CDW PEOPLE WHO GET IT®

WHAT'S NEXT FOR IoT? THE CLOUD

What are your business challenges? **Build an IT foundation** capable of supporting them — now and in the future.

EXECUTIVE SUMMARY

To many people, the Internet of Things appears to be a near-magical technology, bringing ordinary, everyday objects to life via sensors that effortlessly collect, transmit and store virtually unlimited data. But there's nothing magical about IoT implementation. Like all tech initiatives, IoT deployments are only as successful as the back-end infrastructure that supports them. Behind-the-scenes functions such as processing, storage and firmware management are becoming even more important as IoT use cases evolve.

Organizations across a wide range of industries already achieve new revenue and efficiencies through IoT solutions. These examples are becoming more prevalent as the standards powering IoT-connected sensors and devices achieve greater consistency and adoption. To take advantage of this latest wave of technology, organizations must first provide back-end services that guarantee high levels of interoperability, portability and management. The cloud represents a strategic option for organizations looking to deliver a robust and reliable IoT infrastructure.

How Do You IoT?

For years, people both inside and outside of the IT world read stories in the media about futuristic smart refrigerators that notify their owners when there is no milk, or smart washing machines that can be started remotely (but still must be loaded by hand).

Today, the conversation has largely shifted toward real-world use cases that generate new revenue for businesses, create new efficiencies in the workplace and provide tangible value to their customers. While still in its infancy, the IoT applications with the greatest impact are those that identify new ways to leverage easily collected data for very practical purposes.

In the consumer space, wearables that help people to track their health and fitness goals are thus far the biggest winners. In retail, companies are finding new ways to connect with customers and deliver better shopping experiences through mobile beacons and mobile point-of-sale solutions. Cities use sensors to give citizens real-time access to information about traffic, parking and other facets of urban life. And across industries, organizations are saving money through smart lighting and the integration of energy management systems.

16.9%

Compound annual growth rate of the worldwide IoT market as it balloons from $655.8 billion in 2014 to $1.7 trillion in 2020[1]

It's not enough to simply come up with a good idea for wringing new value out of commonplace information. Organizations must also figure out how to store, transport and process that data in such a manner that the costs don't outweigh the benefits.

In some instances, the sheer amount of data creates challenges; for example, smart security cameras that capture high-definition video and analyze the footage in real time to check for anomalies. In others cases, there is no existing power or connectivity to support the solution — for instance, sensors that check to make sure a city's fire hydrants are functioning properly — and no business case to be made for investing in miles of new cabling. Even relatively straightforward IoT initiatives require robust and sophisticated back-end infrastructures. And a solid cybersecurity infrastructure must be implemented to ensure that all of these new connections do not create new vulnerabilities.

Enterprises already commonly rely on public cloud providers for storage, computing and other Infrastructure as a Service functions in their day-to-day operations. Cloud infrastructure can help to support IoT initiatives, as well. In fact, a number of public cloud vendors are already making a push in the IoT space. For example, the Azure IoT Suite from Microsoft enables organizations to integrate the various devices and operating systems in an IoT initiative with advanced analytics and machine learning tools that help to capture insights from data.

Looking ahead, some industry observers foresee full-scale IoT Platform as a Service tools that will integrate back-end systems, real-time analytics, mobile device management and other aspects of an IoT deployment.

Future-Proofing Through the IoT Stack

For years IT professionals have designed and implemented new solutions using a standardized, seven-layer model. Today, a new seven-layer IoT stack has emerged as an industry standard:

1. Physical Devices and Controllers (the "things" in IoT)
2. Connectivity (communication and processing)
3. Edge Computing (data element analysis and transformation)
4. Data Accumulation (storage)
5. Data Abstraction (aggregation and access)
6. Application (reporting, analytics and control)
7. Collaboration and Processes (includes people and business processes)

The IoT World Forum Reference Model's seven-layer stack represents more than just a handy way to organize the IT department's think›ing about new IoT solutions. Because the model establishes a foundation that provides room for growth and agility, building solutions and strategies against it helps future-proof IoT initiatives.

In the coming years, existing vendors and startups are likely to produce new IoT solutions that aren't even a blip on innovators' horizon today. Organizations that do not build up an IoT environment around a standardized model risk sizeable compatibility problems down the road.

In particular, the Data Abstraction, Application and Collaboration and Processes layers of the IoT stack represent prime opportunities to leverage cloud-based resources.

IoT Fuels Modern Manufacturing, Powers Modern Cities

The manufacturing floor may seem miles removed from the state-of-the-art, high-tech imagery commonly associated with IoT. But it's a place where the automation and just-in-time interventions made possible by the strategic use of data can have an enormous, practical business impact.

Food processing company SugarCreek used IoT solutions to integrate operational technology and IT when the business recently expanded its manufacturing facility. One major benefit of the initiative is increased collaboration and communication between employees in widespread physical locations. A network of 260 video cameras allows remote employees and partners to watch operations and assist with maintenance from offsite locations. Cameras positioned over product flows assist with quality-control efforts. The company even outfitted employees' hard hats with radio-frequency identification (RFID) tags, helping to generate workflow productivity data and locate workers in the

[1]SOURCE: IDC, "Explosive Internet of Things Spending to Reach $1.7 Trillion in 2020, According to IDC," June 2, 2015

case of an emergency. The facility also incorporates tools such as Cisco WebEx, unified instant messaging and digital signage.

To make the IoT-powered facility a reality, SugarCreek needed to invest not only in each of the disparate tech solutions, but also in a robust wireless infrastructure to connect those solutions with one another. The investment is expected to pay off for SugarCreek in the form of increased efficiency and productivity. The company anticipates that the IoT deployment will help to increase the facility's labor utilization rate from about 80 percent to well above 90 percent.

In municipal government, many cities turn to IoT solutions to improve public transit service, streamline utility delivery and gather data to drive quality-of-life improvements. Chicago, for example, deployed hundreds of sensors on streetlight poles to monitor temperature, humidity, noise, air quality, and traffic from cars, pedestrians and bicycles. Through this "Array of Things" initiative — a partnership between Chicago, the Urban Center for Computation and Data, the University of Chicago and Argonne National Laboratory — the city aims to optimize traffic signals, relieve congestion, improve air quality and give businesses access to traffic pattern data that will help them better schedule operating hours to meet peak demand.

47%

Percentage of IT professionals who see security, more than any other factor, as a barrier to moving more services to the cloud[2]

Other popular IoT initiatives at the city level include the use of smart utility meters, gunshot detection systems that can improve police response times, and smart parking and traffic initiatives that give citizens access (usually via mobile apps or digital signage) to real-time information about open parking spots and optimal driving routes.

Public discussions about these programs naturally focus on the innovative solutions rather than the back-end systems supporting them. But investments in connectivity, storage, computing and security — either on-premises or in the cloud — make these solutions possible.

IoT and Retail

For IT professionals in the retail sector, IoT has proved to be both intriguing and challenging. On one hand, the ability to increase communication with (and provide more information to) shoppers has the potential to dramatically improve the buying experience and help stores convert more sales. On the other hand, the success of many prospective retail IoT use cases depends heavily on participation by customers, who may feel wary about sharing their data with large companies or simply confused by multiple stores rolling out many different types of programs.

Mobile beacons have been widely discussed as an IoT tool that could potentially prove disruptive for retail. These devices can track foot traffic, transmit Wi-Fi signals and deliver special customized offers to customers' mobile devices. According to some projections, the number of mobile beacons deployed worldwide will hit 8 million by the end of 2016 and explode to 400 million by 2020. There is also evidence that customers are open to the idea of becoming, in a manner of speaking, the "things" in retailers' Internet of Things initiatives. A 2016 study from the public relations firm Walker Sands showed that 70 percent of consumers would be willing to opt in to in-store tracking and mobile push notifications if properly incentivized.

The early evidence concerning the effectiveness of mobile beacon programs is mixed. According to the Walker Sands report, only about 1 in 20 consumers already use them. Additionally, more than half of shoppers say they have concerns about privacy, security and message overload. The Kohl's department store chain tested mobile beacons in a 22-store pilot, but eventually removed the devices, with the company's chief technology officer saying that pushing special offers to customers results in "too much noise."

Other IoT use cases in retail include smart mirrors that can recognize clothing articles and target shoppers with deals on those items, video analytics systems that provide detailed information about how shoppers move through a store, and the use of RFID tags on merchandise to allow retailers to track the location and availability of assets and automatically generate new orders.

CDW: Your IoT Partner That Gets IT

One of the major challenges presented by IoT initiatives is that they require enterprises to merge operational technology and information technology, often for the first time. CDW has

Hyperconvergence, IoT and the Cloud

A number of enterprises are turning to hyperconverged solutions — such as NetApp and Cisco Systems' FlexPod — to simplify their data center deployments. These solutions are sometimes referred to as "infrastructure in a box." In a hyperconverged model, a software-centric architecture integrates computing, storage, networking and virtualization into one commodity hardware box, which is supported by a single vendor.

Hyperconverged solutions are often identified as natural fits for IoT deployments. Because the model provides the computing power necessary to analyze data alongside storage and networking functions, data can be analyzed "at the source." This can greatly reduce hardware spending, and can also help to prevent data breaches.

Vendors and industry observers frequently compare hyperconvergence to the cloud, pointing out the similar scalability benefits of both options. In particular, an enterprise doesn't need to make a big investment in new infrastructure in order to expand, so hyperconvergence offers a level of flexibility that is attractive to many organizations.

[2]SOURCE: CDW, "Cloud 401: Navigating Advanced Topics in Cloud Computing," February 2015

assembled an IoT and Digital Transformation Team to guide organizations through this process.

The IoT and Digital Transformation Team includes business architects with deep experience in both OT and IT infrastructure, across a broad swath of industries. Business architects can help companies create comprehensive IoT and digital transformation strategies while reducing the complexity that often swirls around new IoT initiatives. The IoT and Digital Transformation Team orchestrates the appropriate resources for any IoT deployment, and brings with it the subject matter expertise required to successfully deploy and manage this new infrastructure.

35%

The portion of IT services currently delivered either totally or partially via the cloud[2]

CDW also offers in-depth advice from dedicated cloud computing experts who walk enterprise IT decision-makers through available options for cloud-based storage, computing, backup, security and more, further enhancing IoT initiatives and allowing for more rapid deployment. Our cloud experts ensure that each organization receives personalized, end-to-end support, from the assessment and design phase to deployment and ongoing management of custom cloud solutions. CDW's Infrastructure as a Service partners include industry leaders such as Microsoft Azure, VMware vCloud Air and Oracle Database Cloud Service.

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