monitoring how a change in policy is doing against the norm.
- 5. Data analytics.** Data-driven projects require analytics to support decision-making and to help predict outcomes. It can take a good project and make it into a transformative one.

pipeline of talent for conducting analytics. More importantly, the director of DHS sees data analysts as a priority, according to Dalton. Hiring analysts is not an option, but an investment decision, she said.

The explosion in data at the local level has led to a wide range of breakthroughs in the field of social services, according to Alex Engler, program director for computational analysis and public policy at the University of Chicago. He points to analytics in Chicago that allowed city officials to prioritize which homes needed to be inspected based on their likelihood of having lead paint. They were even able to single out at-risk homes prior to when a family with children moved into them. He also mentioned the city's ability to predict where rat populations were likely to occur and curb outbreaks before they happened.

The point, he said, is that predictive analytics can happen when analysts repurpose data that was initially collected for another reason. Yet, Chicago is one of just a handful of local governments that has figured out how to analyze disparate data sets in a useful way, a dilemma that Goldsmith and others have warned about.

"This type of shift in how data can be used is a big problem for public social services, because there's no one with the skill set to deal with it," said Engler. "The number of computer science graduates who go into public policy is unbelievably low. The public sector is about 30 percent of the economy, yet less than 10 percent of computer science grads go into public service."

Engler left a promising career as a data scientist working for Washington, D.C.-based think tanks and has returned to academia at the University of Chicago to recruit and train promising public policy students in the arcane world of data science and analytics. The education process centers around the practice of causal inference in public policy, which means looking retroactively at whether a program works, said Engler. As an example, he mentioned how changes to the Medicaid program can affect health-care prices, which can then impact consumer health care.

"The tools you use to teach causal inference are statistical analysis tools, such as Stata and SAS," he said. But a shift is taking place in academic data science, with more students learning analysis using open source tools, such as R or Python. At the same time, Engler believes the expanding universe of open data in government is helping to make possible more data-driven solutions for problems around poverty, homelessness and health. The universe of



In Chicago, data analytics help the city determine which houses need to be inspected based on their likelihood of having lead paint.

DAVID KIDD

data that could be beneficial to a local government's social problems keeps expanding, with more private data sets beginning to have an impact too.

"Today, we have to teach students how to use new tools such as Python and have them evaluate Yelp data for health inspections," said Engler.

The new generation of statistical tools are getting better, according to Engler, "and a lot of the best tools are free." But the tools are not getting dramatically easier to use. "There's no point-and-click solution to any of these things," he said. "You have to build an application that is going to integrate data coming in from various city services, as well as the private sector, and then build a platform for internal and external use."

Where Engler sees progress is with local governments that have a chief data officer in place with a small staff who partners with the community. He cites Tom Schenk, Chicago's CDO, as someone who has created a model data-driven strategy that is impacting a broad range of public policies, including social services. One thing Schenk has done to expand the impact of data on policies is use community volunteers to help sort through the vast amounts of data the city is collecting. Cities like Chicago are doing this as much out of necessity as for community engagement and improved outcomes.

Chicago, despite its size, struggles to find people who can interpret the data government collects and develop

predictive models. In one project, the city turned to volunteers to pore over data that will predict with a high degree of accuracy when the city's beaches would be affected by an E. coli outbreak. Another data project is helping the city accurately gauge how much rainwater runoff goes into the city's sewers and how much can be diverted by more environmentally friendly methods.

Using volunteers to conduct data science utilizing dashboards and other tools does have risks. They might see some data that the government doesn't want them to see. Or, they may make correlations and predictions that could end up as inconsequential or even distracting. But for local governments that can't find or afford analysts with a background in public policy, using volunteers can be beneficial as long as the data is presented in the proper context and with the right parameters.

Technology as a Unifying Force

Tackling homelessness, poverty, food deserts, opioid addiction and other social ills draws in a lot of different experts and professionals from government agencies, nonprofits and even academia. But what is the role of the CIO? Stephen Goldsmith, who has worked with many technology chiefs in his career in public service, said CIOs play an absolutely critical role in getting technology into the process of fixing urban social problems.

"They should first focus on how much value they can bring: to help their elected officials, to hire better workers who can figure better solutions and to manage contracts more effectively," he said. More importantly, the CIO has to be clear about the value proposition around technology's role in data-driven solutions to social problems. "Then the role of the CIO is to have the mayor bring in the right legal support to develop policies around privacy and security to help create the right kind of data-sharing agreements," said Goldsmith. "CIOs need to toot their horns on what they can do and make sure the right process is in place, along with the right tools. Then it's up to the mayor to expend the political capital to get it to work."

Others counsel CIOs, data officers and social policy managers to focus on tactics that lead to small wins. Don't try to solve the opioid epidemic within one project. "Start with data collection or simple solutions, maybe an app that shows the location of opioid prescription drop-offs," said Esri's Chris Thomas.

While tackling social problems can be complex, the underlying technology and the process it drives don't have to be radically new or different. "We're seeing a lot of parallels between winning solutions in non-social areas, such as snow removal data, and how it can be applied to social problems and become a game-changer," he added.

For Nancy Burke, the role of technology in helping Anchorage come to grips with its homeless problem wasn't clear-cut at first. But the more she talked with her colleague Tina Miller, the more she saw the possibilities of what could be done with mapping, dashboards and mobile apps.

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Building 21st-Century Communities

Digital Communities are real places that understand and value the transformative power of broadband connectivity, core computing technologies and interoperable applications to improve the way government conducts business and interacts with citizens. The Digital Communities Program showcases solutions from leading technology companies that are specifically designed for communities and local governments that want to exceed the expectations of their citizens. In addition, the program provides a collaboration forum where community officials discover and share emerging best practices and innovative community technology deployments.

DAVID KIDD

