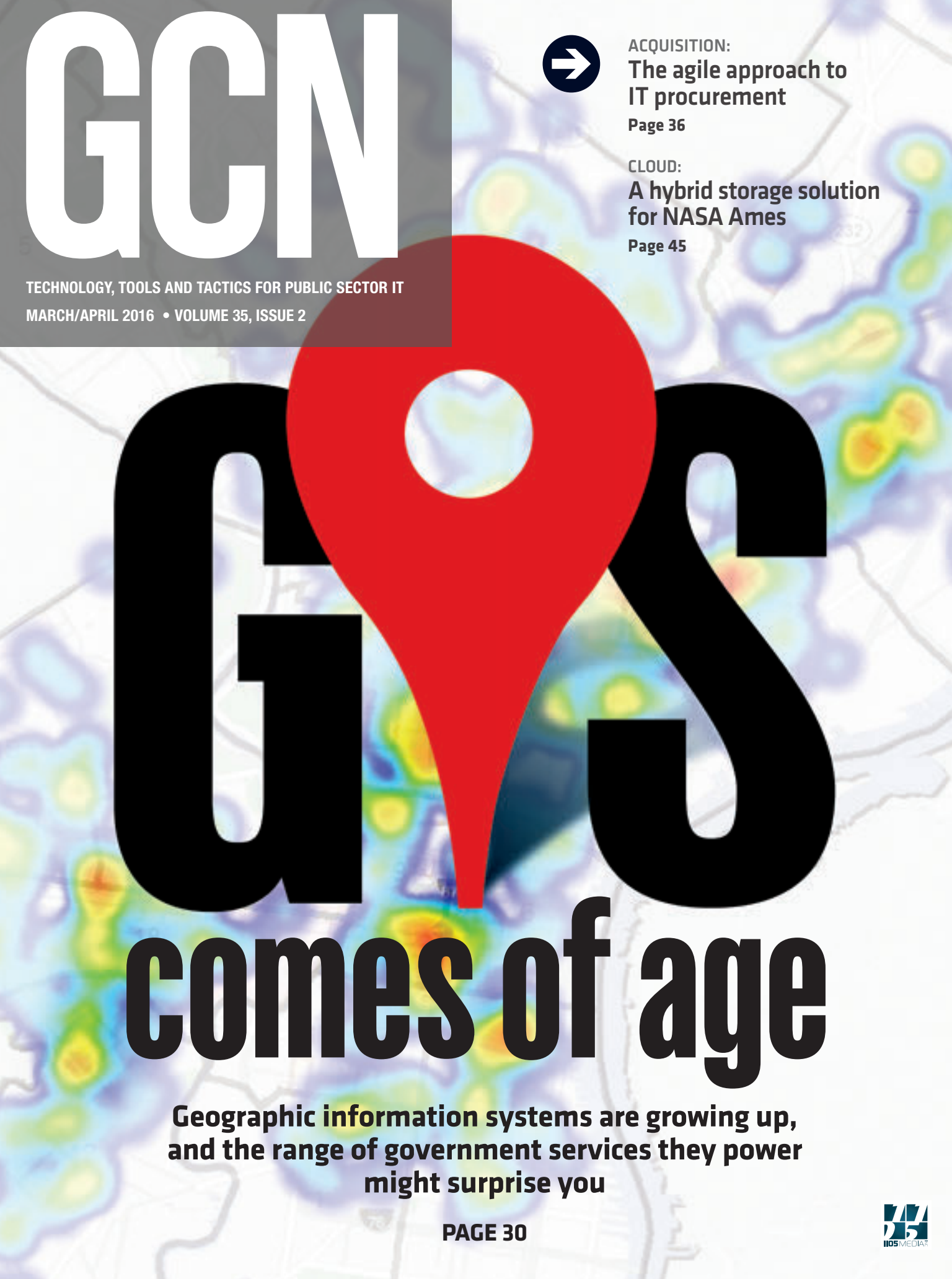
GCN

TECHNOLOGY, TOOLS AND TACTICS FOR PUBLIC SECTOR IT

MARCH/APRIL 2016 • VOLUME 35, ISSUE 2

ACQUISITION:
The agile approach to IT procurement
Page 36

CLOUD:
A hybrid storage solution for NASA Ames
Page 45

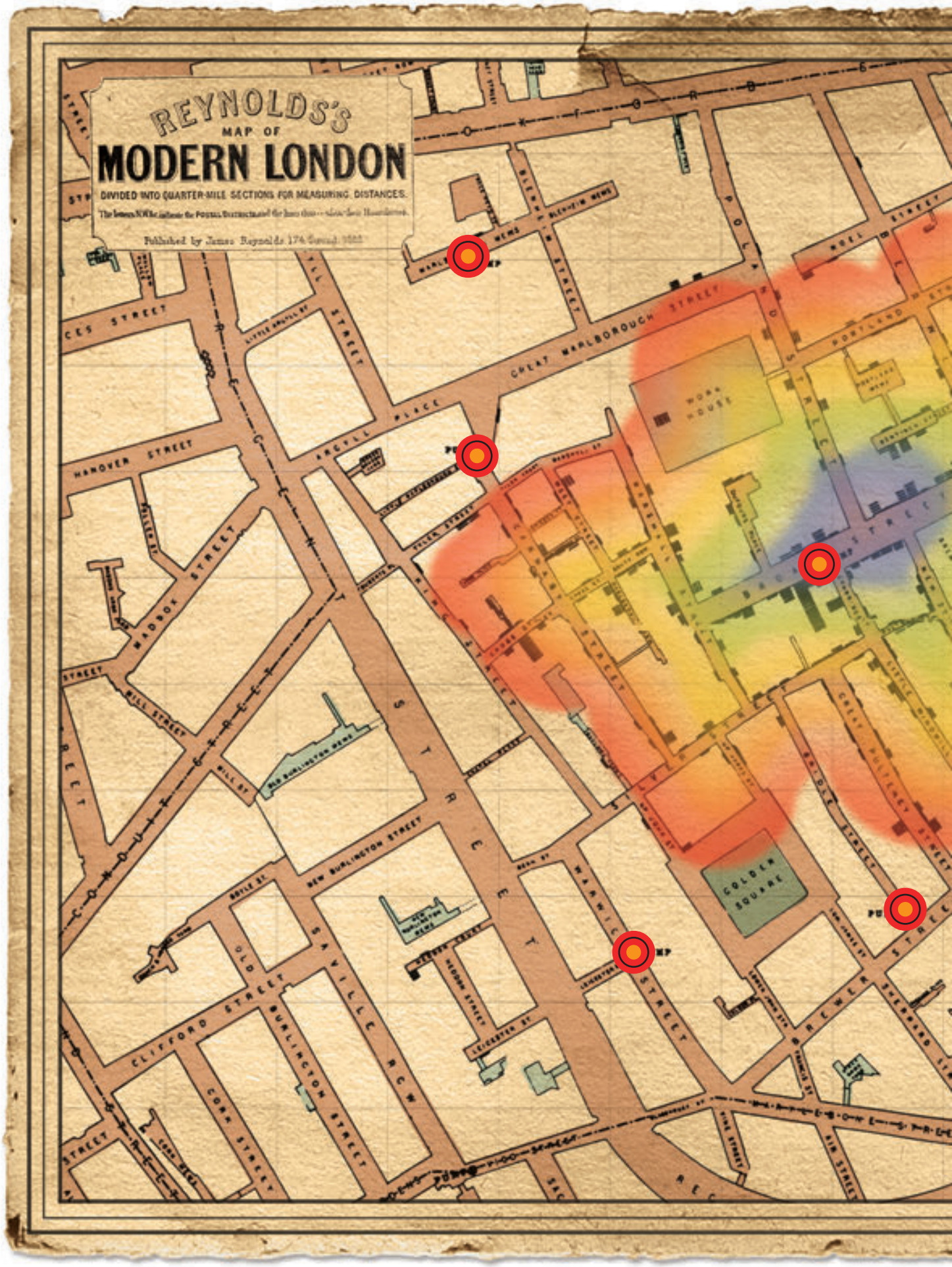


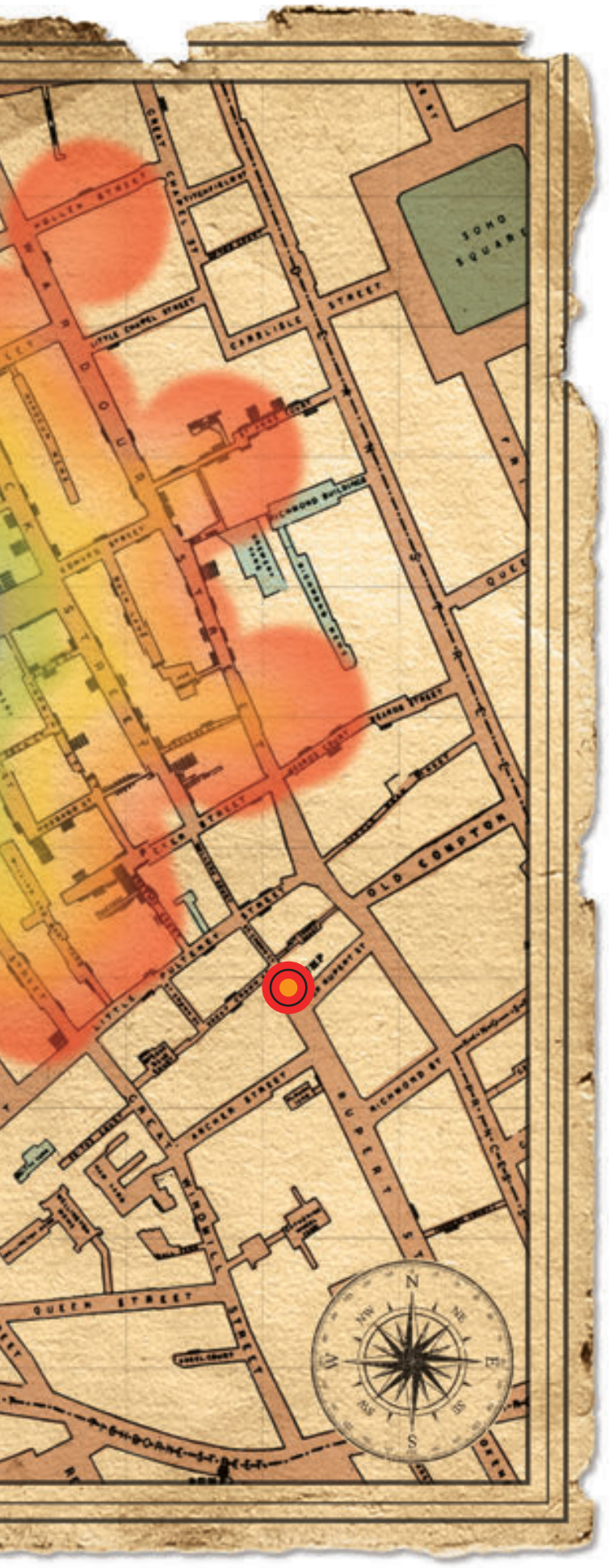
GIS comes of age

Geographic information systems are growing up, and the range of government services they power might surprise you

PAGE 30

1105 MEDIA


REYNOLDS'S
MAP OF
MODERN LONDON
DIVIDED INTO QUARTER-MILE SECTIONS FOR MEASURING DISTANCES.
Published by James Reynolds 174 Strand
GREAT MARLBOROUGH STREET
ARGYLL PLACE
HANOVER STREET
REGENT STREET
NEW BURLINGTON STREET
OLD BURLINGTON STREET
SAVILLE ROW
CLIFFORD STREET
CORK STREET
GOLDEN SQUARE
WORK HOUSE



GIS COMES OF AGE

Geographic information systems are growing up, and the range of government services they power might surprise you

BY MATT ALDERTON

Modern-day Chattanooga, Tenn., looks nothing like Victorian-era London. The former is lined with rocky ridges, buzzing with modern conveniences and kissed by the scent of fried chicken and fresh-baked MoonPies. The latter was dense and damp, crowded with rodents and horses, stained with soot and awash in the sticky smell of sewage.

Despite their stark differences, however, new Chattanooga and old London have at least two things in common: public health crises and geographic information systems.

"GIS is how it was determined that cholera spread through the sewage and drinking systems in London and not the air," said John Bilderback, a program manager at the Chattanooga-Hamilton County Health Department. During the infamous 1854 cholera outbreak that killed 616 Londoners in a matter of weeks, "they literally plotted the outbreak on a map as it was happening and were able to trace it all the way back to its source, then address the issue. In many ways, that was the foundation of public health, and GIS was responsible for it."

One hundred and fifty years later, in 2004, Hamilton County Mayor Claude Ramsey declared that his jurisdiction had its own public health emergency: obesity. In response, he established a countywide initiative to promote physical fitness and healthy eating called Step ONE (Optimize with Nutrition and Exercise).

The health department repeatedly relied on GIS to identify and address community needs in pursuit of Step ONE's goals. In 2012, for example, officials launched the Chattanooga Mobile Market, a mobile grocery store that brings healthy foods to commu-

Thanks to GIS, Hamilton County, Tenn., was able to identify neighborhoods that lack easy access to grocery stores and sent in mobile markets as part of a campaign to tackle obesity.

nities in so-called food deserts. And in 2014, health officials lobbied the Hamilton County Department of Education to adopt a "shared use" policy that opened elementary school playgrounds for community use outside school hours to create opportunities for recreation and exercise in neighborhoods that lack public parks.

In both instances, local agencies mapped populations and resources to develop targeted solutions for residents in need.

"GIS is a visual tool that helps you see where your resources are and aren't compared to where your people are," said Bilderback, who manages the Step ONE program. "It's the job of our decision-makers to triage needs in a way that provides a fair distribution of resources across the community, and GIS has helped us do that."

GIS can help agencies at all levels of government solve problems the way it has in Hamilton County — and in London a century ago. First, however, government IT and GIS departments must understand the full range of possibilities and the strategies that can bring them to bear.

MAKING AN OLD TECHNOLOGY NEW AGAIN

Although agencies have used GIS for decades, advances in computing power and mobility have made an old technology new again.

"GIS has become an integral part of what government does because government by its very nature is focused on location," said Todd Sander, vice president of research at e.Republic and executive director of the media and research company's Center for Digital Government. Government services are targeted to specific places, "and the ability to capture and integrate that has really taken off as a result of other technology changes."

Sander also noted a fundamental shift in the nature of public-sector GIS. It "initially was focused on things the government cared about, like outlying political boundaries, public facilities and infrastructure," he said. "Now it's becoming tied much more directly to service delivery."

Mitch Bradley, vice president of sales programs at government software company Accela, said communities are increasingly demanding location-based services. "Thanks to apps like Uber, we as consumers have gotten used to being able to quickly see a map and interpret information from it," he added. "The public is now expecting that capability from government, too."

Internally and externally, the demand for GIS is growing. And so is the opportunity, said Bert Granberg, director of Utah's Automated Geographic Reference Center, which manages GIS on behalf of the state. Not all government information can be mapped, he admitted, but where it can, geospatial tools offer increased transparency, efficiency, accountability and productivity — all of which create value for individuals and communities.

"GIS isn't always the right tool for the job," Granberg said, "but there are a lot of places where there is significant payoff if you make it the foundation for your business process."

UNDERSTANDING PROBLEMS BETTER

When Daniel Nau discovered GIS a decade ago, he was skeptical. Faced with personnel reductions and budget cuts, however — and a town full of snowy streets that needed plowing every winter — he felt compelled to give it a chance.

"To be honest, it was kind of forced on us," said Nau, director of highway and solid waste management in Framingham, Mass. "We had to revamp our entire [snow removal] system, and we didn't really know what to do. So we went to our GIS folks."

Nau didn't even know what GIS was, but the town's resident expert helped him devise a system of snow management zones — approximately 60 predefined plowing routes designed for maximum efficiency based on the town's geography and the available resources.

Now he's a believer. Combined with GPS tracking that shows where snowplows have already been, the system has cut employee overtime, reduced

FLICKR.COM/PHOTOS/WIDGETSANDSTONE

salt and fuel consumption, and increased productivity.

"During last year's extraordinary winter, we in the Boston area got seven feet of snow in 21 days," Nau said. "If we didn't have maps to make us more efficient and productive with the time we had to clear the roads, we probably would have lost roads and been unable to achieve our goals."

And it's not just snow removal. If a government service involves a time and place, GIS likely plays a part.

At the federal level, for example, the National Park Service uses GIS to manage the habitats of endangered plants and animals. Bighorn sheep prefer to graze in areas of open vegetation that are 3.2 kilometers from water and slope at an angle of 27 to 85 degrees. Park managers can use GIS to map all those variables and determine whether their park has enough suitable habitat.

"There's something special about a map and the ability to visualize and share information to inform decisions," Granberg said. "Our approach is trying to use our resources the best we can to produce the most beneficial outcome from this technology."

Another state that's using GIS in big ways is Maryland, whose MD iMAP website features more than 80 interactive maps and dashboards. Geographic Information Officer Barney Krucoff said his most prolific customers include the Maryland Emergency Management Agency, whose OSPREY system provides real-time situational awareness during storms and other emergencies, and the Department of Transportation, which works with the Department of Budget and Management to produce a capital budget map that shows where taxpayer money is being spent on items such as bridges, roads, schools and parks.

In Austin, Texas, the fire department and special events office use GIS, said GIS Manager Ross Clark. The former taps the technology to streamline hydrant maintenance and the latter to more efficiently document and enforce permit rules during the city's annual South by Southwest festivals.

"When people look at maps, they understand problems better, and when they understand problems better, they make better decisions about where to deploy their resources," Clark said.

HOW TO MAKE COMMUNITIES SMARTER

For Chris Thomas, the power of GIS lies not in a single application but in a suite of capabilities that give agencies a holistic view of the communities they serve. It's the ability to see from the air instead of the ground.

"Take a city like Rancho Cucamonga, Calif.," said Thomas, director of government markets at GIS software company Esri. "The city manager there pulls out his iPad every single morning and opens an executive dashboard to make decisions in real time based on [geospatial] information in areas like public safety, public works and law enforcement. He

GIS and open data: Complementary or competitive?

Geographic information systems represent one of the biggest public-sector technology trends today. Open data represents another. Chris Thomas, director of government markets at GIS software company Esri, said agencies exploring one should take advantage of synergies to exploit both.

"Everybody is excited about open data right now, and the most commonly downloaded data is spatial," he said.

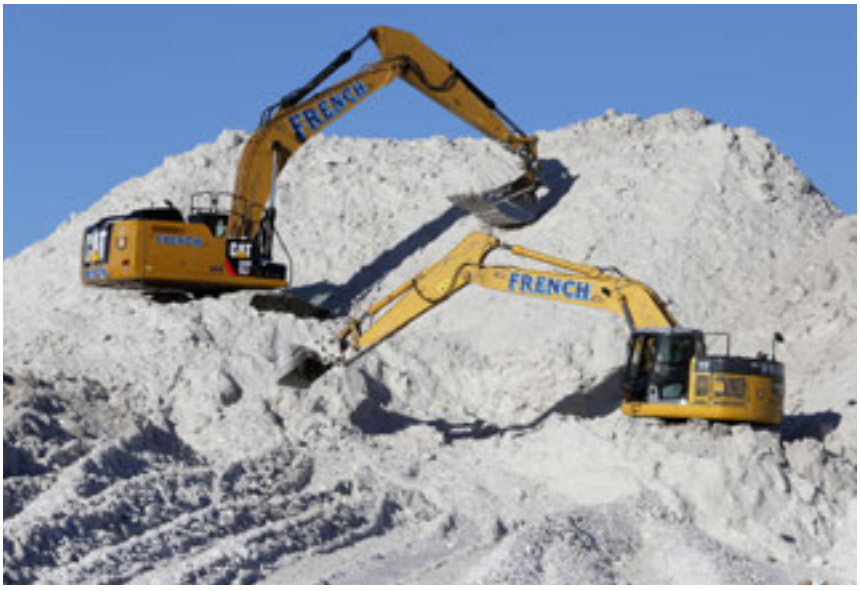
Government software company Accela is fusing GIS and open data at CivicData.com, an open-data portal that it offers free to any government agency that needs a platform through which to offer data to citizens.

"Open data has a lot of momentum right now, and when we have these huge datasets, we immediately start looking for ways to visualize the information," said Mitch Bradley, Accela's vice president of sales programs. "If I'm looking at all of the maintenance work orders that were done by a city over a period of time, for example, I can look at what the city has spent, what the maintenance costs are, what assets were impacted, etc. But I can also put all that information on a map that shows me where in the city we're spending our maintenance dollars on infrastructure versus not. That's really, really powerful, and it's something I never could have gotten from a spreadsheet."

In the hands of citizens and app developers, the opportunities for open geospatial data are equally significant. Before opportunities can be fully leveraged, however, agencies must answer some fundamental governance questions, said Barney Krucoff, Maryland's geographic information officer.

"When you're setting up this new open-data function, you have to ask how it relates to your older GIS function," he said. "Is it going to be merged with your GIS, for instance? Or are they going to be separate units using different systems and technology? There's a lot of data that could be on one side or the other. They overlap a great deal, so although I favor relatively few of them, I think you need to set boundaries."

– Matt Alderton



Framingham, Mass., officials overhauled their snow removal strategy by dividing the town into snow management zones based on geography and resources.

reads the local newspaper to see whether the city has been mentioned, then he turns to his iPad and begins looking at how to adjust."

In smart communities like Rancho Cucamonga, city managers routinely use data to make life better for the people who live and work in them.

It's a nice idea, but it doesn't happen overnight, said Thomas, who added that IT departments must take an integrated approach to GIS to fully exploit it. "You used to have a GIS strategy and an IT strategy," he said. "They shouldn't be separate anymore."

Whether your agency is a GIS amateur or veteran, you can make the communities you serve smarter by following these principles:

1. Start with good data. GIS is changing rapidly, but the need for data is constant. "The first thing is to make sure you have the data you need and that it's of a quality that's actually useful," Clark said. "If I were starting out, I would consider managed services for some of the data creation and management."

2. Adopt a platform. Esri is the market leader with its ArcGIS software, but it's not the only option. Bilderback uses Community Commons, which provides public access to community health data and visualization tools. Other options include Google's Fusion Tables and GE's Smallworld, which is designed for communications and utilities. Cloud-based solutions offer maximum flexibility and affordability and include Esri's ArcGIS Online, MangoMap, GIS Cloud, Mapbox, CartoDB and OpenGeo Suite.

3. Train analysts. If GIS is in the hands of IT practitioners who lack geospatial expertise, it's wise to connect them with experts who can help them think like a geospatial analyst. "Too often, an agency throws data at [IT people] and asks them to produce a map, but producing a map isn't the same as understanding GIS," Bradley said. "When we run into that, the first thing we do is find the local [GIS software] account rep and get them introduced. Because the more educated they can get on GIS, the more they'll be able to actually use it."

4. Find GIS advocates. IT departments can't build GIS in a vacuum. They need satisfied customers to be evangelists, said Alan Shark, executive director and CEO of the Public Technology Institute. "If you're frustrated by people not appreciating all that can happen with GIS, you need to build champions," he said. "The way to do that is to show and tell. Don't wait for people to ask; show them what can be done."

5. Prioritize. "There are so many opportunities," Sander said. "Picking things that are really valuable and that people care about — not just things that government thinks is cool — is a first step toward building support."

6. Be agile. "You're never going to check all the boxes or identify all the requirements upfront," Bradley said. "But if you can stand something up, show value and educate folks on what can be done, then the ideas will come and you can evolve."

7. Compare notes. "There are pockets of innovation around the country — cities, counties and states that may be the first to address a need and exploit it," Sander said. "And governments are usually really good about sharing with each other. GIS has come a long way; nobody needs to feel like they're starting from scratch."

8. Reuse and recycle. Mapping applications' many data layers makes building them uniquely time- and resource-intensive. The best strategy, therefore, is one that embraces efficiency. Clark recommends a "build it once, use it everywhere" approach to GIS development. "The goal is to reduce custom coding, which takes so much longer than reusing or recycling other apps," he said.

Thanks to challenges like budget constraints, stakeholder resistance and data silos, the path to GIS success is rarely easy. But "the value is there," Thomas said. "Whenever you're able to make data-based decisions in real time, as you can with GIS, it changes the dynamics of cost savings, efficiencies, productivities and public engagement.… And that's really exciting." •

AP IMAGES