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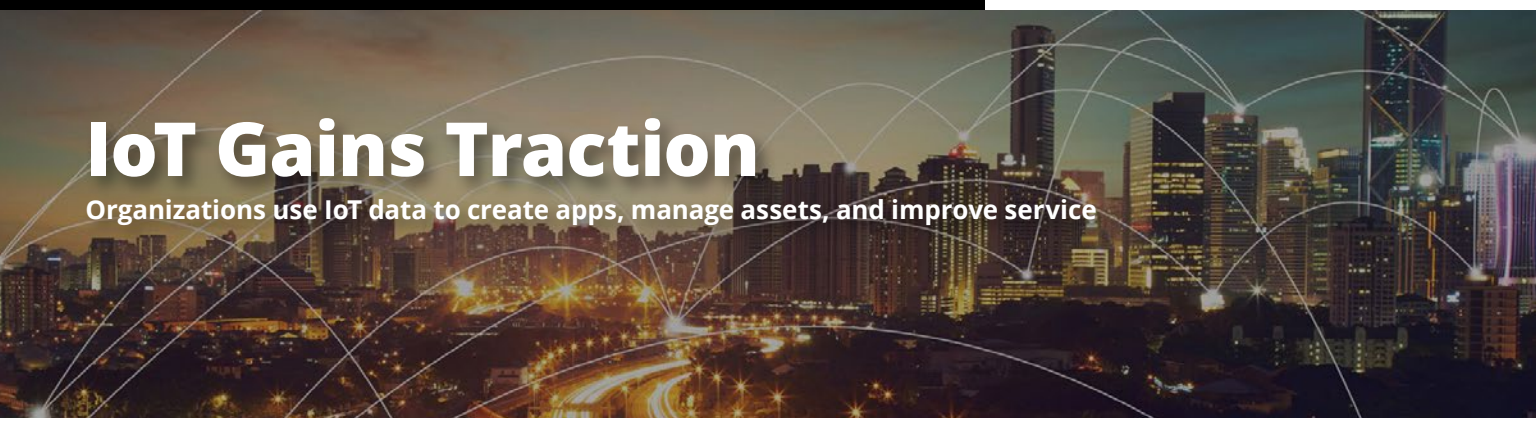

IoT Gains Traction

Organizations use IoT data to create apps, manage assets, and improve service

Part of the challenge that comes with the Internet of Things (IoT) is learning to think about problems—and solutions—in new ways.

IoT's basic value proposition is simple. IoT has made its mark in every industry around the world because it allows organizations to interconnect smart devices, collect massive amounts of data, and mine it for insights.

From predictive maintenance and connected cars to wearables for worker safety, IoT supports applications that have the potential to help organizations lower costs, enhance customer service and improve their operations.

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Organizations are expected to install about 22 billion IoT devices by 2018.

For IoT to succeed, however, it will require a coordinated effort from public and private industry, some innovation and forethought, and a focus on bolstering security and ensuring privacy, speakers said at the July 25th event, Connected Government: How IoT Will Help You Manage Assets, Resources and People.

Already, there are use cases for IoT in government and agencies are beginning to understand how to make better use of the data the IoT devices deliver, said Brian Done, Deputy Chief Technology Officer in the Office of Cybersecurity and Communications at the Department of Homeland Security.

"I'm excited to see that is common now whenever we're thinking about how to approach cybersecurity with departments and agencies," he said. "Just the fact that people are talking about it is fantastic."

LEVERAGING IOT TO MANAGE DISASTERS

The Federal Emergency Management Agency, for example, believes IoT will help it prepare for, react to, and manage a disaster, said Adrian Gardner, Chief Information Officer, at FEMA.GSA is not the only agency that has jumped on the mobile bandwagon. The Defense Information Systems Agency (DISA) has been a telework leader within the Department of Defense for some time. Now every new application in the agency must have a mobile component.

The agency "will have to play against the IoT" and ensure things are interoperable, and that data can be leveraged and used for rapid, real and accurate decision making, Gardner said. "We know that we can do this better," he said.

The Internet of Things has evolved to support machine-to-machine interactions, which provides information and analytics to decision makers. Soon cognitive computing

PUBLIC SECTOR MEDIA GROUP

The National Institute of Standards and Technology is one agency helping organizations prepare for IoT—first by helping them better describe and understand it, and then ultimately secure it.

based on artificial intelligence, signal processing, and human-computer interactions will be the norm, Gardner said.

Embedded IT is in many devices that emergency managers can leverage—from cameras that respond to a gun shot in a community, to smart storm water gauges and smart tsunami buoys, and sensors that tell first responders what to wear after a chemical leak.

The challenge for them will be to manage and understand this data, which is why the analytics and machine-to-machine interfaces will be important, Gardner said. "The ability to make sense of it and use the right data source will be one of our challenges," he said.

IoT presents other challenges for first responders, too, such as how to connect when there is limited or no Internet available, how to prioritize data traffic in an emergency, and how best to manage privacy concerns surrounding data collection, Gardner said.

"Are [we] prepared, not only for en event … but are we prepared for IoT?," he asked.

The National Institute of Standards and Technology is one agency helping organizations prepare for IoT—first by helping them better describe and understand it, and then ultimately secure it.

In a recent publication, NIST described a Network of Things, which just like the Internet of Things, employs a mixture of sensing, communication, computation, and actuation, said Jeffrey Voas, a computer scientist at NIST.

The difference is that NoT does not necessarily run on the Internet. Instead, it might rely on a local area network. In any case, Voas said, there is no singular IoT, and the Internet can't be measured or bounded, he said.

The NIST Special Publication 800-183 lays out five building blocks that support the NoT (see box). "These are the Lego pieces for a Network of Things and the science behind the Internet of Things," Voas said.

Out of all these building blocks, the "decision trigger" is the most important, because it is the reason organizations built a Network of Things to begin with, he said. It defines the end purpose of a NoT.

"This whole notion of NoT and IoT is a distributed system… where everything is a function of time," Voas said. "Time is probably one of the very most important elements in any Network of Things in a distributed system."

IoT is taking off, but there are some challenges organizations must address, including security threats and liability issues when IoT or NoT systems fail, Voas said. It's also difficult for organizations to properly certify the "things" and secure time-stamping, and to find trained IoT engineers.

"Consumers seem to be moving toward being all-in but don't know what they are in for," Voas said.

THE VALUE OF DATA

For organizations, IoT is a data problem that drives value through new applications, said Chris O'Connor, General Manager, Internet of Things Offerings, IBM. "Technology doesn't mean anything if you don't get value out of it at the same time," he said.Johnson is part of the mobile services category team at GSA trying to change this. The group wants to make it easier and cheaper for agencies to buy and manage mobile services and devices. It is working to better define the components that make up mobility—applications, end point protection, telecom expense management, and emerging tools. It has already standardized subcomponent definitions, identified common requirements for agencies and solution providers, and potential supplier sources.

For instance, the Army's Logistics Support Activity operation is using IBM's Watson IoT, a cognitive computing platform, to gain better visibility into performance. As a result, the agency is avoiding about $15 million per year in operational costs, O'Connor said.

"We work heavily across this idea of what do you do with the data and how do you get it to be something you can use once you get it in, and what type of logistical

capabilities do you have," O'Connor said. For example, it can analyze video captured by drones; support software that enables energy companies to accurately maintain their assets; provide the analytics and connectivity for worker safety; and support a 'digital twin' of devices or systems.

IoT goes beyond the smart device and connecting machines to allow organizations to enter into the digital lifecycle, which improves how they deliver services, O'Connor said. It allows organizations to talk with customers differently and share data with the appropriate community.

Watson IoT supports a wide range of applications, O'Connor said. For example, it can analyze video captured by drones; support software that enables energy companies to accurately maintain their assets; provide the analytics and connectivity for worker safety; and support a 'digital twin' of devices or systems.

IBM has 7,000 IoT clients around the world using its software and has committed $3 billion over four years in this space, O'Connor said.

There is almost unlimited potential for IoT technologies, said Evelyn Remaley, Acting Director, Digital Economy, at the U.S. Department of Commerce, as well as Deputy Associate Administrator for Policy Analysis and Development at the National Telecommunications and Information Administration.

The goal is to see IoT grow and allow innovation to happen, which means letting industry lead, Remaley said. NTIA earlier this year released a green paper that addresses some of the policy, infrastructure, and standards issues that should be considered in order to foster the advancement of IoT.

"What we found … is that we really shouldn't change the policy approach to how we treated the Internet back in the 90s," she said. "We made a conscious decision to let industry to lead, when there were policy challenges we should look at those in a multi-stakeholder manner."

NTIA is working with stakeholders to patch consumer IoT devices and also on combating botnets, which has an IoT aspect to it. "So we are looking across the next year at what layered and federated solutions across the ecosystem can come together to make the environment more secure overall," Remaley said.

Organizations have to maintain the right balance between a reducing risk and encouraging innovation. Policy is important, but global engagement and collaboration are too. If organizations "want to see the full reach of IoT" it has to be on a global scale, she said.

Many issues related to IoT will require a long-term strategy, said Dr. David Bray, Senior Executive and Chief Information Officer, Federal Communications Commission.

Understanding the 'Network' of Things

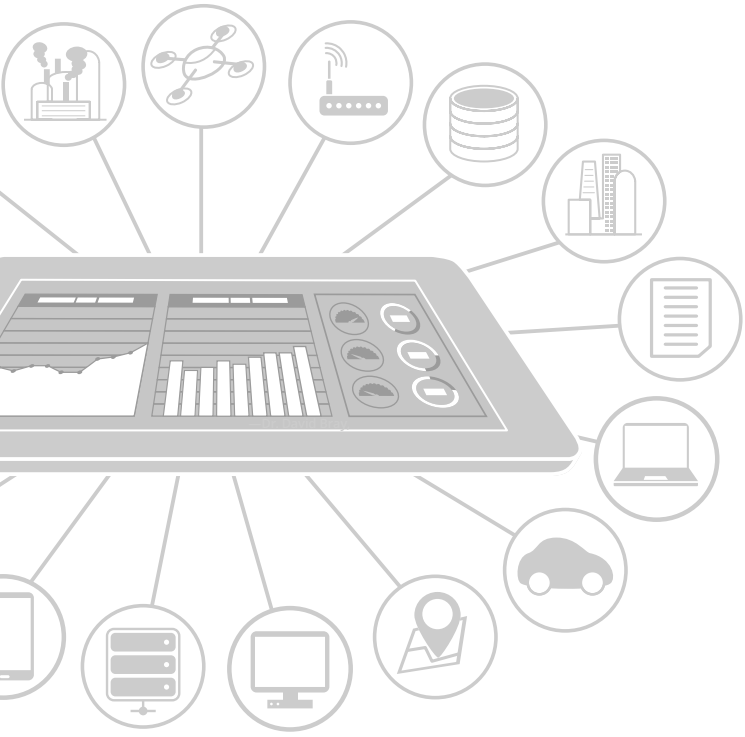
The NIST Special Publication 800-183 lays out five building blocks that support most distributed systems, including the Network of Things and the Internet of Things. The Study on Mobile Device Security looked at the device itself, as well as how it connects via the network, public app stores, and cloud services. It also considered mobile security threats by category, and broke that down into threat categories such as denial of service.

These are: sensors, aggregators that handle big data, communication channels so that things can talk to things, external utilities such as hardware, software and services, and the decision trigger, which creates the final output needed meet the purpose or requirements of a specific NoT.

"With these five primitives, I can build any Network of Things," said Jeffrey Voas, Computer Scientist, at NIST, who authored the publication.

The decision trigger is the most important piece of this, Voas said. It creates the final result or results needed to satisfy the purpose, specifications and requirements of a specific NoT.

There are other key elements that are important players in trusting NoTs, Voas said, such as the environment a sensor or aggregator works in, the cost associated with building and maintaining a NoT, and where a sensor or en external utility operates.



For instance, organizations that still use on-premise systems will have a hard time scaling when they start to receive IoT device data. “We have to get to cloud to have that flexibility and elasticity to deal with everything else that will come next, and we’re not there yet,” Bray said.

IoT also suffers from a bit of a perception problem that will take the public sector and its partners working together to fix, Bray said. The Internet, he said, is not as people-centric as it should be.

“How do we use the Internet of Things to improve people’s lives demonstrably so they can see the value and understand the value of public service,” he said. “This is about building bridges” regardless of whether you’re in the public or private sector, academia, or in a nonprofit.

There needs to be a compelling narrative about why the Internet should be a benevolent force for good, he said. “The Internet of Things, much like humanity, is really a reflection of what we choose to do that decides whether it’s good or bad. The technology itself is amoral,” Bray said.

Machine learning, artificial intelligence and cognitive computing paired with data coming from smart devices can help agencies create new applications and ways of interacting with their customers.

But agencies have to be nimble, comfortable with building working prototypes quickly that may not be perfect, and be able to build trust by adopting fair privacy policies. This means agencies need change agents who will “illuminate the way” and step outside the status quo, Bray said.

IoT apps deliver results

IBM has numerous use cases of how its customers are using the IoT to support and improve their business. Here are some examples:

Army’s Logistics Support Activity: Uses IBM for Watson IoT, predictive analytics, and cognitive computing for better visibility into performance. Leverages Watson IoT Manufacturing to determine optimal repair methods to take proactive repair measures.

Aerialtronics drones: Vehicles leverage Watson IoT cognitive capabilities to provide high-quality inspection services for organizations, such as monitoring traffic patterns and inspecting wind turbines. Government can use this for crowd safety and damage assessment.

North Star BlueScope Steel: Uses wearables to protect workers in extreme environments. Instrumentation identifies potentially dangerous conditions in real-time.

DTE Energy: Uses and IoT for Energy solution to implement an analytics roadmap to support the health and reliability of its assets.

Sodexo: Moved to a SaaS Facilities Management solution to better manage over 1.2 million assets in over 24,000 buildings, saving money.

IBM and Maersk: Built a global trade solution that uses blockchain to help reduce fraud and errors and the time products spend in the transit and shipping process, and improve inventory management.

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>
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