

Cognitive IoT: Making the Internet of Things Deliver for All of Us

By Harriet Green- GM, IBM Watson IoT

The early visionaries of the Internet of Things, IBM's thought leaders among them, foresaw a time when practically any physical object could be equipped with sensors and hooked up to the Internet to translate the physical world into digital information.

They were focusing on factory assembly lines, electrical grids, automobiles, highways, buildings, and the like. The goal was to gather streams of information from sensors that could be used to automate processes—such as balancing supply and demand in a power grid—and operate more efficiently.



The IBM Watson IoT campus in Munich

Today, these applications have become mainstream, so it's time to take advantage of a second generation of Internet of Things technologies and capabilities—something we at IBM call the Cognitive Internet of Things.

Cognitive IoT technologies will make it possible for business leaders to understand what's happening in the world more deeply. By infusing intelligence into systems and processes, businesses will be able to not only do things more efficiently, but to improve customer satisfaction, to discover new business opportunities, and to anticipate risks and threats so they can better deal with them.

As powerful as today's sensor networks are, they aren't up to the task of unlocking the complex interrelationships between people, places and things that drive business and the economy. To reach the next level, businesses need cognitive technologies that enable them to gather and integrate data from many types of sensors and other sources, to reason over that data, and to learn from their interactions with it.

Think of it this way: First-generation IoT technologies gave us nuggets of information that could make a big difference in achieving operational efficiencies. The next generation creates vast communities of devices that share information, which in turn can be interpreted in a larger context and managed by people using cognitive systems. In the era of Cognitive IoT, no machine is an island.

Today, as IBM opens the doors to the world headquarters for our IBM Watson IoT business in Munich, Germany, we're making a bold statement about what it will take to reap the full benefits of the Internet of Things—the addition of cognitive technologies. We're asserting our global leadership of a “movement” that billions of people will benefit from and many organizations will help propel forward.

IBM has a broad portfolio of technologies for managing the data gathered from sensors. We're working with the UK's utility provider, National Grid, to proactively maintain the health of the grid, keeping the lights on across Britain. We're working with Vodafone in Spain to analyze information from sensors in cities—energy, water, emergency management, healthcare—to improve operations and the quality of life. And, in Germany, we're working with Robert Bosch to develop smart, connected automobile products.

These days, about 90 percent of the data that's gathered by sensors is lost or thrown away for a variety of reasons—including bandwidth limitations and constraints driven by

security and privacy. In addition, a wealth of unstructured data is available from sources ranging from news Web sites to call centers to social networks. With our new cognitive IOT capabilities and Watson, our clients can combine all of these diverse sources of data in real time, understand what's going on more deeply, and derive valuable insights.

We're adding several cognitive technologies to our IoT portfolio— machine learning, natural language processing, video and image analytics and text analytics. Our clients and business partners will be able to tap into these capabilities in the cloud to enhance existing IoT-based applications and build new ones. More cognitive capabilities will be added in the coming months.

In addition, working with leaders of industries, we're creating industry-specific solutions that combine IoT and cognitive—starting with telecommunications, real estate, aerospace and retailing. For decades, IBM has worked with some of the largest banks, financial institutions, insurance companies and others protecting security of these clients. We have 48 cloud data centers across the globe giving clients the choice of locating their data where they want it.

To give you a clearer picture of the shift that's underway, let me lay out a scenario. Imagine a large department store. Today, facilities people tap networks of sensors to better manage the temperature and energy use. Tomorrow, thanks to cognitive technologies, the store, essentially, becomes self-aware.

The store bristles with embedded technology. It's blanketed with unobtrusive video cameras. Sensors on merchandise and shelves are hooked up to the network—as are shoppers who have agreed to be connected via smart phone apps. Audio speakers facilitate two-way conversations with people and gather information about what's being said. A cognitive system combines all of this sensor data with information gathered about the local weather and news, social networking streams, and sales trends.

These new capabilities enable managers to understand what's going on in the store in real time, interact with shoppers, and anticipate changes. If it's raining outside, digital signs in the store might direct shoppers to umbrellas, rain gear or hair-care products. Video analytics tools discover the demographics of people buying certain items. If a

large number of shoppers pick up an item but don't buy it, machine learning algorithms spot patterns that signal what's going wrong. Stores will be able to provide shoppers with cognitive assistants—via their smart phones—that know them and provide them with superior in-store experiences.

There are a host of other situations where Cognitive IoT can make a big difference. For instance, an airline might combine data from sensors measuring stress on aircraft with turbulence data to optimize maintenance schedules—potentially heading off expense repairs, or God forbid, a failure in flight.

I have had a long career driving transformations in organizations, most recently as CEO of Thomas Cook Group, the European travel company. Earlier, I drove change and digitization in the electronics and enterprise technology industries. In those leadership roles, I bought and used a lot of information technology, so I'm attuned to what makes a difference for business leaders. That's why I'm excited by IBM's vision for bringing insights from Cognitive IoT into organizations.

Our new headquarters in Munich is going to be a workshop for Cognitive IoT. It's a major down payment on the \$3 billion we committed to investing in IoT over the next three years. When visitors arrive to this campus-like environment, they'll be drawn into stunning interactive spaces where they can learn about the potential of Cognitive IoT. But to me, the most exciting thing is the collaboration spaces. Our engineers, designers and domain experts will work closely with their counterparts within clients and business partners to create new technology solutions capable of transforming industries and professions.

This is where the IoT "movement" really gains traction. I can't wait to help lead us to the next level.