**Harvard Business Review**

# TRANSFORMING CUSTOMER EXPERIENCE WITH THE INTERNET OF THINGS

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**ANTON JOOSTE**

**GROUP PRINCIPAL DIRECTOR: INTERNET OF THINGS, NETWORKING**

**DIMENSION DATA**

There has been a lot of noise around the potential value that the Internet of Things (IoT) will bring to businesses, but—as with many new technology trends—that optimism is often met with cynicism. All too often the Next Big Thing turns out to be more hype and less real business benefit.

For IoT to deliver real business value, it's critical, however, for people to stop thinking about IoT as simply a collection of connected sensors and devices. For the Internet of Things to deliver on its promise, sensors and devices need to leverage the power that modern analytics systems provide.

It's the combination of the data collected at the edge of the network, the networks themselves, and the big data analysis that make up what we see as true IoT.

Our experience is that, in contrast to many other technologies that take time to deliver true business value, IoT projects are already providing tangible benefits to organizations that have approached them with clear business needs in mind.

We've seen that companies that are focused on the business outcomes from the start of the project are those that see real value. Organizations that try to solve a number of disparate business problems find that a lack of focus is less likely to lead to success.

A key example of how the focus on key business objectives delivers real value is our work with Tour de France organizers, Amaury Sport Organisation (A.S.O.).

The Tour de France has continuously evolved over time, starting in 1903 with the aim of selling more *L'Auto* newspapers, through to the introduction of radio and then television coverage. The move to digital platforms was the next logical step.

From the outset, A.S.O. focused on bringing the race into the digital era. For them, the objective was to embrace the benefits of digital technologies and leverage this to protect broadcasting rights and open up new revenue streams.

The core of the solution is IoT: attaching GPS devices on every bike in the race peloton and relaying the location data back to a central location. But the business value isn't achieved from the devices alone; the value to A.S.O. is from the services that turn the raw data into information that the fans can use to better understand the challenges, tactics, and race strategy during every stage of the race.

The same focus was critical to the success we had in our efforts to reduce rhino poaching in a private game reserve in South Africa. By using sensors and cameras, we were able to track all the people entering the reserve and, through the application of analytics, were able to cut the incidence of poaching in the reserve by 96 percent.

It's the same with any other IoT implementation. It requires a clear understanding of the desired outcome and the delivery of smart services that turn raw data into actionable information and drive the strategic goals of the organization.

The Internet of Things is a fundamental part of the broader conversation about digitization that almost all organizations are having at the moment. For many companies, their approach will determine their future success, and clear business objectives are, as with so many other technology projects, at the heart of it.

To see more about our Connected Conservation project, go to our VR experience at **dimensiondata.com/virtualtour**

# TRANSFORMING CUSTOMER EXPERIENCE WITH THE INTERNET OF THINGS

Lisa, a student at Deakin University in Melbourne, Australia, is running late to class. Knowing she's not going to make it through that 8 AM lecture without coffee, she's grateful when her phone pings as she's approaching the cafeteria. Would she like her usual double-shot latte? She presses yes, and her order is placed, paid for, and waiting for her by the time she walks in the cafeteria door. As she runs into the poli-sci building, a message flashes on a nearby screen to tell her that her class has been moved to room 204 for today. This saves her at least three minutes, and she just makes it to class on time.

This personalized student experience is made possible by Deakin's use of sensors, location-based services, predictive analytics, and artificial-intelligence-based agents. Deakin is not alone. Organizations in a variety of industries are leveraging the Internet of Things (IoT) and its underlying technologies to create a more compelling, engaged customer experience across the digital and physical worlds. In fact, improving the customer experience was the number-one driver for IoT adoption in a recent survey by Harvard Business Review Analytic Services, named by 58 percent of the more than 300 business leaders who responded.

While connected consumer products like fitness trackers, home digital assistants, and connected cars are becoming familiar commodities, IoT as a platform for customer experience is not just for consumer product companies. In one form or another, it is becoming a critical component for almost any business. In this paper, we will explore applications in sports, healthcare, and education.
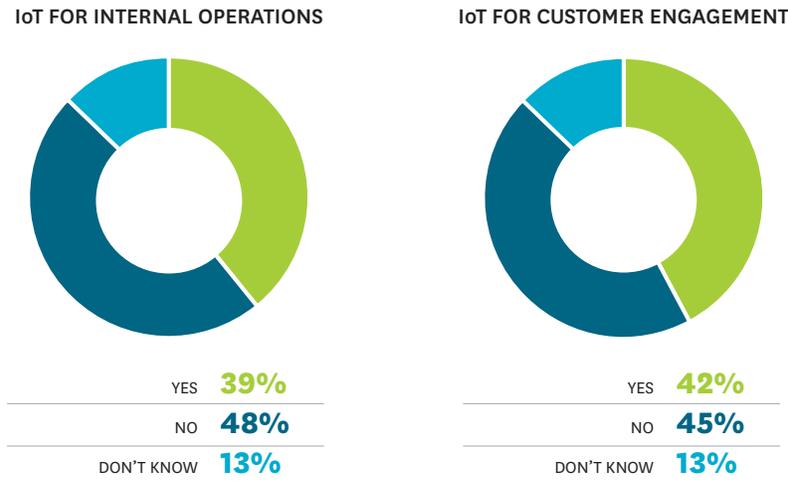
"There are two spaces where the Internet of Things can have a big impact," says William Confalonieri, chief digital officer at Deakin, which has five campuses and more than 55,000 students. "One is [to drive] efficiency." At Deakin this means optimizing building utilization, heating, and lighting, based on the movement of students throughout the campus and the analysis of these trends over time.

"The other is as an engagement platform to take the customer experience to a completely different level," Confalonieri says. Survey respondents, who represent a variety of industries and geographies, are pursuing both operational efficiency and enhanced customer engagement through their use of IoT. figure 1

FIGURE 1

## OPERATIONAL EFFICIENCY AND CUSTOMER ENGAGEMENT THROUGH IOT

Percentage of respondents pursuing both operational efficiency and enhanced customer engagement through their use of IoT.

**IoT FOR INTERNAL OPERATIONS**

| | |
|---|---|
| YES | **39%** |
| NO | **48%** |
| DON'T KNOW | **13%** |

**IoT FOR CUSTOMER ENGAGEMENT**

| | |
|---|---|
| YES | **42%** |
| NO | **45%** |
| DON'T KNOW | **13%** |

**SOURCE** HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, SEPTEMBER 2016

By combining location and proximity services with personal information overlaid with sophisticated analytics and intelligent agents, Deakin aims to "deliver a personalized, inspiring, beautiful experience to every customer," Confalonieri says. The screen that let Lisa know about her reassigned classroom is one of 1,000 spread throughout Deakin's campuses that recognize individual students as they approach and that serve up information tailored to that student's schedule, interests, and needs.

Market research firm Gartner forecasts that there will be 8.4 billion connected things in use worldwide this year, up 31 percent from 2016. This will more than double by 2020, to 20.4 billion connected devices . Much of this growth will come from initiatives that benefit and provide greater engagement with customers.

## ENGAGING SPECTATORS AT THE TOUR DE FRANCE

Not all customer-focused applications of IoT are as direct and personal as Deakin's. Amaury Sport Organisation (A.S.O.) has been using IoT for three years to track the movement of riders during the long and often grueling Tour de France. By placing trackers under the saddles of riders, A.S.O. is able to provide fans with very specific information about what is going on in the race—the speed of individual riders, their position, the climb they are currently facing, and more. "This allows us to take a 'second screen' approach [providing supplemental content through mobile devices to fans watching on TV] and provide more data in real time in order to tell new stories in new ways," says Adrien De Cheveigné, head of digital for A.S.O.

By placing trackers under the saddles of riders, A.S.O. is able to provide fans with very specific information about what is going on in the race.

Collecting this data is challenging. "Being an outside event, it's not like providing performance data in the controlled environment of a football stadium," for example, De Cheveigné explains. Riders cover 150 to 300 kilometers a day, traveling through the Alps, the Pyrenees, and remote villages. Official race cars and TV motorcycles collect the live race data from the trackers and then transmit it to helicopters or planes overhead, which then send it back to A.S.O.'s technology partner's big data truck. Here, it is combined with other race data—how many riders started the race, how many have left, the day's course, etc.—as well as things like weather data and descriptions of the areas the riders are passing through.

"There are many data points coming into the systems," says De Cheveigné. "This is key to give new insight into what's happening in the race." For example, if a particular segment seems slow, it may not be because the riders are tired; it may be because they're facing a strong headwind. "This is how we make the race easier to understand and more engaging for the audience in all media." The three Vs of big data—volume, variety, and velocity—are in full play here, providing a competitive advantage to A.S.O. by being able to customize the race experience to different audiences through their second-screen experience.

In the case of the Tour de France, customer engagement comes from providing access to information that was never available before, putting it in a context that has meaning and presenting it to audiences through their channels of choice. A.S.O. takes a different approach to IoT in its operation of mass participation events like marathons, in which the "things" (wearable fitness trackers) are owned by the participants and operate in another company's ecosystem. "The main challenge here is to connect to the platforms that already exist," says De Cheveigné. This is done through APIs once users grant access to their data. Runners use the app to track their training results and compare them to other runners in their class leading up to the race. To encourage user adoption— always a challenge with something new—A.S.O. suggests different ways of training, and there is a gamification element, as users unlock badges when they achieve certain results. "We're creating a customer journey that is longer than just the race," he says. Users maintain control of their own data.

## ENGAGING PATIENTS AND STAFF IN A SMART HOSPITAL

A public health organization in Belgium is integrating IT, unified communications, and the hospital's operational technologies to create a higher-performing hospital environment. Intercommunale de Santé Publique du Pays de Charleroi (ISPPC) is adding intelligence to the systems that control nurses' calls, building operations, and safety as well as refrigeration units that store organs and blood. "Our objective is to have real-time monitoring of the physical world and take actions in the digital world for location services, better response time, and, above all, the ability to provide better, more proactive patient care," says Jean-Pierre Binon, director of Information Technologies and Communications. "It is by being proactive that IoT adds the most value."

The hospital's first big win has come from monitoring temperatures of refrigeration units—over 700 fixed refrigerators and freezers that store critical supplies, such as grafting organs, medicines, blood products, and laboratory reagents. "If a temperature threshold is exceeded, an alarm is triggered, with a notification sent via buzzer, email, or voice message (or all three), depending on the equipment," Binon says. In the three years this application has been in use, none of these supplies have been lost. The hospital adds location and time elements for blood bags that leave the laboratory in Frigo Boxes for potential patient use. If the blood has been kept within a certain temperature range and is returned unused within a window of four hours, it can be saved for use by another patient. Knowing exactly where the unit is makes it possible to recall it once that time limit approaches.

In the future, ISPPC will add more direct customer engagement elements to its IoT program, such as using digital signage to direct patients to the right department inside the hospital, based on location data from their mobile device or hospital bracelet. Creating greater efficiency and effectiveness today is the foundation layer to creating a greater patient experience overall.

## START WITH STRATEGY AND A FOCUS ON BUSINESS OUTCOMES

Without a clear business outcome in mind, bringing IoT into the customer space can lead to some head-scratching and potentially costly solutions and dead ends (like the connected hairbrush, salt shaker, toaster, or egg tray). Organizations that start with a business outcome and then tie their IoT initiatives to meeting a real customer desire or need are much more likely to succeed.

The impetus for Deakin's leadership team was initially broad—and extremely compelling: "to eliminate the risk of becoming irrelevant" and to differentiate Deakin from other universities, says Confalonieri. They set out to create a smart campus that responds to the individual student and to tie digital capabilities into everything they do. "It is about having intimacy with the customer on a massive scale," he says. One of Deakin's five campuses is virtual, with students who never set foot on a physical campus. This reality has impelled a lot of their digital initiatives. But "we also have a big number of students who come to campus," Confalonieri says. "We decided we needed to deliver something special for [both]." The Internet of Things is what makes this possible in the physical environment.

IoT done right fulfills the promise of digital business: the ability to exploit information for real business value at unprecedented speed. It's not just about collecting and communicating information but creating insight in real time in order to anticipate and satisfy customers' next intention or desire, such as helping students find a quiet place to study nearby or to locate and connect with their friends on campus. This has led to real results. "Our numbers, our growth, is impressive compared to the rest," says Confalonieri. He attributes this to the university's reputation for both "excellent teaching and digital innovation." Leading in student satisfaction for seven years in a row has helped in recruiting and had a direct and positive impact on the bottom line.

A.S.O.'s efforts have been driven by the evolution of media, from newspapers to television to today's always-on, real-time demand for rich information. For this year's Tour, A.S.O. is creating a more personalized experience for fans and media partners through the development of a number of different use cases that can be activated on demand. For example, members of the press want specific data that will appeal to a broad audience, while core fans want access to all the data, tweets, and news flashes they can get. Someone who is more of a travel buff than a sports fan can get detailed information about the villages and countryside through which the race is passing. In the future, this personalization will include geographic elements, such as fans, from Japan being

> Serving up rich and relevant stories from masses of data across a variety of channels requires huge processing power and flexibility.

able to get data on their country's riders through LINE or Snow, not just the usual social platforms. "We will make the right data available to the right people," says De Cheveigné. This is helping to generate new sources of revenue, as A.S.O. is able to attract new audiences to the sport.

## NETWORKS, PLATFORMS, AND PROCESSING POWER

Needless to say, serving up rich and relevant stories from masses of data across a variety of channels requires huge processing power and flexibility. The big data truck used at the Tour de France is an integration and mobile collaboration workplace that enables A.S.O. and its technology and data providers to deliver data services from the field. Around a dozen people, working with a distributed team using various collaboration tools, make sure the data arrives from the course, create the right feeds and infographics, and deliver the insights and services to consumers and media partners. The actual processing power is delivered through the cloud.

ISPPC has developed its own IoT platform in-house. Called SERVAL, it is "a key element of a smart hospital," says Binon. "It is the orchestrator between all the connected objects on the one hand and the unified communications and actuators [buzzers, automatic door closure, etc.] on the other." For the hospital's security program, this lets ISPPC integrate fire detection, access control, intrusion detection, surveillance cameras, IT alarms, and personnel mobilization.

A robust network is key to harness the business benefit of any IoT project. The network must be able to scale the IoT opportunity across the wireless network, the organization's (often hybrid) wide-area network, and the data center and to take future needs into account. Deakin built its IoT capabilities on top of an earlier project to have high-quality Wi-Fi everywhere on campus. Confalonieri and his business partners have since defined four pillars to reshape their relationships with customers. In addition to the Internet of Things, this includes artificial intelligence, blended (or augmented) reality, and predictive analytics. "You need those four things working together to create a new, smart, inspiring, beautiful reality surrounding your customer," Confalonieri says.

### PRIVACY AND SECURITY IN THE INTERNET OF PEOPLE

Customer-facing applications of IoT, like Deakin University's, transform the Internet of Things into the Internet of People. Tracking location data, personal preferences, and other information can be sensitive. Deakin addresses this by having users opt in to every service they use and providing them with a personal information dashboard so they can see (and adjust) what information is being shared. This is backed up with the university's robust "Deakin Shield" cybersecurity program.

## CONSIDER THE CYBER RISKS

Traditional perimeter defense strategies aren't effective in securing IoT environments, which have inherently open designs that often lack appropriate security controls. Security must be embedded very close to individual configuration items. However, device manufacturers often default to lower security measures in order to keep costs down—something of which inexperienced users may be unaware. According to a 2017 Global Threat Intelligence Report, over a six-month period, global honeypot sensors determined that two-thirds of IoT attacks were attempting to discover specific IoT devices, such as a particular model of video camera. IoT devices can be both a source and a target of attack. Leaders deploying IoT must make security a primary consideration for all their projects and operational technology device purchases.

## CONCLUSION

The digital economy is really both digital and physical, and the Internet of Things is what makes possible the blending of these two worlds. While there is much to be gained in the way of operational efficiencies with IoT, there is just as much opportunity to leverage it to create exceptional experiences for customers. Leading organizations are putting in the platforms, networks, and infrastructure to enable this new way of operating while testing and learning from experiments with their customers. They start with their desired business outcomes and a broad strategy and then adjust, based on results and customer response. IoT is finding its way into almost every business's customer experience, not just consumer goods companies. The very different examples shown here give just a glimpse at what is possible.

### FOUR THINGS TO REMEMBER:

1. **Start right:** Know what outcomes you want to achieve and build a customer experience strategy around that. Identify the insights that will make a difference to your business, and think broadly about what information will help generate that insight.

2. **Innovate quickly:** Take a test-and-learn approach, and fail fast. Deakin does a lot of prototyping in its digital future lab. A.S.O. team members are always experimenting with what data to display over Snapchat, for example, versus on TV. "Use 'failures' as learning for the next situation," says Deakin's Confalonieri.

3. **Nail the fundamentals:** A connected strategy requires a robust network, scalable data platform, and sophisticated approach to security. While getting to market quickly is important, a broken or slow experience or security breach can quickly reverse any competitive advantage.

4. **Don't go it alone:** Work with great partners. For A.S.O., that includes its technology provider, the media outlets it works with, social platforms, fans, and more.

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