

# IoT Apps Get Creative and Deliver Results

Agencies are finding new and different uses for IoT sensors and apps.

Smart connected devices have been around for a while, but the extent to which the Internet of Things (IoT) is evolving is inspiring agencies to deploy innovative applications. New IoT apps can support their mission and impact their bottom line. The promise of the IoT is spurring many organizations to deploy virtualized devices, connect them via an IoT platform, and use this valuable data to save money and deliver better services.

Successful IoT implementations have relied on the cloud, strong security, and a business case that appeals not only agency IT leaders, but business execs as well. There is significant opportunity in the IoT beyond simply using smart devices or connected products, says Bruce Sinclair, publisher of [iot-inc.com](http://iot-inc.com), Advisor, Author, and Speaker.

The real value comes from using this technology to gather data and then transforming it into useful information that helps an organization support its mission and its customers. “The killer app of IoT is outcomes,” says Sinclair. “It’s being able to deliver the outcomes the customer wants.”

What makes an IoT device unique is its virtualization—taking a physical thing and virtualizing it into a model that can change over time. This lets it connect to other data sources, analytics packages, data services, and business systems. However, the products are less important than what they can deliver as part of a larger IoT ecosystem. “Our customers don’t want our products,” says Sinclair. “They’re a means to an end. What they want is what our products can do for them.”

It will be the IoT platform and the ecosystem that will deliver outcomes. When outcomes are aggregated into a geography and then into a vertical, they become economies. Technically, the IoT is really just an “evolution of what we have today,” he says. “But it’s the outcome economy that will revolutionize business.”

## SECURE AIR TRAVEL

At the U.S. Customs and Border Protection (CPB), the IoT is helping the agency to develop a biometric airline passenger exit process; a system mandated by Congress last year. Because departures from the country have never been restricted, the challenge is collecting biometrics

from passengers leaving the United States when there is no process or environment in place to do so, says John P. Wagner, Deputy Executive Assistant Commissioner, Office of Field Operations, U.S. Customs and Border Protection.

“We said for this to be successful, we have to figure out a simple technology, that integrates what we do, integrates how the airlines already operate, in a way that can be done in the boarding area,” he says.

The result is a system that relies on facial recognition instead of fingerprints, which can be cumbersome. The agency is piloting a system that matches advanced data from the airlines, along with existing and available photos of passengers listed on the airplane manifest, with live pictures taken of these same passengers at the departure gate. This biometric exit system

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is currently being tested at the Atlanta Hartsfield International Airport. “[This could] be the start of energizing a lot of modernization throughout the airport,” says Wagner.

For instance, once a passenger’s picture is captured, it could be used for any transaction at the airport that requires an ID, such as checking bags or shopping in the duty free store. The challenge would be to encourage people to participate and ensure their privacy would be protected

The platform also has potential to improve the arrivals process. When a passenger checks in with a boarding pass overseas, that data could be staged in the cloud and matched to that passenger upon arrival using a photo. The data is there to allow this to happen, says Wagner. It’s just a matter of thinking about it differently.

## TRULY CHANGING THE WORLD

Similar to what the CBP is doing, the State Department discovered it could use an IoT device and application far beyond the original intent. The U.S. embassy in Beijing installed an air quality meter in 2007 to help inform its athletes who would be arriving in that city for the 2008 Olympics. Data from the meter, which was made available on the Web, would often contrast with the numbers recorded by the Chinese government.

Ultimately, Chinese citizens started to push their government for better information on air quality health. The result was far-reaching, says Landon Van Dyke, Senior Advisor for Energy, Environment, & Sustainability, Department of State.

“With one device, we were able to push an entire government ... to change the way it communicated on health issues and environment issues to its public,” says Van Dyke. “That made us realize that IoT devices have the potential for diplomacy.

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They have the potential for us to actually change the world.” The department is expanding its air quality technology into 30 countries and plans to expand its network of other IoT devices to help it reduce its environmental footprint around the world.

State currently has a large footprint—it has more than 90,000 employees and more than 22,000 buildings and facilities. The IoT devices it uses help it monitor such things as utilities, power quality, vehicles, water, and fuel usage of its embassies around the world. For example, smart meters help the department reduce the energy consumption of its buildings by sending information via the cloud for analysis.

Although there were initial concerns over security, the cost savings of installing these meters turned doubters into believers, says Van Dyke. The cost savings “changed the value proposition of the IoT device.”

## AGRICULTURE AND IOT

The IoT is an exciting new area of cloud computing that is spilling over into edge computing, says Sam George, General Manager, Azure IoT, Microsoft Azure. One example

of this is a partnership between Schneider Electric and WaterForce, which teamed up to create a farming solution in New Zealand that significantly reduces the amount of water used in agriculture.

The application includes sensors placed in the soil to determine water saturation at different levels. This information is fed to irrigation arms that swing across the fields and water the crops based on the ground saturation data, avoiding areas that don't need to be watered at all. The system also determines the best time to pump water from the rivers into holding tanks, based on upcoming weather patterns, amount of water saturation in the soil, and the price of electricity.

In New Zealand, there are restrictions on how much water farmers can draw from the river. “So it's really important for them to get this right and to also do it at times when the cost of energy for pumping this out is low,” says George.

These farmers have already been able to save two-thirds the amount of energy they were using in just moving water into these holding tanks. “It can be the difference between a failed crop and a crop that is successful,” he says

The impact of IoT is wide ranging. The ability to sense things from the physical world in real time and push intelligence to those things can have a significant effect on an agency. “The Internet of Things can have a dramatic impact on your mission,” he says.

Azure has been in the IoT market for several years and recently deployed into the Azure Government cloud, making the company's Azure IoT Hub available there. The company wants to simplify the IoT; making it easy to build secure, scalable solutions from device to cloud, provision and manage devices at scale, gain insights from IoT data, and infuse intelligence on devices themselves.

Microsoft solutions include:

- Azure IoT Suite: preconfigured solutions for common IoT scenarios
- Microsoft IoT Central: a fully-managed IoT software as a service offering
- Azure IoT Hub: a platform as a service offering and device provisioning service
- Azure IoT Edge: secure distribution of cloud intelligence locally and at scale

The IoT continues to have increasing impact on a variety of business and logistical problems. “IoT projects are quite lucrative, applied in the right way to the right problem space,” says George.