No. 7 IN A SERIES

IBM Point of View: Internet of Things

The Internet of Things

Driving transformation for inventors and operators by focusing on the things that matter

In 2008, IBM set a bold agenda for a Smarter Planet—a global movement built by infusing *instrumentation, interconnection and intelligence* into the systems that drive human progress and economic growth. Over six years, IBM has helped the systems of our world become:

- *Instrumented* with billions of smart sensors and mobile devices
- *Interconnected* through countless networks, applications and data centers
- *Intelligent* as data is transformed into real-time actionable insights at massive scale.

Today, IBM is helping organizations create the Internet of Things (IoT) by leveraging cloud, analytics, mobile, social and security technologies. We believe that the next wave of IoT value creation will be led by those who are focused on inventing new capabilities based on instrumentation and intelligence, and by those that leverage intelligence to create and operate complex interconnected systems.

Invention of capabilities

The invention of new capabilities will redefine every industry. The things that we rely on today in our homes and businesses—everything from heavy equipment to pace makers to televisions—will be reinvented with new capabilities that improve functionality, reduce costs, and set new standards of availability. And every day value is created as new things are invented—from wearable fitness devices to exoskeletons to drones—each instrumented and architected as part of new systems.

Operation of systems

The operation of old and new systems, now integrated with intelligent things, represents a new frontier of value. Each system can become its own interactive, reactive, adaptive, intelligent network of not only things, but places and people. For those that already rely on complicated systems, success means a greater understanding of how things work together, of how long equipment will last, of how efficient business can be. For those that can extract value from the system itself or connect disparate systems to one another, there is opportunity to deliver new services, upset long-standing business models, and find new and radical ways to connect people to the world around them.

What's changing in the world?

Exponential instrumentation is the genesis point for understanding the world around us. Billions of things are now instrumented and generating data. There's a fundamental need to bring the *right* things together, to drive integration at relevant points. To gain access to and harness the full potential of data through the creation of new connections.

Universal interconnectedness is generating new points of data between individuals, devices and organizations. As you gain access to this IoT data, you must have integrated systems in place to securely store the data, analyze it for insights and then act on those insights in real time to make the right decisions—whether you're building a connected car, optimizing production assets or improving patient care.

New levels of business insight and consumer demand are driving a new innovation agenda. As barriers to entry fall and new competitors emerge, increased responsiveness and automation are today's keys to gaining market advantage and creating competitive differentiation.This is true whether you're focused on redefining entire industries or achieving incremental efficiencies.

What's at stake? Why act now?

Without the right connections, instrumentation shifts from competitive advantage to unmanageable complexity. In the IoT, the value of "things" is measured not only by the data they generate, but also by the way those things securely respond to and interact with people, organizations and other things. The increasing complexity of instrumented connectivity requires that you create and manage those connections today to achieve success tomorrow.

Your opportunity to radically elevate your business is now, before the rest of the pack catches up. As the IoT becomes mainstream reality, consumer demand that organizations do something meaningful with it will grow. Personalize, customize, and deliver a differentiated experience. Predict next best actions and proactively address maintenance issues to eliminate downtime. But do it securely and maintain privacy, or lose your best customers for life.

Innovation in isolation will not succeed. As you take risks and turn ideas into experiments, you should be prepared to operationalize your idea before someone else does. What starts as small-scale experimentation must be capable of scaling rapidly to global production, manufacturing and distribution—and all that entails—without disruptions or service degradation. You must build things with systems in mind.

How do you act strategically?

1. Control and secure the data already streaming from instrumented devices.

Build new products with interconnections in mind. Understand that the data generated is available for application across the value chain. Use data to make adjustments in real time—not necessarily to change the device itself, but to tranform the way people interact with it. Redefine how you control that data and use it to securely deliver value at every point in the system, while maintaining privacy.

2. Analyze data and act on the insights, applying them where they matter most.

Take into account the physical nature of things, using technologies specifically designed to provide context and a predictive view. Enable things to connect with back-end systems that support your ability to act on the data, positioning you to move without pause. Build a central nervous system that connects data insights to organizational (or individual) response.

3. Design new products and services to take advantage of intelligent systems.

Seize the opportunity to disrupt the status quo to your advantage. Start with projects that promise clear ROI—implement predictive maintenance or build a new customer interface app. Study usage patterns, refine your approach and optimize your processes. Then embrace that momentum and expand your vision, moving quickly but thoughtfully with partners and proven technologies you can trust.

How can IBM help?

IBM delivers the foundation of a successful IoT implementation. From application infrastructure, to cloud connectivity and integration, to enterprise-level mobile support, IBM understands how to make IoT a part of your IT infrastructure. We help businesses use the IoT to optimize business processes that simplify and accelerate the integration of diverse applications and business data across dynamic, heterogeneous environments.

IBM provides purpose-built and custom-designed IoT analytics solutions that help you understand the physical nature of things, the relationships between things, and the data they generate. We'll tap into our extensive industry expertise to provide the insights you need to understand and optimize how the "things" in your world act, securely integrating their data with your processes. And we enable your back-end systems to be open to supporting a full range of applications, allowing you to confidently and rapidly apply real-time IoT insights to your business.

IBM provides systems for rapid prototyping and experimentation, helping you achieve reduced costs, less downtime and higher revenues. Offerings like IBM Internet of Things Foundation and IBM BlueMix allow your team to quickly and easily create, deploy and manage applications on the cloud. And when you go from 50,000 users to a million overnight, we help ensure your infrastructure—on-premises servers, private cloud or hybrid cloud—is capable of rapidly scaling to seamlessly keep up with demand.

Why IBM:

At IBM, we understand that the Internet of Things is an integrated fabric of devices, data, connections, processes, and people. We're proven global leaders in the technologies that allow you to capitalize on the IoT—Cloud, Analytics, Mobile and Security. We understand the IoT is based on a careful balance between both the Internet and the things within it—locally and globally, in the design lab and on the assembly line, whether in buildings, on roads, and in our very own pockets.

We respect the unique challenges of integrating Internet technologies with physical infrastructures to measure things like engagement, occupancy, flow, torque and vibration. We recognize that an effective IoT strategy requires the participation of front-line operations, lines of business, and all of IT—the CIO, CTO and CISO. And we offer a proven framework that lets you embrace all that the IoT offers without losing control of what matters most to you and your customers—privacy and security.

I invent new capabilities.

IBM can help you design, operate and manage the things you make for optimized performance. We can help you mitigate warranty costs, minimize product recalls and gain new insights into customer use patterns that will empower entirely new levels of product and service innovation.

I operate systems.

IBM can help you bring things together from multiple vendors across heterogeneous environments, optimizing the whole to be greater than the sum of its parts. We deliver the insights that enable you to reduce utility costs, optimize compliance and exceed customer expectations. And we offer exceptional levels of privacy and security.