

GOVERNMENT TECHNOLOGY®

SOLUTIONS FOR STATE AND LOCAL GOVERNMENT

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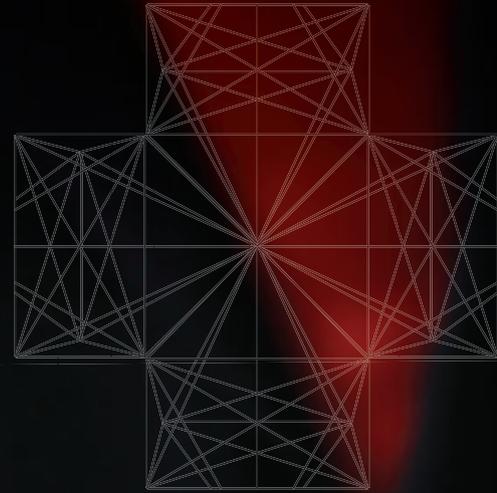
Can wearables be serious medicine?

Making IT Count:

Data drives better social outcomes

Healthy Tension?

Innovators spar with regulators

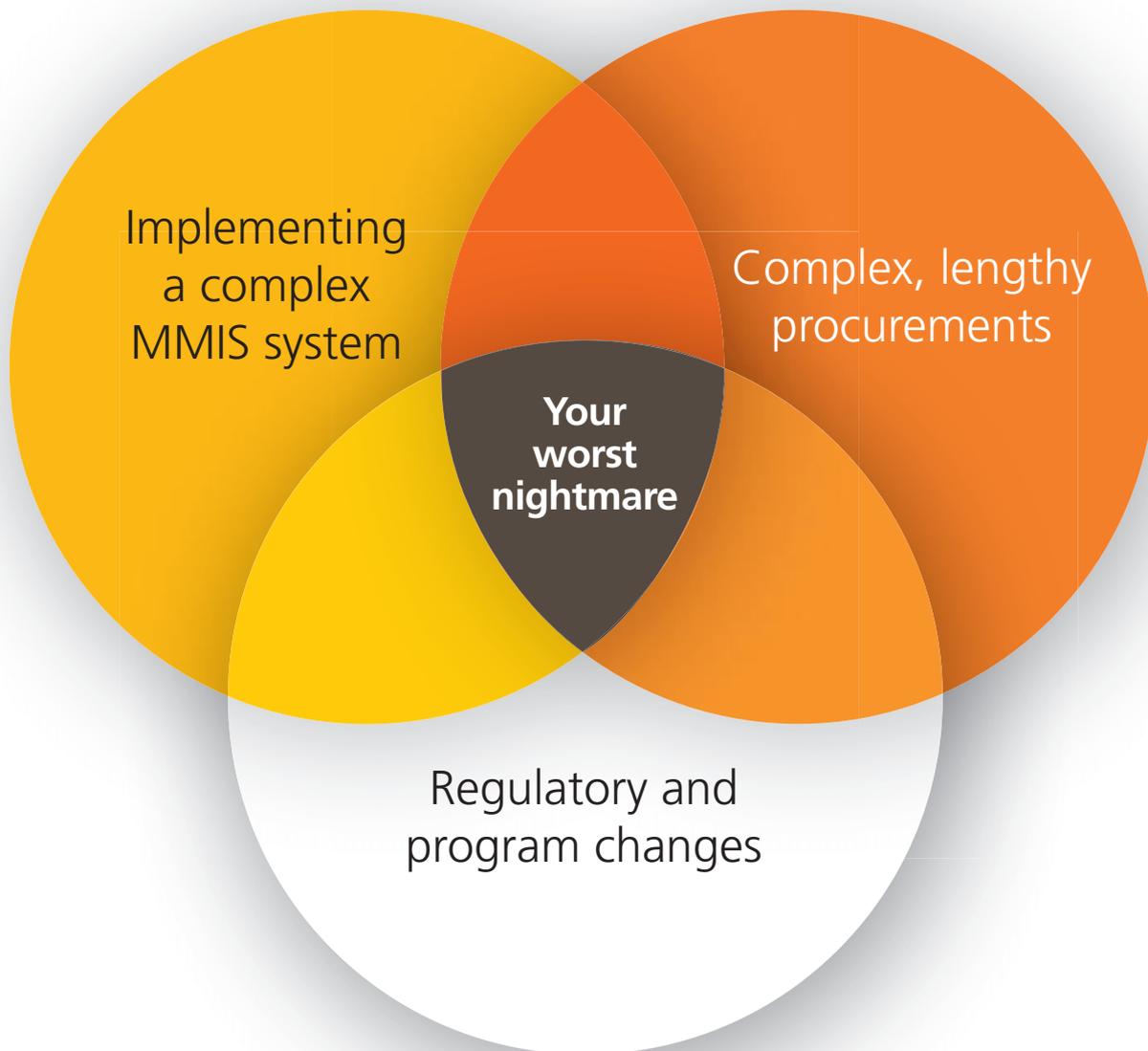


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Using social analytics to fight epidemics

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IN OUR NEXT ISSUE:

Beyond the Hackathon

Open data looks for its second act.

Profiles in Transparency

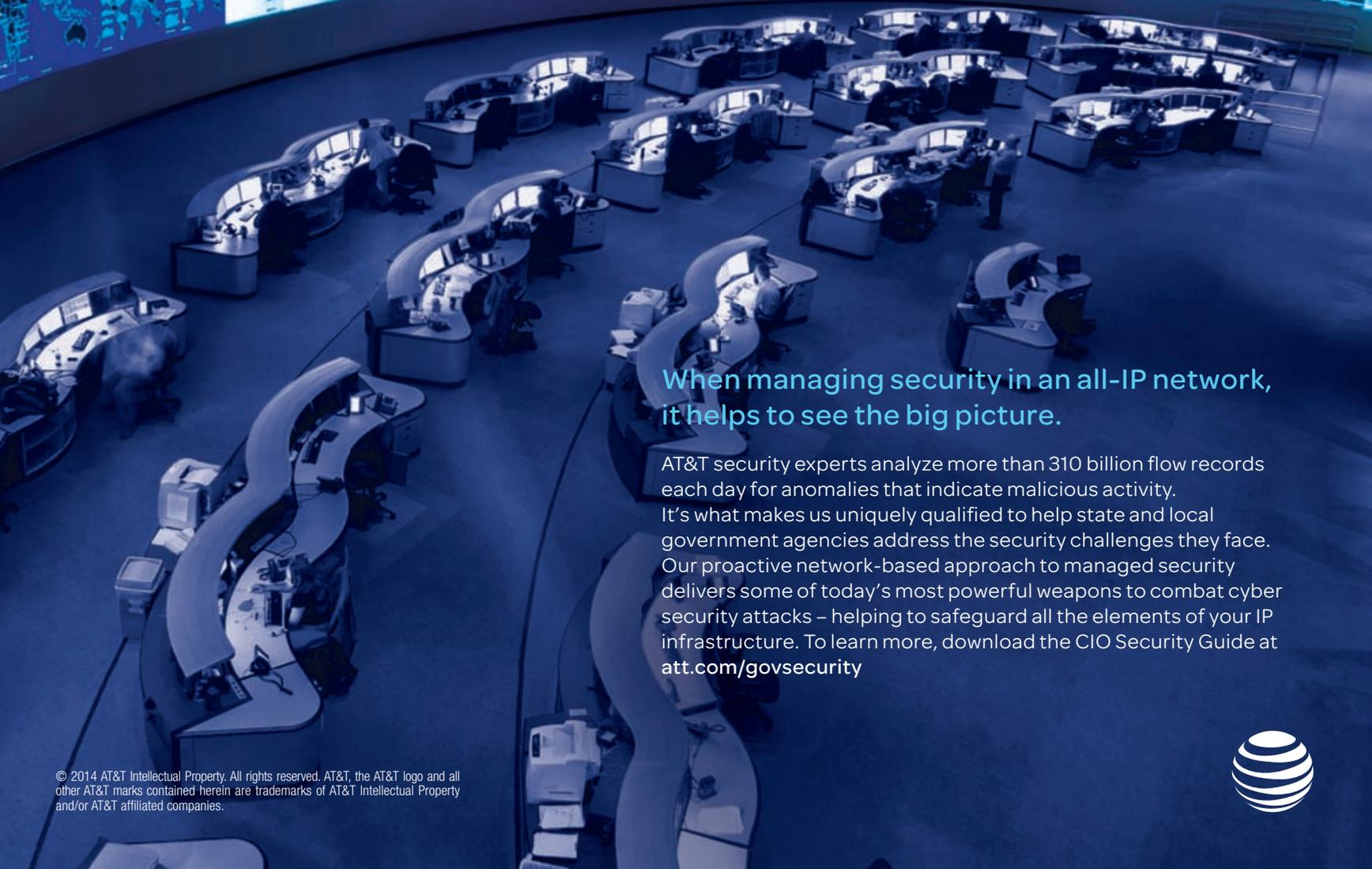
Sizing up open data efforts in cities of all sizes.

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Who has one, who needs one, and what do they do?



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Bigger Data and Smaller Dollars

Indiana has one of the nation's worst infant mortality rates. So, earlier this year, reducing the number of Indiana infants who die before reaching their first birthday became the initial goal of a statewide data analytics effort.

Indiana began crunching billions of rows of data from multiple departments and programs to identify root causes of the problem and improve outcomes for infants and children in the state. The initiative is backed by an executive order from Gov.

Mike Pence compelling agencies to share data with Indiana's Office of Technology and Office of Management and Budget (OMB). The data is fed into sophisticated analytics software running in a newly created

Management and Performance Hub situated in the basement of the state Capitol.

As this issue of *Government Technology* went to press, Indiana officials were preparing to release formal findings from the initiative. Speaking at an industry event a few months ago, Indiana OMB Director Chris Atkins said the project has uncovered distinct at-risk populations and risk profiles. Those insights were helping officials target program resources more effectively. The state, he added, is creating dashboards

that will let managers drill down and manipulate data using a variety of filters.

Ultimately the plan is to equip child welfare caseworkers with mobile analytics tools that will help them assess the risk for specific cases and determine the most effective course of action, said state CIO Paul Baltzell in an interview earlier this year. He also expected the analytics effort to expand to other areas like improving the safety of older children and fighting recidivism.

Analytics is one way technology is improving the health and welfare of our communities — which is the focus of this month's issue — and we expect this sort of “big data” to become a more common and more powerful tool for HHS programs in the future. With states and localities searching for ways to contain costs and improve the performance of these programs, using analytics to make better decisions offers a compelling proposition.

As Atkins pointed out, revenue growth is flat for most governments, but the amount of data available to them is expanding exponentially. Indiana is intent on putting that growing resource to work, as are an increasing number of other government organizations.

“We have a billion megabytes of data. We need to use it effectively,” he said. “That’s where our biggest opportunity lies.” **GT**

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“Analytics is one way technology is improving the health and welfare of our communities.”

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Video as Public Record?

A mass request of police videos has law enforcement agencies around Washington state **rethinking their dash- and body-cam programs**. In September, an anonymous software developer began making public records requests to most police departments in the state, asking for copies of “any and all video” on file. The request was viewed as a burden for most departments, raised questions of privacy and transparency, and led to the cancellation of at least two body-cam programs. But on Nov. 20, the requester’s persistence also earned him partner status with the Seattle Police Department, which will use his expertise to hone its evolving video collection, retention and distribution policies.

“What I would like to have happen is that video cameras be mandated for law enforcement, both in-car and body camera,” said the requester, who asked for anonymity so strangers wouldn’t show up at his house and police wouldn’t harass him. “And what I would also like is that the Public Records Act become the publishing act.”

“While increasing cloud access may yield some cost efficiency, I’m not optimistic about ‘government as a platform.’ Technologies that abet civic input are good in theory, but once such input is piped through a technological conduit, it must then go through a bureaucratic filter. That’s where a resulting bottleneck will only grow as throughput generated by technology runs into procedural, legal, cultural and personal (personnel too) problems of bureaucracy.

fliieger in response to 4 Trends to Watch in 2015

Wi-Fi on the Go

Ubiquitous information, communication and connectivity. These are the lofty ambitions propelling a new Silicon Valley startup to rethink **Internet access using public transportation**. João Barros, the former national director of the Carnegie Mellon Portugal program, and Susana Sargento, a professor at Portugal’s University of Aveiro, have launched Veniam, a startup that harnesses public transportation fleets to deliver Wi-Fi access to citizens. The service hopes to be an enabler for the Internet of Things and a solution for affordable Internet access.

Two years of research to create the technology has culminated in a successful deployment in Porto, Portugal: 60,000 users access Internet that’s delivered on a fleet of more than 600 vehicles. A bus passenger — or anyone within range of an equipped vehicle’s signal — can receive free Wi-Fi access through Veniam’s on-board units.

**4.9
BILLION**

The number of Internet-connected devices predicted to be online this year. (And that’s just the beginning: The number is expected to reach 25 billion by the end of 2020.)



“Most urban revitalization initiatives encompass broadband deployment strategies that include institutional stakeholders and higher-income citizens. Chicago Smart Communities is one of the few initiatives that’s focused on an inclusive economic development imperative. Providing broadband access to underserved communities isn’t enough. Closing the digital divide should facilitate small business growth, workforce development and improved educational outcomes. Blacks and Latinos collectively compose over 60 percent of residents within Chicago. ‘Moving the needle’ in diverse communities will help improve the tax base for all Chicago residents. Furthermore, cross-cultural collaboration among empowered communities will result in unprecedented innovation.

Todd Q. Adams in response to How Chicago is Narrowing the Digital Divide

WHO SAYS?

“Policymakers can’t bury their heads in the sand and pretend this technological revolution isn’t happening, only to wake up years down the road and try to micromanage a fast-changing, dynamic industry.”

www.govtech.com/quote-jan15

MOST SHARED STORIES

2014 Digital Cities: Winners Focus on Innovation, Boosting Transparency and Privacy **668 SHARES**

Internet of Things Helps Buffalo, Other Cities with Snow Removal **510 SHARES**

Former Arkansas CTO Claire Bailey Continues at Compuware **347 SHARES**



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Anonymous ‘Requester’ Turns Police Body Camera Programs Upside Down **5,688 VIEWS**

Internet of Things Helps Buffalo, Other Cities with Snow Removal **3,686 VIEWS**

2014 Digital Cities: Winners Focus on Innovation, Boosting Transparency and Privacy **3,726 VIEWS**

Is Microsoft’s Newest Security Flaw the Next Heartbleed? **2,584 VIEWS**

Is Ride Sharing’s Next Stop a Bus? **1,846 VIEWS**

4 Trends to Watch in 2015 **2,107 VIEWS**

“This is a true public policy dilemma. Information created by government belongs to the public, and the public has a right to see it. But releasing the information to the public creates real burdens on governmental entities. The release of confidential information is a criminal offense in many places. It’s expensive to have people review the information and make redactions. Technology can help, but there’s no technology that absolves governmental entities from their responsibility to protect confidential information.

imabattle in response to Anonymous ‘Requester’ Turns Police Body Camera Programs Upside Down



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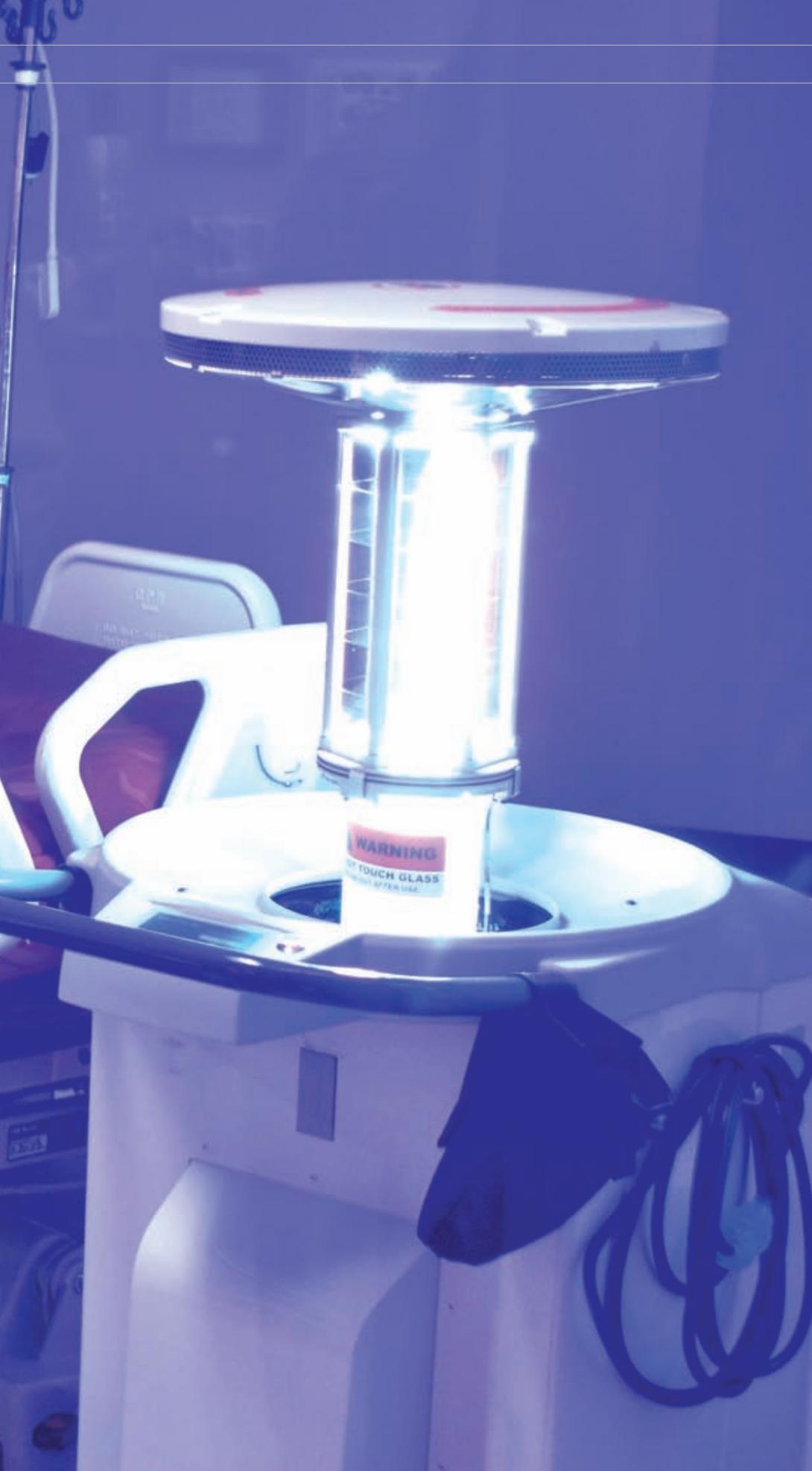
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Machine Helping Man

Robots are being used more and more often in the health-care field. Remote-control machines with monitors for “faces” connect patients with remote providers and allow doctors to collaborate across the miles, while other robots are being programmed with the capacity for human emotion themselves, in the hopes that they can play a role in caring for the sick.

This germ-zapping robot from San Antonio-based Xenex uses pulsed ultraviolet technology to disinfect hospital rooms to help control infection. The machine is placed beside a hospital bed, filling the room with flashes of blue light emanating from a column of UV-C lights. The process takes between five and 15 minutes. In response to the recent Ebola outbreak, the company developed specific protocols for treating Ebola-contaminated areas, as well as the personal protective equipment worn by health-care workers during treatment.



An Argument for Analytics

Tips for getting started with analytics in government and making the case to leaders.

Let's assume you are the CIO of a public enterprise — one typical in that it is led by a committed but financially stressed elected official. You can see through the morass of new technologies great opportunity for the jurisdiction, but not one without startup expenses and changes in IT governance. What might your message be as you approach the boss and other agency heads to make your case for how mobile tools, data mining and cloud software can be combined to improve responsiveness? It might include the following elements:

The Value Proposition. We now have the tools to dramatically enhance public services. Through prediction, we can solve problems before they occur, redirect resources to where they make the most impact, hire and promote the best people, help those citizens most in need and save the most money. Technology advancements have produced startling breakthroughs.

The Team. A leader with strong executive support is critical, because a successful data operation will require cooperation from throughout the enterprise. An executive order from the relevant elected official is often the easiest and most expedient way to begin. The leader should bring a creative, generalist lawyer in from

Start with key agencies to build enthusiasm and validate the model, rather than seeking a blanket mandate.

the beginning to work with agency lawyers around data use. Someone with budget authority is also essential to help calculate and justify the savings realized through analytics. A working group with a representative from each agency should meet regularly to socialize successes.

Piloting. Start with key agencies to build enthusiasm and validate the model, rather than seeking a blanket mandate. If the analytics team demonstrates the value of data by successfully solving problems, the pilot agencies will become the advocates of data. The team should work with the agencies to identify a problem statement first, collect the data second and identify gaps in the data third. This approach is far more effective than ordering all data to be shared or included in a central place before any value is proven.

Transparency and Security. Include transparency about the policies for data use and access from the beginning. Of course, protecting privacy and data confidentiality is crucial, but one needs to be open about the related policies. Data security requires a range of rules — including deletion of personal identifiers, archiving and access — so that field workers and others throughout government will

have access to the data needed to solve problems with analytics.

Funding. Discretionary funding enables a faster start. In some cases, this may be through philanthropy. If that funding is not available, including a leader with budget authority on the project team is essential, like the Office of Management and Budget director. To justify an investment, look at it as a way to more effectively spend existing money, rather than as a new expenditure. As successful use cases emerge that demonstrate efficiency and savings, making this argument will be easier.

As we have observed governments starting a data office or team, these keys to success have remained constant across geographies and levels of government. **GT**

Stephen Goldsmith is a professor at Harvard Kennedy School and director of the Innovations in Government Program and Data-Smart City Solutions. The former mayor of Indianapolis, his latest book is *The Responsive City: Engaging Communities through Data-Smart Governance*.



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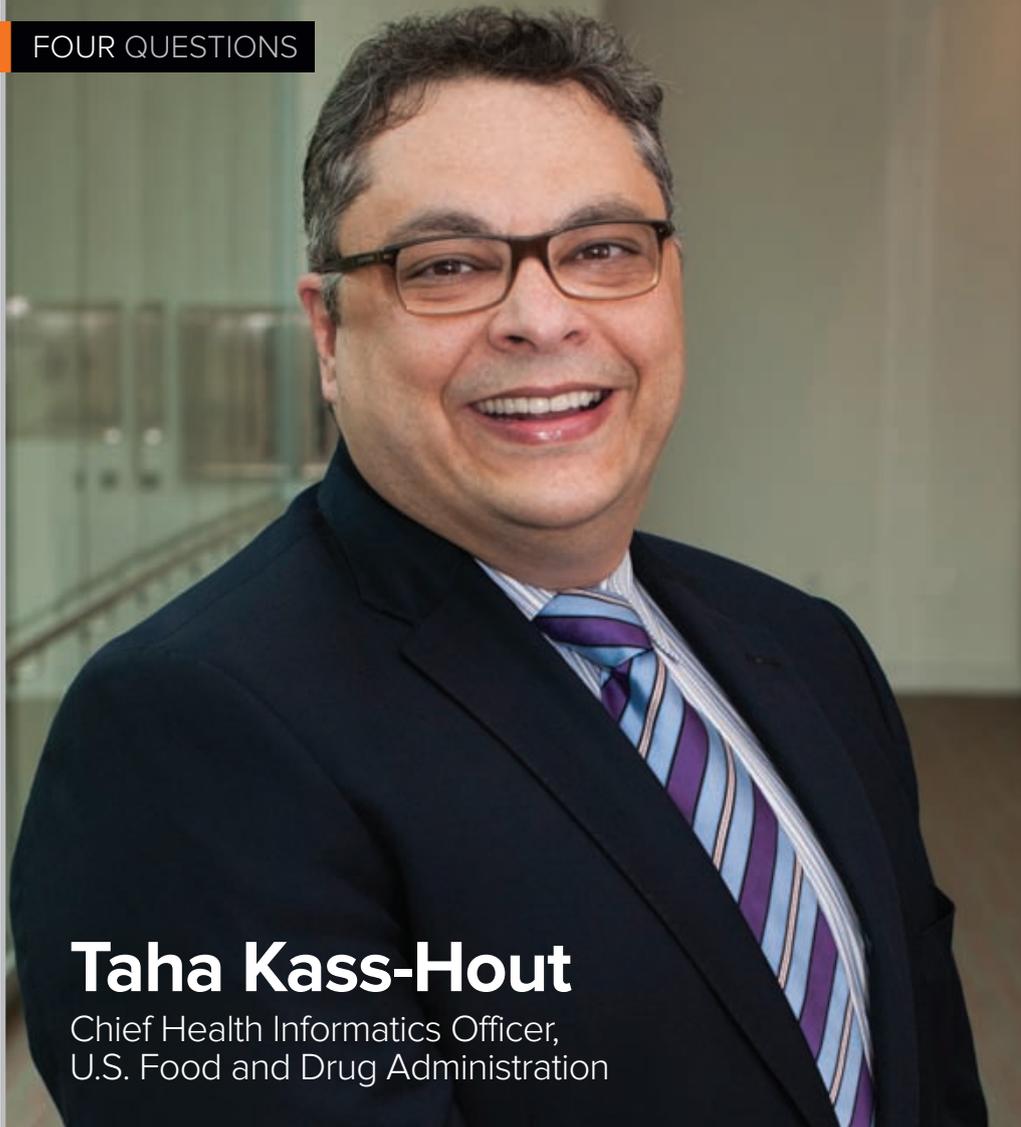


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Taha Kass-Hout

Chief Health Informatics Officer,
U.S. Food and Drug Administration

*Even skeptics about the responsiveness of an organization as large as the FDA have had to admit that the agency's first chief health informatics officer, **Taha Kass-Hout**, has shaken things up with the creation of the Office of Informatics and Technology Innovation (OITI). Kass-Hout came to the FDA in March 2013 from the Centers for Disease Control and Prevention, where he had helped with the adoption of cloud computing. At the FDA, Kass-Hout's first endeavor was the creation of openFDA, an initiative launched in June 2014 to make it easier for Web developers, researchers and the public to access public health data sets collected by the agency. In a recent interview, Government Technology asked Kass-Hout about the creation of openFDA.*

1 What was the impetus behind openFDA? Previously it was almost impossible for developers and researchers to easily access the data. Also, the Freedom of Information Act Office was getting lots of requests, many of them asking for the same things. If you wanted to look at acetaminophen over time, for instance, you had to download all these separate files and stitch the data together and de-duplicate it. We talked to some developers who said it had taken them almost two years just to construct the data. So the data was public but not easy to

access. We wanted to make it easier and more transparent, both for the industry to submit information and for the consumers of the information to access it.

2 What were the next steps and some decisions you had to make? When we thought about openFDA, we saw it as sort of the sandbox for how to deal with all the other problems we have to deal with. We have a wide variety of data types, from genomic to regulatory to clinical research. I engaged my team, primarily FDA employees, but we brought in a small company

from Silicon Valley [Iodine]. We chose to use a search-based application program interface (API) that gives developers the ability to search through text within the data. The open source code and documentation are shared on GitHub. We hope this will encourage the industry to move to this API and big data approach. At the same time, we wanted to stop at the API and not force one set of applications or another on people. This method allows them to build their own applications on top of openFDA, giving them flexibility to determine what types of data they would like to search and how they would like to present that data to end users. This enables a wide variety of applications to be built on one common platform.

3 What types of data sets have proved most interesting to developers so far?

In public meetings with people interested in getting data from FDA, the first choice was adverse-event reporting of drugs. So that was the first data set we made available — 3.8 million adverse event reports received between 2004 and 2013. You can search by a generic name, brand name, active ingredient, inactive ingredient, etc. The second was recall data; the third was device-adverse events, and the fourth was labeling for more than 65,000 products. So it is almost like this trinity: adverse events, recalls and labeling. Through engagement with the community, we are thinking about adding other data sets.

4 Do you think the creation of the OITI can spark new ways to think about things in the FDA?

My office, the OITI, is focused on where innovation should take us, looking at data standards and knowledge management issues. But I also work closely with the CIO who runs the Office of Information Management. So the innovation operation has ties with FDA centers and offices, as well as with industry and the development community, to allow us to deliver high-impact solutions that can help us achieve our mission. **GT**

— **David Raths**, Contributing Writer



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innovations to improve cities and the lives of their low-income residents.



Doctors aren't necessarily clamoring for patients' Fitbit data, but wearable technology may just be poised to transform medicine.

BY COLIN WOOD

AMERICA IS DANGEROUSLY FAT.

The nation's obese population puts itself at greater risk of coronary heart disease, diabetes, stroke and cancer, while contributing \$190 billion in annual health-care costs to an increasingly unsustainable system. Starbucks buys more than 270 million pounds of coffee each year, yet still manages to spend more on health insurance — about \$300 million annually. America's health-care burden drives up prices — General Motors adds \$1,400 onto the cost of each vehicle sold to cover its own health-care costs — and puts the nation at a competitive disadvantage, compromising the opportunities of future generations.

Today's wearable technology won't solve America's health problems, but a single irresistible device could be enough to heighten health awareness and transform America's image and culture, just as the iPhone kick-started a worldwide technology obsession less than a decade ago.

America wants to be healthy. Consultancy group PricewaterhouseCoopers projected that the personal health and wellness industry will grow to \$452 billion by 2015, while others expect the sector to reach \$1 trillion by 2017. The wearables industry alone is expected to reach \$19 billion by 2018. As often seen in nascent industries, wearable tech is now waiting for a leader to emerge who can show the world what's possible, and today there are thousands of researchers around the world applying their knowledge of technology to transform health care.

COULD
BETTER
HEALTH
BE ALL
IN THE
WRIST?

For personal health and health care, the potential impact of wearable tech is massive, said Michael Matly, principal at Montreux Equity Partners. Matly's firm invests in late-stage companies in the health-care sector, but it hasn't invested in wearables yet — it's still waiting for the right product to come along. And new devices and apps seem to come along each week.

Sensor-laden clothing is produced by companies like Hexoskin, AiQ and Glofaster. There are dozens of wristband activity trackers, the most popular coming from Fitbit and Jawbone, with newer entries coming from Microsoft and Nintendo. Samsung and Apple are pushing smartwatches with marketing that is increasingly oriented around the wrist. Spire produces a respiratory monitor, and several groups are developing wearable glucose monitors. There are smart diapers (Pixie Scientific), smart glasses (Google), smart jewelry (Cuff, Logbar), two kinds of smart hand sanitizer dispensers (HyGreen, BioVigil), smart headphones (Bragi) and smart stickers (MC10). There's even a smart wristband to shock the user into behaving correctly (Pavlok). The consumer wearable market is already so saturated that makers have begun catering to other species (FitBark, Whistle, Voyce).

"I think you're starting to see trends where we are taking more ownership in our health and wellness," Matly said. "So risk and cost are being transferred from employer to employee. Right now if you get sick, you're pretty much responsible for financing a solution and you shop for physicians now the way you shop for phones. There is an increase in growth in the consumer-oriented health and wellness sector and I think that becomes apparent when you look at the wearable tech space." Experts predict that 150 million wearable devices will be in use by 2020.

The wearable tech industry is exploding, but it has at least one big problem. The value of wearables is confusing. There was a point in recent history when it no longer made sense not to own an Android, BlackBerry or iPhone. Engineers kept adding functionality, the utility-to-cost ratio went off the charts, and almost everyone who didn't already own a smartphone bought

one. The same cannot yet be said of any wearable device. Today's wearables are enticing to early adopters, they are novel, and in specific applications they can provide some narrowly defined value, but there is no wearable device that can change the lives of the general population in the expansive way that smartphones have.

One effect of the wearable industry's ambiguous role in the consumer's life is that device retention is relatively low. The winners in the wearable device industry will be determined by who can best harness the subtleties of human behavior, Matly said. "If you look at digital scales, the retention with those companies after a year is 80 or 90 percent," he said. "Is it because the scale is giving better information than your wearable is? Probably not. I think it's because you don't have to do anything. You get out of your shower and step on your scale and you leave."

Daniel Matte, leader of wearable tech research at Canalys, said attitudes toward wearable devices are in many ways similar to how people view gym memberships. "The perception is that that device may end up in the drawer after three months, after six months," Matte said. "These activity trackers in particular, people buy them as part of a New Year's resolution to lose weight or just to be more active, more healthy."

The wearable market is small today with fewer than 10 million devices, but it's growing fast and changing, said Matte. "We think smartwatches are the next big segment in consumer technology, the biggest since tablets," he said. "We're trending toward smartwatches because users only want to wear one device on their wrist, so there's going to be a convergence of technologies. In time, smartwatches will come down in price to the point where it leaves very little room for the basic bands to compete. I think it will be very similar to smartphones encroaching on basic phones."

Apple and Google must have noticed the fragmented and confusing space that wearable tech inhabits in the market, because they've both ramped up their investments in health sensor tech and launched mobile apps (Health and Fit, respectively) that act as central

dashboards for wearable sensor data. If done correctly, apps like Health and Fit could impact health on a global level, especially since smartphones pass the passive-use test as most people keep their phone in their pocket or purse most of the time, making additional wearables viable but not essential components in the health data ecosystem.

Encouragement by employers further drives wearable adoption forward. In 2013, CVS Pharmacy infamously instated a policy that penalized its workers with a \$600 annual fee if they failed either to quit smoking or to disclose their body weight. Though the policy was controversial, the company is far from being an outlier.

The *Workplace Wellness Programs Study*, published by the U.S. Department of Labor (DoL) in 2012, found that about half of U.S. employers with 50 or more employees offer workplace wellness programs that typically include things like clinical screenings, preventive intervention and health promotion benefits like onsite vaccinations. According to a Towers Watson survey, about 22 percent of companies with wellness programs use financial incentives structured as penalties, like CVS does. The DoL study concluded that employer wellness programs are both sustainable and clinically meaningful as a way to curb "the current epidemic of lifestyle-related diseases, the main driver of premature morbidity and mortality in the United States."

Despite criticism that such programs are potentially discriminatory and privacy-invading, many are willing to accept such monitoring if they believe it can benefit them personally. For there's no quicker way to abate man's outrage than to hand him a check. A 2014 PricewaterhouseCoopers report called *The Wearable Future* found that price is the leading factor prohibiting wearable adoption, and offering wearables through employers boosted adoption rates greatly. About 70 percent of consumers said they would wear employer-provided wearables streaming anonymous data to a pool in exchange for a break on health insurance premiums.

The report also found that wearable makers have a great hurdle to overcome in changing the public's ambivalence toward

the technology. “If I head out the door in the morning and leave my fitness band at home, I’m not going to turn around to go back and get it. If I leave my phone at home, you bet I’m going to go get it,” said Jeff Malmad, survey respondent and Mindshare employee. “For wearable products to take off,” the report concluded, “they will need to carve out a distinct value proposition that a phone alone cannot deliver.”

That wearables have not yet carved out a distinct value proposition is largely because we are in the earliest days of the technology, said Lisa Suennen, managing partner of Venture Valkyrie Consulting. Wearables for health care are coming next.

“I don’t think there have been enough entries [to make an impact],” Suennen said. “Most of them have been heart rate monitors for arrhythmia, eye rhythm is one instance — really good products, but they’re focused on one problem and there have not been a lot yet that focus on a broad range of medical conditions. But I think there will be.”

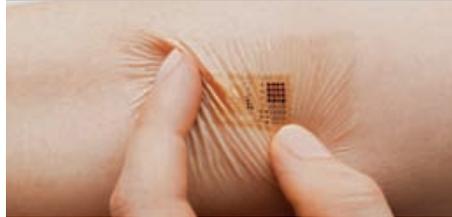
Suennen estimated that within the next five to 10 years, wearable devices will begin to prove their use in health care. But first, those products will need to demonstrate that they work effectively and reliably, they must go through clinical trials, and be placed in the hands of doctors, because most people won’t use medical-grade products without a doctor’s recommendation, Suennen said.

Most of today’s wearables are too whimsical to be taken seriously by the medical community. Doctors don’t care how many steps their healthy patients are taking, Suennen explained. They want an effective method for monitoring at-risk patients, so they can prevent readmission or catch a problem before it becomes a bigger problem.

In these early days of wearable research, there are many promising contenders vying to become the next big thing in health care. MC10 manufactures bendable, stretchable electronics that allow the user to affix multiple sensors to their body as they would a Band-Aid.



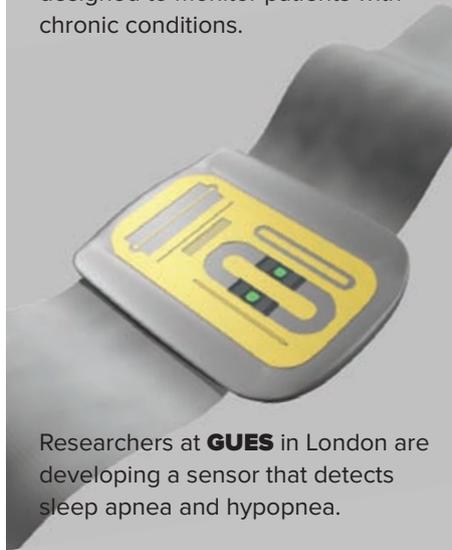
WHAT'S NEXT FOR WEARABLES?



Described by creators as “mechanically invisible,” users of **MC10** can jog, swim or shower while wearing it. The technology lets doctors monitor patient cardiac activity remotely, as well as muscle activity, eye movement, temperature and acceleration.

A group of Pennsylvania State University researchers called **Atoptix** is working on smartphone-based sensing technology to monitor blood and tissue.

Biovotion developed a wearable, smartphone-connected device designed to monitor patients with chronic conditions.



Researchers at **GUES** in London are developing a sensor that detects sleep apnea and hypopnea.

The **Vitaliti** health monitor is a cloud-based mobile platform with wearable devices for monitoring 10 health metrics, including heart rate, blood pressure and heart anomalies.

MC10 is unique because unlike other wearable electronics, the device integrates intimately with the human body and is “as soft as human skin,” said Yonggang Huang, an engineering professor at Northwestern University. Huang has spent the past eight years developing the technology behind MC10 along with John A. Rogers at the University of Illinois.

“It’s like a children’s tattoo printed on the skin and you don’t feel its existence and it doesn’t interfere with your daily activity in any way,” Huang explained. “You can even take it swimming, go jogging, play all kinds of contact sports. We call them mechanically invisible. That’s a big difference with wearable electronics.”

MC10 could allow physicians to monitor their patients remotely, wirelessly, 24 hours a day, Huang said. MC10 can monitor a patient’s EKG and send an alert to the hospital if something changes. It can also monitor muscle activity and eye movement, temperature and acceleration.

In October, Nokia announced 11 finalists to its Sensing XCHALLENGE, a contest in which the communications company would award \$2.25 million to developers of breakthrough medical sensing technologies. A similar competition, called the \$10M Qualcomm Tricorder XPRIZE, would reward research teams developing technologies that pull personal health technologies from the realm of science fiction and place them in the hands of patients.

Atoptix, a research team at Pennsylvania State University, is developing smartphone-based blood and tissue sensing technology. Biovotion developed a wearable, smartphone-connected device designed to monitor patients with chronic conditions. Research team DMI of Cambridge, Mass., is developing a sensor that could run hundreds of clinical lab tests using a single drop of blood. London-based research team GUES is developing a sensor that detects sleep apnea and hypopnea (shallow breathing). The cloud-based Vitaliti health monitor provides a mobile platform and wearable devices for monitoring 10 health metrics. There are health monitoring projects under way by Danvantri, Aezon, Dynamical Biomarkers Group, Hemolix, Final Frontier Medical Devices, MESI Simplifying

Diagnostics, Scanadu and dozens more research teams from around the world.

Many see wearable tech encroaching on health care within five to 10 years, but Arun Mathews says that day may come sooner. Mathews is the chief medical information officer at Medical Center Hospital in Odessa, Texas, where he assisted in the transition from paper to electronic medical records (EMR). Though wearable tech is still in the concept phase in his facility, the value in harnessing the quantified-self and quantified health care is hard to ignore, Mathews said.

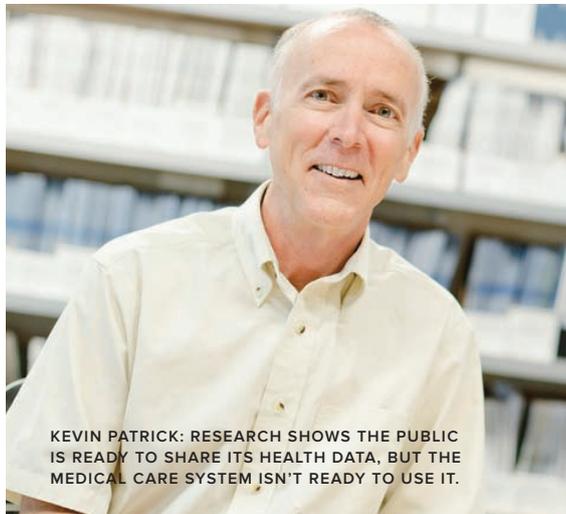
“The part that really interests me as a clinician is the use of analytics to power advanced clinical decision support,” Mathews said. “We’re working with a third-party group to build some probabilistic computational logic to help identify patients that are high risk for readmission using our data and [scoring them] and once we identify those patients, adjusting our process while the patient is in the hospital to rapidly address things that they would need following discharge. And we’re tracking those outcomes to see if our analytics tool is in fact impacting our readmission rates as a result.”

Those who make conservative estimates about wearable adoption in health care may be (justifiably) looking at regulatory risk and institutional barriers in medicine as the main impediments to adoption, Mathews said. “The consumers are pushing it, and if all it takes is one or two very compelling applications of something like HealthKit, then health-care policymakers will start to sit up and take notice,” he said. “It’s not right around the corner, but I would say within the next five years we will see a compelling use of HealthKit data somewhere in the EMR.”

Wearable tech has the power to transform today’s sick-care model to one of high-quality preventive medicine and wellness maintenance, Mathews said. “The simple fact is, you give people the data in terms of how sedentary they are and behaviors start to change, and that’s pretty darn powerful. Then you can apply gamification principles into it and sustain some of these changed behaviors. In my

view, even though I like the idea of using wearable tech to address acute problems and monitoring post-failure, I think pre-failure and keeping people healthy is where wearable tech has some real potential.”

Just how wearable sensor data can be integrated into health care is an area of budding research. Kevin Patrick, a professor at the Department of Family and Preventive Medicine at the University of California, San Diego, and principal investigator of the Health Data Exploration Project, is one of those investigating the degree to which companies, health-care institutions, and technology users are prepared to use their health sensor data to make the American population healthier.



KEVIN PATRICK: RESEARCH SHOWS THE PUBLIC IS READY TO SHARE ITS HEALTH DATA, BUT THE MEDICAL CARE SYSTEM ISN'T READY TO USE IT.

Through interviews and surveys, the Health Data Exploration Project has in its earliest stages emboldened researchers by revealing a public that is ready to share and use personal health data, though not without qualification. There are prevalent concerns about data privacy, ownership and access. Those issues will be addressed in time, but the largest barrier to adoption may be a lack of institutional readiness.

“The last thing your doctor wants to see during an eight-minute visit is all your Fitbit data combined with a bunch of other things that you might have,” said Patrick. “The medical care system right now is not really set up to address or deal with this.” What’s promising, however, is that there is a lot of interest on all sides in making the most of the data that will inevitably be generated, Patrick said.

“There’s more to managing diabetes than measuring an HBA1C periodically and asking people whether or not they took their medication and whether or not they were physically active over the last few months,” Patrick explained. “It really is important to know how active they were, and — if they weren’t — what were the barriers, what were the problems, so health care can benefit from a lot of the insights that can come from a lot of these wearable devices. There’s just a lot of work right now to figure out how to make that happen.”

Getting a lot of people to monitor and share their data across populations is critical to making this whole thing work, and Patrick says it will happen one day. “We may consider it odd in the future if people aren’t using these kinds of devices,” he said. “There was a time when glasses were not very common or contact lenses didn’t exist and the first people who wore spectacles were probably considered oddballs, but now we just take them for granted. In all likelihood, I think that is going to be the direction we take as a culture in certain areas.”

Insurance companies have scared people to the point where they’re afraid to share data because they don’t want to be penalized, Patrick said. About 90 percent of those surveyed said they would want their health data to be shared anonymously. Whether data sharing is done anonymously or personally, collective data sharing holds the potential to unlock insights of untold prosperity.

“Every year, there are about 2.5 million deaths in the United States and we can explain about half of them as far as what the cause of death was,” Patrick said. “We can say somebody got cancer or had a heart attack or whatever, but heart attack and cancer were just the cause of the death — something caused the cancer, something caused the heart attack — smoking or obesity or whatever. We think opening up a bit more of these data and letting people look at them across demographic groups, by age groups or by location might actually help gain insights that save lives.” **GT**

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By David Rath

DIGITAL HEALTH DILEMMA

Regulators struggle to keep pace with health-care technology innovation.

Federal health-care regulators walk a fine line between protecting the public's health and fostering innovation in a huge sector of the nation's economy. But because the pace of new product development in health-care technology is accelerating, finding that balance has become more difficult as the distinctions between medical devices, software and consumer applications blur. Health IT firms ranging from two-person startups to Fortune 500 companies are urging Congress and federal agencies to clarify and simplify several aspects of regulation and to more frequently update their guidance.

There are two key areas where business leaders argue that laws and regulations are impeding innovation: the Health Insurance Portability and Accountability Act (HIPAA), which protects the privacy and security of patient data; and the U.S. Food and Drug Administration approval process, which software companies say is too ambiguous about which types of software will be regulated.

HIPAA, first signed into law in 1996, was updated in the HIPAA Omnibus Rule required by the HITECH Act of 2010. The update strengthened privacy, security and enforcement provisions, but many people designing mobile health applications say it did not simplify policy and technical language. Some complain that instead of specifying how to comply, the regulations offer only high-level recommendations. The U.S. Department of Health and Human Services (HHS) refers developers to other resources such as the National Institute of Standards and Technology (NIST) for recommendations on how to encrypt data, for instance.

Dr. Divya Dhar is the CEO of Seratis, a Philadelphia-based startup that has created a secure patient-centric mobile messaging application for doctors, nurses and other health-care providers. The application also involves some data analytics. She stresses that in one sense, HIPAA rules enable innovation. “The fact that there is HIPAA means that a secure messaging service like ours is important,” Dhar said. “Without it, people would just use things like iMessage and Android SMS.” On the other hand, she says, HIPAA can hinder innovation. “Because data gets locked in, you are unable to use it for the big data analytics piece,” she said. “Even if a patient came to you and wanted to share that data, you would have to go through several hoops to make that happen. The patient should have access to their health data and should very easily be able to say who else they want to share it with.”

Dhar said her company had to hire attorneys to make sure its solution complied with HIPAA policies when providers put it in place. “The policy piece is hard to decipher on your own, and we worked with a very good firm, but obviously that is extremely expensive.” App developers



Dr. Divya Dhar
CEO, Seratis

“The patient should have access to their health data and should very easily be able to say who else they want to share it with.”

say the law should be written so people can implement it without having to hire lawyers to understand its basic elements.

In fact, one startup, Atlas Health in Nashville, Tenn., has built its business model around helping other startups meet HIPAA requirements. “The company’s founding was inspired by my own experience as an independent software developer working for small health-care organizations — people with ideas for the next big mobile health app,” said Philip Misiowiec, president of Atlas Health. “I realized areas of HIPAA are really murky. You have to spend a lot of time digging through it. It is like reading an encyclopedia.” There are high-end consulting groups that can solve HIPAA woes, but they are expensive, he said. “A two-person company developing a mobile app doesn’t have that kind of money, so that is where we come in.”

Misiowiec said he has made several recommendations to the federal Office of the National Coordinator for Health IT (ONC). “First, they should develop a simplified guide that says here is how HIPAA

applies to you, the possible use cases and what you need to do — with specific guidelines, including bringing what NIST recommends into that same document.” Second, he said, the ONC should create and maintain an online community for developers to share information. “If you look at the developer community, there are a lot of great resources like Stack Exchange,” said Misiowiec. “Just having a resource to post questions would be helpful.”

Morgan Reed, executive director of ACT, the App Association, which represents approximately 5,000 app companies and IT firms, said there is a huge disparity in the quality of user experience in the applications available in health care and in other sectors of the economy. “It’s not as though there are no good ideas out there, but health care is often where good ideas go to die,” he said. At least part of the reason involves regulatory barriers people face when developing apps in this space.

One area Reed wants to see Congress and HHS revisit is whether cloud service vendors should be required to meet HIPAA requirements as “business associates” of health-care providers. “If you are merely using a cloud service as a waypoint as data moves on to a care team and it is end-to-end encrypted, why require business associate agreements?” Reed asked. “If every single waypoint has to have a business associate agreement, that is going to slow down the ability to move forward on some of these technologies, especially in one key area: the quantified health solutions such as Apple’s HealthKit and Fitbit, as those products start being more useful.”

Another problem app developers face is outdated documentation on HHS websites. For programmers, examples are key to how they learn and build their business model, Reed said. But if the examples given predate the iPhone and only reference BlackBerry, then that leads to uncertainty. “The examples are so out of date that you can’t make a coherent case to your venture capitalists or investors,” he added.

Some analysts and consultants argue that the language of HIPAA security rules is ambiguous by design to put the burden of determining what compliance means on the regulated organizations

themselves, based on their own structures, size and budgets. They say companies should be careful about demanding that HHS provide more specificity, because they may not like the more rigid framework drawn up in response.

Reed said the industry is glad that HHS takes a technology-neutral approach to HIPAA, and he admits that the ONC and HHS' Office for Civil Rights are in a difficult position of trying to ensure the privacy and security of data on one hand and accessibility and flow of data on the other. "They are absolutely trying to figure out how to take advantage of this enormous explosion of mobile health apps that can change patient outcomes," he said. "They have to figure out how they can restructure documents that are going on 10 years old to reflect high-speed Internet, mobile devices and wearables, and it is all coming at them now, and not just on the patient side, but on the physician side as well."

ACT recently sent a letter to U.S. Rep. Tom Marino, R-Pa., asking Congress to push HHS to make changes to HIPAA. Among its suggestions are that "HHS should provide HIPAA information in a manner that is accessible and useful to the community who needs it. The agency should draft new FAQs that directly address mobile developer concerns." It also asks that the Office for Civil Rights improve and update guidance on acceptable implementations. "Given that HIPAA is a federal statute that mandates several requirements, OCR should provide implementation standards — or examples of standard implementations that would not trigger an enforcement action — instead of leaving app makers to learn about these through an audit," the letter said.

CALLS FOR CHANGE AT THE FDA

If grumbling about HIPAA compliance is commonplace, the complaints about the FDA approval process are much louder and insistent. Facing a growing number of applications that move data (and sometimes care recommendations) between devices, providers' electronic health records and patients' mobile devices, the FDA has sought to understand which ones pose a potential patient safety risk and require a formal approval process. So

“There should be greater certainty about which technologies will be regulated, by whom and to which standards. The current model ... has the potential to stifle innovation.

far, the FDA is taking a fairly hands-off approach and requiring approval for few types of applications while it learns more about the burgeoning market. But that ambiguity is tough on entrepreneurs seeking venture capital funding.

"I know developers who have opted to go into other things rather than mobile apps they think would be subject to FDA approval now or in the future," said Joel White, executive director of the Health IT Now Coalition, which represents patient groups, provider organizations, employers and payers. "And I know companies that are building regulatory risk premiums into their product development, which would make them more expensive," he added. "Either the products don't get developed or they are more expensive. Either way, it is not a good situation, which is why we want more clarity so we can have an environment that promotes innovation."

"There should be greater certainty about which technologies will be regulated, by whom and to which standards," said Mike Marchlik, vice president of quality assurance and regulatory affairs for health IT company McKesson, in an email interview. "The current model of using the 40-year-old device definition and statute to govern modern health IT creates significant uncertainty, subjects health IT regulation to the changing political landscape, and therefore has the potential to stifle innovation."

He noted that lawmakers have been working with health-care stakeholders and patient and provider organizations to define categories that ensure patient safety, foster regulatory certainty and promote innovation. Last year legislation was introduced in both houses of Congress that would create three definitions of health-related software: "medical software," "clinical software" and "health software." Only medical software would be subject to regulation by the FDA.

In response, the FDA, working with ONC and the FCC, issued a lengthy draft report (the *FDASIA Health IT Report*) that recommends a similar three-bucket regulatory risk-based framework, but doesn't set the categories in stone and leaves some questions unanswered, critics say. (The report also calls for the creation of a Health IT Safety Center to study issues related to patient safety.)

A fundamental tension has developed between the FDA on one hand and software companies and some members of Congress on the other, explained Bradley Merrill Thompson, general counsel of the mHealth Regulatory Coalition. "Members of Congress want to lock the definitions and process in, and FDA is saying we don't know enough to draw those lines with enough certainty that a year from now we won't need to revisit them," he said. "FDA is saying you need to leave us flexibility about what causes harm and allow us to be flexible in how we apply the



Morgan Reed
executive
director, ACT,
the App Association

“It's not as though there are no good ideas out there, but health care is often where good ideas go to die.

rules. Innovators are saying we don't know whether our product will be regulated or not and investors need to know. There has to be some compromise between those positions."

One technology executive who believes the FDA's approach is the correct one is Anand Iyer, chief data science officer at disease management software company WellDoc, based in Baltimore. His company received FDA approval for its "mobile prescription therapy" software more than five years ago. The company's BlueStar platform is used to help diabetes patients adhere to physicians' treatment recommendations.

Iyer said the FDA was wise to develop an approach called "enforcement discretion," which leaves it to the manufacturer to conduct a risk analysis and assure stakeholders that it has followed good manufacturing processes and that it doesn't believe its product is going to create any residual risk to a patient.

"I think this was helpful," Iyer said. "It offers flexibility. Truthfully it is too early to be more prescriptive. If you actually drop the pins in the sandbox on regulatory guidance and pour concrete around those pins in an embryonic and evolving market, you might do a disservice to the market. You might constrain it in ways that could be completely wrong."

Iyer said WellDoc solved issues with the FDA through informal dialog. There is a formal process called 513(g) that companies can use to go on record to officially ask the FDA for its perspective and feedback on something. "We have not done that yet," Iyer said. "We were fortunate to be part of many public-private, open-forum discussions with the FDA. These were open things we would just discuss and debate," he said. "They also have held summits with the FDA, NIH, FTC, National Science Foundation and others to create a cross-governmental perspective on mobile health applications as it relates to regulation, risk and patient safety."

Yet others still see much room for improvement. The FDA's approval process is badly in need of repair on a couple of different levels, said Thompson. One is the threshold question of defining with precision what it does and does not regulate. "We have been asking since

2011, over three years, to publish a guidance document defining the portion of clinical decision support software that they intend to regulate," he said.

In the *FDASIA Health IT Report*, the FDA said it would figure out later what to do about clinical decision support, according to Health IT Now's White. "Later is now for companies like IBM trying to put products based on Watson on the market that link people with clinical trials using clinical decision support," he said.

Another unanswered question relates to accessories and connected health. "The old rule was that if something connects to or plugs into a medical device, it is a medical device regulated in the same manner," Thompson said. "Well, now everything is connected to everything else in a network, so that rule doesn't make sense anymore. We are scratching our heads trying to figure out where medical devices stop and start. FDA promised us guidance on that, and it is not out yet."

“If you actually drop the pins in the sandbox on regulatory guidance and pour concrete around those pins in an embryonic and evolving market, you might do a disservice to the market.”



Anand Iyer
Chief data science
officer, WellDoc

The FDA also could be nimbler in response to developer requests, suggested Reed. "We have been forthright and aggressive with the FDA about some of the timelines to get through the 510(k) or the 513(g) process. [A 510(k) is a notice of intent to market a medical device.]

The idea that you have to wait for 100 days to hear back on something is not reasonable." The developer community says that even an answer of "no" is better than no answer at all. "Then at least they know how to begin to address the problem or do something differently," Reed said. "It is the nonexistent answer that kills."

Speaking at a conference symposium last February, FDA senior policy adviser Bakul Patel told the audience that in 80 percent of the cases, the agency had met the statutory 90-day timeframe under the 510(k) process, according to a report in *Health Data Management*.

Patel described the oversight as focused on a small subset of apps that present the greatest risk to patients, while the vast majority of apps do not require active FDA oversight because they do not meet the definition of a medical device under the federal Food, Drug and Cosmetic Act, the report said.

By its definition, digital health is at the nexus of clinical innovation, behavioral science innovation, pharmaceutical innovation, and consumer electronics and gadget innovation, WellDoc's Iyer said. That requires a complementary structure of policy and regulation and data security and privacy. He said you could imagine that complicated picture in one of two ways: One is a shoelace that has 16 tangled knots in it. The other is the intersection of freeways 405 and 10 in Los Angeles — chaotic but well structured. Every onramp and offramp has a purpose.

"That is the future you want to invoke: well structured, highly complex, with lots of moving parts, but it works," Iyer said. "This is the mother of all freeway interchanges, and I think the traffic is starting to flow. People were reticent to get on the onramp, but now you see more people getting on." **GT**

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eGovernment today is fundamentally about delivering citizen and business services securely — to any mobile device — and making these services more accessible to the people who need them. There are many “behind the scenes” dimensions that make eGovernment operate efficiently and successfully — but it all starts with the three foundational elements of security, mobility and transactional services.

Understanding these three key tenets of eGovernment will form a powerful and robust framework to lead government agencies confidently into the future.

IT STARTED HERE:

Basic information online and some core online services such as driver’s license renewals.



TODAY:

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eGOVERNMENT FOUNDATION

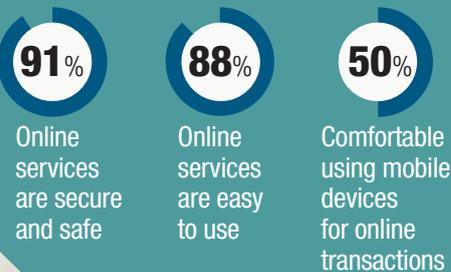
TRANSACTIONAL SERVICES

Completing end-to-end transactions with government through self-service platforms and providing a variety of secure payment options.



CITIZENS

Unanimous sentiment: Prefer to interact with state government online.



BUSINESSES

Unanimous sentiment: Prefer online as the primary communications channel.



GOVERNMENT EXECUTIVES

Unanimous sentiment: eGovernment needs to be expanded.

Mission-critical components:

1. Mobile
2. Security
3. Multichannel customer service



THE KEY COMPONENTS

Essential Elements of Successful eGovernment

- > Maintenance/Enhancements
- > Technical Infrastructure
- > Content Management
- > User Engagement
- > Design
- > Customer Service
- > Sustainable Funding
- > Staffing
- > Promotion
- > Market Research
- > Training/Education
- > Governance

THE DRIVERS



HOW DATA SHARING AND ANALYTICS
ARE CHANGING HHS FOR THE BETTER.

STRENGTH IN NUMBERS

The Missouri state Medicaid agency MO HealthNet covers some 880,000 people. How sick are they? How much does it cost to treat them? Until recently, no one really knew. As in many states, Missouri health information has resided in silos. Emergency room visits didn't get reported to home-care providers; primary-care doctors didn't necessarily share word of chronic conditions with other practitioners.

All that is changing, as the Missouri Department of Health and Senior Services has begun a data-sharing project with the state's departments of Mental Health and Social Services. Under the new Health Homes initiative, "we are finding data wherever we can find it and then figuring out how to plug it in," said Joe Parks, director of MO HealthNet.

Missouri is not alone. In many states, IT planners in health and human services have sought ways to bridge the divide, gathering data from disparate sources across government in order to forge cohesive pictures that can inform the public, drive better policy and ultimately improve social outcomes.

BY ADAM STONE / CONTRIBUTING WRITER



PAUL BALTZELL, CIO OF INDIANA, SAYS THE STATE IS ANALYZING 5 BILLION ROWS OF DATA TO HELP REDUCE INFANT MORTALITY RATES.

GATHERING DATA

Much has to happen behind the scenes in order to share data among government entities and open it to the public. Policies, technologies — there are a lot of moving parts. Before examining these, it's worth taking a look at the kinds of data that may come into play in this kind of an IT upgrade.

In San Francisco, for instance, planners started modestly two and a half years ago by releasing the food safety scores compiled by 36 inspectors in their examinations of 10,000 restaurants. The information went up on the city website — datasf.org — and drew over 6,000 views. (On the city's data site, "public health" is one of the most commonly searched terms, with more than 20,000 queries in 2014.)

Why start with restaurants? Because the data was already there and in relatively clean form. "It was the low-hanging fruit," said Cyndy Comerford, planning and fiscal policy manager for the San Francisco Department of Public Health.

More recently the city expanded the scope of its data sharing to encompass more ambitious aims. With its San Francisco Indicator Project, the city is gathering some 100 data points from such far-flung agencies as transportation, education, housing and economics. On the health side, the system brings together data on hospital beds, prenatal care, preventable hospitalization — a range of measures related to access and quality.

Much of this information was already in use for various assessments, but often it could only be accessed by special request, an inefficient system for requestors as well as for holders of data. With easier access to data, city agencies can cross-pollinate their ideas, Comerford said. Housing officials, for instance, may poll local hospital capacity before approving developments, while traffic officials may draw upon comingled data in order to correlate traffic density to pollution and health issues.

These scenarios remain largely theoretical. Although the city has drawn some funding from the Centers for Disease Control and Prevention to help measure outcomes, there has been no formal evaluation yet. "That is our next phase in the open data world," Comerford



DREW ENDICOTT

said. "So far we have been removing the barriers to get it all up there. The next step will be the evaluation phase: How successful is this? What is the impact? At the very least it has freed up a lot of our staff time, which is valuable to me."

Missouri has more solid numbers in hand. Parks reports that under the open data strategy, hospital use is down by 20 percent among enrollees in the state's Medicaid program and emergency room visits fell by 12 percent among enrollees. The drop in emergency room visits alone will save an estimated \$8 million annually.

In Indiana, meanwhile, state IT leaders have taken on infant mortality as their lead effort in a program of data sharing among agencies. To understand the phenomenon, it was necessary to look beyond

the first few rows of data, said state CIO Paul Baltzell. Demographics can help paint the picture, but a fuller round of figures is needed to ferret out causations.

That meant dipping into the data vaults of the state's Family and Social Services Administration, the Department of Corrections, the Department of Revenue and the Workforce Development agency. Together these have generated some 5 billion rows of data, Baltzell said.

Taken together, this data has the real-world effect of helping case workers better allocate their resources. "We wanted to give that field worker real data so they would know whether there is an 80 percent chance that something bad will happen to this child, or whether there is a 10 percent chance," said Baltzell. "Then



INDIANA'S MANAGEMENT AND PERFORMANCE HUB, WHICH PROVIDES REAL-TIME DATA FOR POLICYMAKERS AND STATE EMPLOYEES, HAS BEEN CALLED THE "BRIDGE OF THE ENTERPRISE" BY GOV. MIKE PENCE.

we can directly connect them with the people who can make that happen. Here is the parole officer's name, here are the workforce development people, they are going to be notified as well. That is when you start to change outcomes."

Laudable as these efforts may be, such results do not come easily. A range of challenges, both technical and procedural, must be overcome in order to compile data across agencies and make them work toward health and human services ends.

LEGAL LANDSCAPE

In Illinois, state CIO Sean Vinck has teamed with Kathleen Monahan, executive director of the Illinois Framework project, to develop a massive data project. The multiagency framework encourages

technology sharing among 60 programs in nine health and human services agencies.

Before organizers could even begin to manage the data, they first had to establish the rules of the road. First and foremost was understanding privacy rules. It's understood, for example, that the Health Insurance Portability and Accountability Act restricts the use of personal medical information. Less well known is the law's ban on the use of certain depersonalized data, even for statistical purposes.

Other rules posed similar problems. In Illinois you can remove personal information from juvenile court records for statistical purposes, but once you do that, the usefulness of those records diminishes. Planners would like to correlate crime to location, age and other personal factors, but that can't be done under the present regulations.

For some, this effort to establish data-sharing policies began as a shot in the dark. "When we started doing our open data process, the city did not really have guidelines of what to publish or how to publish," said Comerford in San Francisco. Beyond privacy concerns, planners had to make careful selections from among the masses of data. Transportation, for instance, turned out to be of limited use: Its format would have been incomprehensible for the layman.

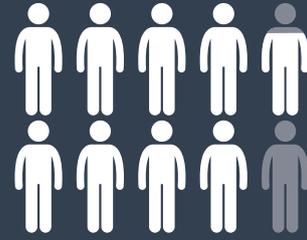
In Missouri, guiding principles took on a distinctly HR feel. In addition to opening channels of shared communications, the individuals within the varied agencies involved had to be prepared to commit to data-sharing as an ongoing endeavor.

"Nobody should underestimate the amount of managerial attention or administrative effort it takes. We are always remapping our underlying tables, either when new software updates come down or when there are updates to the service codes, and then you have to constantly monitor the staff to make sure they are looking at the stuff and using it," Parks said. "It's like building sand castles on a beach."

In Illinois, opening up information required legislative action, in the form of a bill that created an open data platform and regulatory architecture. The law requires agencies to make architectural choices with open data in mind.

In Indiana, meanwhile, those same

THE CASE FOR BIG DATA



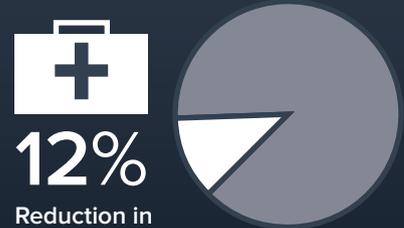
880,000

Number of people covered by MO HealthNet, Missouri's state Medicaid agency



20%

Decline in hospital use by Medicaid enrollees credited to Missouri's multi-agency data-sharing efforts



12%

Reduction in emergency room use as a result of the program



\$8 MILLION

Annual savings associated with the drop in emergency room visits



ILLINOIS CIO SEAN VINCK:
DATA-SHARING SOLUTIONS
RELY ON EQUAL PARTS
TECHNOLOGY AND
PROCUREMENT SAVVY.

But the bulk of project funds will still have to come from the Indiana Office of Technology's regular budget.

For state IT leaders, it's not just about the money. Even when they can identify appropriate solutions, and can find the money to buy them, there's still the buying process itself to contend with. "You have to have enough technology savvy and also procurement savvy," said Vinck. "In part this means appreciating the timing. Where data sharing is desired, it likely won't be in the budget until other systems come due for upgrades. No one gets to jump the line just to make social services data interoperable."

If all this talk of money seems tangential to the technology issues, there may be good reason. "The initial setup is a bit of work, but after that it just rolls," Parks said. "Once you set up the extract algorithm, it just dumps the files. It's not real fancy software."

Vinck concurred: "The technology part is easy, in principle."

While the tools of "big data" processing might prove valuable here, even the vast amounts of municipal information rarely rise to the volume produced by, say, Target or Walmart in a single day. "We do have some really large data sets. We have 10,000 restaurants being inspected two to three times a year. But that is 200,000 records at most. We are not creating terabytes of data every day," Comerford said.

The larger challenge comes in forging shared links between data sources. While this takes some effort, for instance in the standardization of fields and coding of meta-data, it is ultimately more a human problem than an IT issue.

"Interoperability among different data systems comes down to just working with people, trying to manage different city agencies," Comerford said. "It's about working with different IT departments and program managers to show them that this is a valuable idea for their department."

Parks backed this notion that the most valuable IT asset here is the people who will ultimately drive the systems from within their varied agencies. "The real key is having basic trust and a willingness to take shared risk," he said. "It's about having a true partnership. You need to be willing to see the other man's problem as being just as important as your problem." 

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choices led to physical imperatives on the IT side. There, the IT shop includes a secure room for use only by cleared individuals, for purposes of data security. In the basement of the governor's office, a \$500,000 secure space houses aggregated data as it's processed into the system.

Finally, policies regarding open sharing need to balance the desire for immediate action versus the IT need to take things slow, said Este Geraghty, former deputy director of the Center for Health Statistics and Informatics at the California Department of Public Health. Geraghty, who led the launch of California's first open health data portal, now serves as chief medical officer and health solutions director at GIS provider Esri.

"In some cases there is a directive from the city officials who will say: 'We want to put everything up as fast as possible.' You may not get a lot of detail, but you will get the data very quickly," she said. "Some people will be OK with that, just get it up there and they will clean it up, where other people want to know they have a more reliable source."

Geraghty tends to back the tortoise, more so than the hare. "People may be fast in getting it up there, but then they just have to go back and fix it later," she said.

MAKING THE TECH CHOICES

Once policies are in place, it's time to make technological choices that will eventually meld masses of disparate data into a unified whole that can be cross-referenced and shared.

Even in states with successful programs, the smooth integration of data has been problematic. In Missouri, for instance, emergency room data has to be emailed to Medicaid health-care providers each morning. Clearly a more integrated, automated system would be preferable. As use of the system increases, "we are getting close to where we would need to convert to that," Parks said. "But as a state agency, I am not resourced to do it."

Some states have looked for outside help to make the money work. Indiana received a \$500,000 grant from the Lilly Endowment Inc. for technology enhancements to help drive its project.

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The HealthMap tool uses informal online sources to monitor public health trends.

Putting the ‘Public’ Back in Public Health

Social media is being scoured for indications of disease outbreaks. What potential does it hold for public health agencies?

By **Justine Brown** / Contributing Writer

The recent Ebola outbreak unearthed an interesting phenomenon. A “mystery hemorrhagic fever” was identified by HealthMap — software that mines government websites, social networks and local news reports to map potential disease outbreaks — a full nine days before the World Health Organization declared the Ebola epidemic. This raised the question: What potential do the vast amounts of data shared through social media hold in identifying outbreaks and controlling disease?

Ming-Hsiang Tsou, a professor at San Diego State University and an author of a recent study titled *The Complex Relationship of Realspace Events and Messages in Cyberspace: Case Study of Influenza and Pertussis Using Tweets*, believes algorithms that map social media posts and mobile phone data hold enormous potential for helping researchers track epidemics.

“Traditional methods of collecting patient data, reporting to health officials and compiling reports are costly and time consuming,” Tsou said. “In recent years, syndromic surveillance tools have

expanded and researchers are able to exploit the vast amount of data available in real time on the Internet at minimal cost.”

Given the popularity of social media, infectious disease surveillance systems that use data-sharing technologies to accurately track social media data could potentially inform early warning systems and outbreak response, and facilitate communication between health-care providers and local, national and international health authorities.

A Shifting Approach

Indicator-based methods that rely on the collection and analyses of data based on protocols tailored to each disease are the most common method of disease tracking today. But such methods can’t detect potential threats quickly. In addition, they are poorly equipped to detect new diseases. Given such facts, some health agencies have begun to consider new ways to monitor symptoms in order to speed detection.

Additionally people do not always visit a doctor when they feel sick, making data collected from doctors and hospitals less useful. Yet people who stay home sick are likely to use social media to discuss

their illness or search websites like Google to investigate their symptoms.

Currently there are no official national programs for disease surveillance via social media, but several systems are being used as complementary sources of information.

For example, disease detection app Flu Near You helps predict outbreaks of the flu in real time. Users self-report symptoms in a weekly survey, which the app then analyzes and maps to show where pockets of influenza-like illness are located. Flu Near You is administered by HealthMap in partnership with the American Public Health Association and the Skoll Global Threats Fund. The effort is supported with private funds to demonstrate its utility for multiple sectors that work together on pandemic preparedness. The information on the site is available to public health officials, researchers, disaster planning organizations and anyone else who may find the information useful.

“There are real opportunities for using this data that is scattered across the Web in news, blogs, chat rooms and social media,” said John Brownstein, HealthMap co-founder and associate professor of pediatrics at Harvard Medical School. “We’re focused on collecting all that information

using data scraping, machine learning and other processes and combining it into one platform that will enable clinicians, public health practitioners and consumers to see what's happening."

Brownstein said the volume of data that can be collected today is what predicated the value. "One individual on social media talking about their illness is not going to be that useful," he said. "But in aggregate, that information can tell us really useful things about epidemics. It can even tell us about new things, like the Enterovirus epidemic that we recently experienced. So we are developing systems that are much more crowdsourcing in nature. We are trying to better engage the public, to put the 'public' back in public health. That provides us some really exciting opportunities to understand what's happening on the ground level."

Understanding the accuracy of such information is also important, said Tsou, whose recent study explored the interaction between cyberspace message activity (measured by keyword-specific tweets) and real-world occurrences of influenza and pertussis. Tweets were collected within a 17-mile radius of 11 U.S. cities chosen on the basis of population and the availability of disease data. Tweets were then aggregated by week and compared to weekly influenza-like illness and pertussis incidence. The correlation coefficients between tweets or subgroups of tweets and disease occurrence were then calculated and trends were presented graphically.

"The correlation between the weekly flu tweets versus the national flu data was almost 86 percent," said Tsou. "It was a very high correlation. Even more interesting is that when we compared our data to data from the San Diego County Health and Human Services Agency, who we partner with, we received even more precise data on weekly flu cases reported through their lab testing. The correlation was 93 percent — even higher than the national level. That was a very encouraging finding."

But utilizing social media data in this manner also presents challenges, such as correlating a social media post with a specific disease or condition.

"A lot of people tweet that they have a fever or have the flu, but sometimes that information isn't specific enough for us to connect it with a disease like

whooping cough," Tsou said. "That's one of the limitations we are dealing with."

"There's both a blessing and a curse to using social media in that it's super rapid, but it also generates huge amounts of noise," Brownstein said. "Dealing with all the noise and trying to pick out the signals that have meaning is definitely a challenge."

Public Health Possibilities

Some public health agencies are already beginning to rely on social media data to investigate health issues.

For example, last year the Chicago Department of Public Health began using Twitter to identify cases of foodborne outbreaks. The department teamed up with a group called Smart Chicago to develop an app that analyzes tweets that reference food poisoning, leading the city to step up inspections and enforcement on offending establishments.

The New York City Department of Health and Mental Hygiene is taking a similar approach. It recently worked with Columbia University and Yelp on a pilot to prospectively identify restaurant reviews on Yelp that referred to foodborne illness.

"These systems are operational, and they are being used by government entities to provide situational awareness," Brownstein said. "They're not necessarily the only sources of information, but they are an important source of information."

But it may still be a while before public health departments officially adopt social media data as a significant element of their regular investigations.

"Public health officials tend to be very conservative," Tsou said. "They want to make sure social media can really demonstrate a value for predicted disease outbreak. There is still a long way to go in terms of communication and education. But I think there is great promise and potential for using social media as a public health tool."

"The use of social media for public health surveillance and disease detection is an evolving work nationwide," said Jeffrey Johnson, a senior epidemiologist for the San Diego County Health and Human Services Agency. "Most of the work is still within the realm of research and academics, some of whom are validating their work with real events detected through different systems and reporting channels."

Johnson added that while San Diego County Public Health Services does use social media quite a bit as a media and communication tool, the county is not currently using social media for surveillance and disease case finding.

Going Mainstream

The Milbank Quarterly recently published a study on the challenges facing practitioners as they consider ways to integrate social media and Internet data into the detection and management of disease outbreaks. Researchers involved in the *Social Media and Internet-Based Data in Global Systems for Public Health Surveillance* study found some of the limitations of event-based surveillance: Information isn't always moderated by professionals or interpreted for relevance before it's disseminated to epidemiologists; there's no standardized system for updates; algorithms and statistical baselines aren't well developed; and new information about health events isn't disseminated efficiently.

On the positive side, because it occurs in real time, event-based surveillance can identify events faster than indicator-based surveillance. Ultimately the authors concluded that event-based surveillance could improve surveillance activities, but not without systematic evaluation within a public health agency.

Brownstein agreed. "There needs to be a way for representing that data in a way that's useful for decision-makers," he said.

Yet the combination of indicator-based and event-based surveillance has potential for improved overall "epidemic intelligence" that could help monitor outbreaks and disease risk. And it may have other benefits.

"Even more important is the situational awareness that can be derived from the mining of social media data," said Brownstein. "What are the impacts of outbreak events at the societal level? We can pick up these kinds of things through these channels. There's value in understanding the public perception and communication and how government can refine its communications based on the response of the population. Using social media to understand people's attitudes and beliefs in that way is extraordinarily powerful." 

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Safety for the Long Term

A Kentucky fingerprint-supported Web portal pulls state and federal law enforcement data on health-care job-seekers.

By Douglas J. Guth / Contributing Writer

Kentucky is seeking to implement more stringent criminal records searches for those wanting to care for some of the state's most vulnerable citizens. Though still in the embryonic stage, the Kentucky Applicant Registry and Employment Screening program, or KARES, is another layer of protection aimed at weeding out prospective care workers hiding illegal or abusive deeds committed in other states.

The new high-tech background check program is a pre-hiring fingerprint-supported state and FBI Web portal available to long-term care facilities and employers.

The portal was created to support the Kentucky National Background Check Program, a state effort intended to help reduce the potential for abuse — including financial exploitation — of elderly and vulnerable adults.

In August 2013, the Kentucky Cabinet for Health and Family Services (CHFS) Office of Inspector General launched a website for KARES, meant to supplement screening that providers currently must perform, said Al Ervin, business analyst for the office of administrative technology at CHFS.

A pilot venture kicked off last May, with 24 long-term care facilities across the

state sending applicants to 35 fingerprint collection sites. Kentucky is one of 25 states to receive a \$4 million grant from the Centers for Medicare and Medicaid Services to fund the program.

“Our goal with the pilot was to keep it to a limited number of participants in a controlled environment,” Ervin said.

The LiveScan electronic fingerprint units, provided by Virginia-based biometric and identity solution company MorphoTrak, are kept at three dozen employment training centers. The fingerprint scanning process takes about 30 minutes, after which applicant data is



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includes volunteers providing direct services similar to that of a paid worker.

During the program's pilot phase, KARES proved it worked. The system made several ineligible rulings on individuals based on past criminal history. Among the disqualifying offenses are felonies related to sexual or violent crimes, as well as criminal abuse that involves a child or adult. Activity involving theft and embezzlement will also keep wannabe workers out of long-term care facilities.

"We're trying to prevent any kind of abuse, exploitation or neglect of the elderly," Mynear said. "There are many ways our patients can be taken advantage of."

Before KARES, state law required caregivers to use only name-based background checks conducted by state police or the Administrative Office of the Courts. A semblance of change in this procedure came in 2011 with the reinvigoration of a state-sponsored elder abuse prevention task force, initially created to strengthen support of a care facility system wracked by stories of neglect and ill treatment of patients. In 2007, the Kentucky Department for Community Based Services received 45,048 reports of adult abuse, 9,660 of which were for persons ages 60 and older, according to CHFS.

Discussions about adding a comprehensive fingerprint-based vetting system began in 2011 when the state Office of Inspector General (OIG) applied for grant funding. It took several years of development to integrate KARES into state employment centers. Ervin reports that the technology has been well received by participants since the pilot launched in spring 2014.

"It's a simple, user-friendly platform to work with," he said. "There have been no problems using the system or with the hiring of applicants."

Challenges Ahead

That's not to say there aren't issues to smooth out before a statewide rollout of the KARES program takes place. For example, three dozen fingerprinting locations are not nearly enough for the state's 120 counties, according to officials. Filling those gaps will likely mean buying more equipment or sharing resources across agencies. In addition, the OIG will have to address accessibility issues for scanning stations located in counties with

geographical impediments like mountains that make them harder to reach.

Meanwhile, Kentucky lawmakers are considering a bill that would make the multi-state background check a mandatory program for long-term care settings. Proceedings on the bill, which the OIG will present to the Kentucky General Assembly this year, are expected to delay wider implementation of KARES until at least mid-2015, Ervin said.

LeadingAge Kentucky, a nonprofit overseeing 110 nursing services, intermediate care facilities for the developmentally disabled and continuing care retirement communities, would be more enthusiastic about supporting KARES if the service widened its scope, according to President Tim Veno.

Even then, some elder care providers are reluctant to switch from the current system, as the OIG has yet to provide enough evidence of how fingerprinting would keep lawbreakers from falling through the cracks, Veno said. Some facilities under his organization's auspices already go beyond the current name- and Social Security number-based process, requiring aspirant workers to also take drug tests.

"Our members are asking why we have to abandon what we're doing and go into this new system," said Veno. "It's the need that's been difficult to communicate."

LeadingAge would like to work with the OIG on fixing these problems, as the benefits of KARES are clear. "The [program] is a one-stop shop for all background check needs," Veno said. "We want to encourage our members to test it out and see if it's a solution for them."

Kentucky is surrounded by seven states filled with people willing to cross state lines to find a job. The KARES program is a necessity in an industry that cannot afford to be wrong about the character of its employees, said Ervin. Should KARES find its footing, he can envision the service expanding into a "clearinghouse" similar to that of Florida, which has a centralized fingerprint-centric criminal background check system that shares employee information among specified agencies.

"This is just the tip of the iceberg for us right now," said Ervin. "Anyone who wants to participate, just knock on our door and let's do it." **GT**

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transmitted to local police and FBI offices. Results come back within 24 to 72 hours.

Employers eligible for the service include assisted living communities, home health agencies, hospices and nursing facilities. Under the program, backed by the Kentucky State Police among others, candidates seeking long-term care employment will no longer be able to hide criminal activity committed in other states, noted CHFS Inspector General Maryellen Mynear.

Workers subject to a background check under KARES have one-on-one contact with patients, said Mynear. This



Data-Driven Innovation

States should build multipurpose analytics platforms that leverage data for a variety of benefits.

Editor's Note: Starting this month, Daniel Castro will write a regular column on the intersection of data, technology and public policy.

Many of the most successful tech companies — including Microsoft, Amazon and Apple — have attained their superior status not just by building a series of products, but by also creating a powerful platform for innovation. Amazon, for example, became a global technology leader by creating an online platform that enables innovation among its partners, including merchants, publishers and developers. This lesson of building great products *and* great platforms applies to the business world and also to government agencies seeking to use data analytics to improve performance, reduce costs and better serve their customers.

One opportunity to apply the platform model of innovation is in the use of data. From education to transportation, virtually every state agency is looking to data to improve performance. Combating Medicaid fraud is particularly appealing given the abundance of data and enormous potential savings. States manage a lot of funds — New York's Medicaid program, for example, pays out \$55 billion each year to more than

100,000 providers, and these funds are a prime target for fraud. Nationally an estimated \$19 billion of Medicaid funds are spent each year on improper payments. To address this problem, almost every state attorney general's office has set up a Medicaid Fraud Control Unit (MFCU) with the federal government

providing 75 percent of the funding and the rest coming from matching state funds.

While MFCUs are useful — in 2013, MFCUs recovered \$2.5 billion from their investigations — more can be done, especially with many states expanding their Medicaid programs under Obamacare. Until recently, the overwhelming volume of transactions has made it difficult for auditors to find violations. However, last year the U.S. Department of Health and Human Services ruled that states could use federal funds for data mining programs to fight fraud. This change means more states can develop and deploy data analytics programs to identify fraudulent activities, prioritize investigations and uncover complex criminal activity. Some states have begun to prove the value of these investments. The Texas Health and Human Services Commission, for example, spent about \$20 million to build a fraud analytics program that has already more than paid for itself. States like Massachusetts and Illinois have also made notable progress in using analytics to reduce fraud.

By sharing their data, states can encourage competition between vendors focused on delivering the best analytical capabilities. Some states may want to explore alternative contract arrangements where analytics companies receive a percentage of the improper payments recovered or Netflix Prize-style competitions where states offer rewards for significant improvements in the accuracy of their algorithms. The goal of these efforts is to make data the locus of innovation.

States will need to make some changes to maximize their savings from better analytics use. For instance, most states use a “pay-and-chase” system, which results in wasted effort recovering money that's already gone out the door. Real-time analytics can help identify suspicious payments at the outset, but states must update their payment policies before this can be implemented. States should also consider data sharing agreements with private insurers and other states to improve the quality of their analytics programs. More comprehensive data may help investigators detect new schemes to defraud Medicaid programs and ensure that bad actors identified by one state don't move on to another.

Importantly, state Medicaid programs should recognize that the goal isn't just to implement a one-off analytics program for fraud, but to develop a multipurpose analytics platform that can be used to generate predictive intelligence, cut costs and streamline operations. Just as Apple built the iPhone to be more than a communications tool, so too should states design their analytics platforms to be reused for other purposes.

While the early payoff may come from reducing fraud, long-term gains may come from using data to streamline the health-care system and improve health-care outcomes. By creating a platform for analytics, states can make progress on the immediate goal of reducing fraud, and they can also use it to unlock a new wave of data-driven innovation. **CT**

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Cybersecurity in 2025

What gaps in virtual protection must be addressed?

What will cyberspace look like in the year 2025? What does the future hold for the online protection of people and data? Will we still use credit cards and Social Security numbers in a decade or will they be replaced? Will advances in medicine be matched with progress in protecting personal health records? Will privacy protections be more robust or largely a thing of the past? Bottom line: How will technology impact our lives in the future, in positive and negative ways?

These are important questions, and while there are plenty of cyberpredictions for 2015, it's also important to take a longer-term look at emerging digital threats in order to address gaps in protection.

One area that's getting a lot of attention is the Internet of Things. Wearable and implantable technology, autonomous cars that drive themselves and network-connected household appliances are just the beginning. Most experts believe that a proliferation of smart sensors, cameras, software, databases and massive data

centers will forever alter how we interact in our daily lives.

Patrick Tucker, author of *The Naked Future: What Happens In a World That Anticipates Your Every Move?*, describes upcoming technology this way: "One positive effect of 'ubiquitous computing,' as it used to be called, will be much faster, more convenient and lower-cost medical diagnostics.

This will be essential if we are to meet the health-care needs of a rapidly aging baby boomer generation. The Internet of Things will also improve safety in cities, as cars, networked to one another and their environment, will better avoid collisions, coordinate speed, etc. We will all be able to bring much more situational intelligence to bear on the act of planning our day, avoiding delays (or unfortunate encounters) and meeting our personal goals."

But others see this coming decade as an Orwellian time with more surveillance of our activities and less ability to not be tracked. They wonder: Will citizens be able to opt out of interactions in cyberspace? What freedoms will truly be offered to Luddites?

A recent survey conducted by the Pew Internet and American Life Project found that a significant majority of industry experts believe a major cyberattack will occur before 2025. This online attack was defined by "widespread harm to a nation's security and capacity to defend itself and its people." Could a catastrophic cyberevent shape our future?

According to a 2014 McAfee survey, "68 percent of Americans are concerned about what the state of cybersecurity will be 11 years from now. Nearly two-thirds of consumers stated identity theft, monetary theft and fraud as the biggest concerns. ... The study also revealed that as many as 77 percent of consumers fear their families could fall victim to hackers over the next decade. Almost half believe their families will be affected by cyberbullies in 2025."

Security Scenario Resources

I'd like to highlight three significant efforts that have looked at these questions in detail and offer excellent insights and some practical solutions. All three of these resources are worth a close examination:

1. Cyberspace 2025: Today's Decisions, Tomorrow's Terrain is available from Microsoft at: <http://aka.ms/cyberspace2025>. This report offers several scenarios and allows the reader to evaluate the outcomes of various policy choices across a diverse range of domains — education, immigration and trade — and their implications for cybersecurity.
2. CyberSpace 2025 Workshop. This wealth of information is available from the National Science Foundation at: <http://cps-vo.org/group/CyberSpace2025>. You can download the presentations from the "Files" link at this event website.
3. U.S. Air Force Cyber Vision 2025. This PDF report about military priorities is available at: www.defenseinnovationmarketplace.mil/resources/cyber/cybervision2025.pdf.

One final thought: The latest NASCIO survey put security back at the top of priorities for state government CIOs, after bouncing around the top 10 list for the past decade. While other technology items may change or even disappear, I predict security will still be a top concern in 2025. **GT**

Daniel J. Lohrmann is the chief security officer and chief strategist at Security Mentor. He is an internationally recognized cybersecurity leader, technologist and author. From 2002 to 2014, Lohrmann led Michigan's award-winning technology and cybersecurity programs, serving as CSO, CTO and CISO.



Policy Pitfalls

The four common mistakes in government social media policies — and how to avoid them.

You probably know that developing a good social media policy for your agency is important. A solid policy guides staff, minimizes risk and helps citizens understand your approach to social. However, there are a few best practices that are commonly overlooked in the development of government social media policies.

Tone Deaf

Have you thought about the tone of your social media policy? It might seem trivial, but your policy should strive to be helpful, encouraging and optimistic. You want to send a message that your agency is not against social media — instead you recognize the tremendous value in these tools and want to be consistent and treat everyone fairly.

Social media still tends to make some people uncomfortable, whether due to lack of familiarity or concern about its application. Having a positive tone in your policy can go a long way toward acceptance for both internal staff and the public.

Excluding Elected Officials

Many policies cover employee use of social media, but leave out language pertaining to elected officials. Many elected officials want to embrace social media to better communicate with constituents, but some have indeed exercised bad social media judgment.

Your policy should include electeds in the “Responsibilities” section, which defines who is responsible for what. Department heads are responsible for assigning social media leads for their department, elected officials are responsible for abiding by laws pertaining to campaigning and open meetings as they relate to social media, etc. This language is especially important to employees who report directly to an elected official and may be asked to post on social networks on his or her behalf.

Dated Upon Rollout

A sure way to ensure your social media policy is outdated almost immediately upon rolling it out is to specifically reference platforms and strategies.

While it’s important to broadly define social media terminology to ensure that everyone reading the policy is speaking the same language, the fact is that platforms change all the time. You do not want your policy to require updating and the lengthy approval process that can come along with it, every time a new Snapchat or Vine is introduced. Instead, define broad terms such as microblog, social network, video sharing platform, etc.

Where do you get specific about the approach to particular platforms such as Facebook, Twitter and YouTube? That magic is going to happen in your social media strategy document. One benefit of including this level of specificity in your strategy document is avoiding the delays that typically go along with pushing a

SOCIAL MEDIA POLICY FRAMEWORK

REFERENCES References overlap with other policies

DEFINITIONS Broadly define social media terminology

RESPONSIBILITIES Who is responsible for what

PROCEDURES Typically the lengthiest section

- ✓ Account creation
- ✓ Logins and passwords
- ✓ Elected officials
- ✓ Comment policy
- ✓ Monitoring
- ✓ Archival
- ✓ Employee use

policy update through the system. Just be sure to make a reference to the strategy document within your official policy.

Keeping it Under Wraps

Many public agencies do not typically make their internal policies available to the public. But make an exception for the social media policy and publish it in its entirety on your official government website. Going further, extract the portion of the policy that deals with comments and monitoring and publish a hyperlink to this section on key public areas like social media profile descriptions. This simplifies your policy for citizens because they will be able to easily find the portion that pertains to them.

There are several other important components to a good social media policy, but these four approaches should not be overlooked. **GT**

Kristy is known as “GovGirl” in the government technology industry. A former city government web manager with a passion for social media, technology and the lighter side of government life, Kristy is the CEO of Government Social Media.

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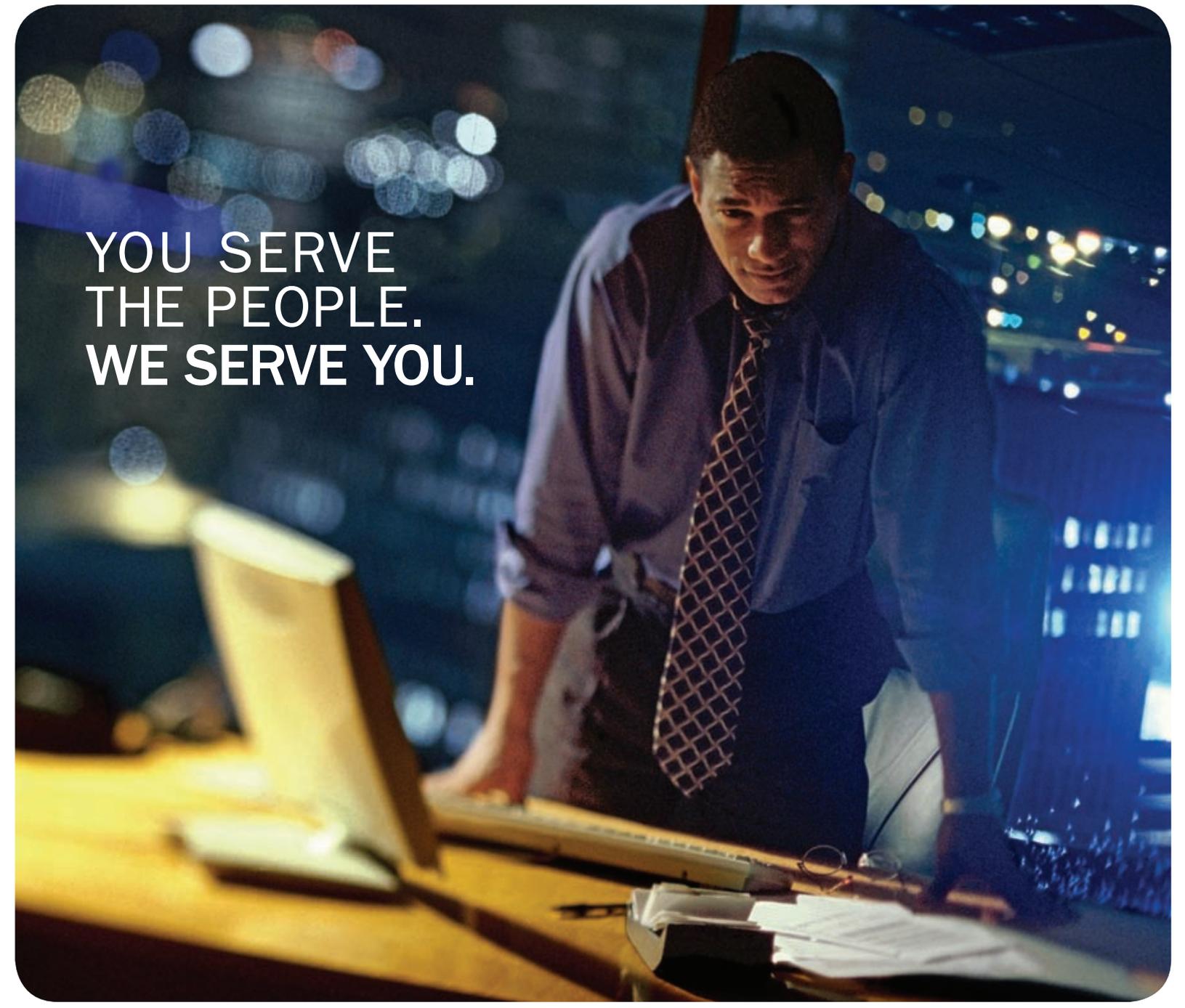


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