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Internet of Things: Convenience vs. privacy and secrecy

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Abstract In this article we introduce the Internet of Things to the broad managerial community and explore one of its central tensions: convenience vs. privacy and secrecy. We clarify the ways in which IoT differs from Web 2.0 and then highlight opportunities, challenges, and managerial guidance. In addition, we explore the prominent issue of privacy and secrecy. Due to substantial increases in amounts of consumer-related data and their accessibility as well as potential tradeoffs in benefits associated with IoT and in properties of humanness associated with the consumer experience, the managerial issue of privacy is elevated to a level never before realized—perhaps on par with, or worthy of inclusion as an element of, the classic marketing mix.

1. It's all connected

Suppose a bicycle racer is on a training ride for the Senior Olympics. On the way home, the bike's shifter mechanism for the rear cogs gets a little wonky, making it difficult to use the full range of gears. More energy than expected will be required to propel the bicycle. Getting home is not an issue. However, there are two problems at hand: repairing the shifter and getting a bit more nutritional fuel so as to maintain the desired quality of the ride. Through technology, repairing the shifter may be handled as follows: First, a bicycle internal diagnostic mechanism identifies the problem with the shifter. The bicycle then engages the Internet and communicates the need for a shifter part to the rider's personal hub computer and database. Next, the personal hub, considering time to delivery, part cost, and other relevant factors, either sends out an order to a desired retailer or puts out a bid request to a variety of electronic devices that represent retailers and providers. Finally, a deal is struck and the part is ordered.

The second problem engages a different set of systems and processes. The racer is wearing clothing

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that keeps track of vital signs such as heart rate, hydration, body temperature, energy use, muscle strength, training 'zone,' and foods processed. In addition, this information is processed in real time by insurance providers to assess compliance with agreed premiums or to apply appropriate surcharges in accordance with activity and diet. An onboard mapping system is monitoring current location and can find a variety of places to obtain food or beverage in addition to calculating the distance to a destination. The health-vitals system and the mapping system coordinate in determining the additional energy needed by the rider and where to acquire nutrition to maintain the necessary energy level. A course to the retailer is mapped, as is the ensuing route back home.

Today, many of the systems described in this scenario are available. However, all of the technical aspects of infrastructure and communications to seamlessly facilitate the scenario are *not* in place. But the promise and notion of it is at hand—and reasonably close. Called the Internet of Things (IoT), it can solve problems and create opportunities for a variety of entities, including consumers, providers, employees, organizations, manufacturers, communities, cities, and governments, among others. Along with that, though, it may create new problems and raise concerns and associated costs, such as those pertaining to privacy.

In an accessible and non-technical manner, this article introduces the Internet of Things to the broad managerial community; clarifies the way in which it differs from Web 2.0 and earlier uses of the Internet and related communications; and highlights opportunities, challenges, and managerial guidance, with special attention to the highly prominent issue of privacy.

2. The Internet of Things is watching you

When the Web emerged, organizations and people purchased Internet real estate in the form of domain names and built it out with websites. Consumers shopped and people read the news online, but information applications were typically static and one-way in communication orientation (e.g., provider to consumer). Then Web 2.0 gathered steam. Services allowed for dynamic information in a variety of forms and enabled n-way conversations and collaboration. Blogging, liking, tweeting, writing online reviews, sharing videos and photos, and such became commonplace (see Kaplan & Haenlein, 2010). With social media, people keep private relatively fewer bits of information and reveal secrets more often. Now a new wave of Internet-connected technologies is gaining steam: The Internet of Things (IoT)—a class of devices and associated processes that will lead to sharing and exposing more information and keeping fewer secrets.

Indeed, IoT may impact stealthiness in a variety of situations. For example, when a patient visits a doctor for a checkup, it may be harder to keep secret a lack of exercise and poor eating habits and behaviors. Home insurers may be able to more easily discover that doors to a house were unlocked during a breaking and entering crime. Auto insurers may be able to note when a vehicle exceeded the speed limit. Similarly, IoT could be used to an individual's advantage: It could reveal a flaw or hitch in one's golf swing and consequently correct the imperfection.

Consumers will have a heightened awareness that data associated with their being, actions, thoughts, and emotions are indeed a currency and are associated with their humanness. Thus, as society—including its business landscape—moves into a more ubiquitous technology and information era, consumers will place greater emphasis and importance on data ownership and data flow-related issues such as privacy, and relatively lesser weight on traditional marketing factors such as the marketing mix. Note that marketing mix elements are of the hand of the marketer but consumer data are generated by and of the consumer. These data are reflections of consumers and can be used to characterize and control them. Thus, organizational and marketer performance constructs, such as reputation and brand perceptions, will be based increasingly on privacy and respect for consumer data, which in turn can signal respect for consumers.

3. What in the world is the Internet of Things?

A wide variety of technologies are called IoT devices. It is estimated that there were about 16 billion IoT devices in 2014, and forecasts point to as many as 50 billion devices in 2020 (Clark, 2014; Middleton, Kjeldsen, & Tully, 2013; Press, 2014). Climate control devices like Nest regulate temperature within a building in a way that satisfies consumer preferences and minimizes energy costs. Fitbit products monitor physical activity and associated vital information, such as heart rate and calories burned, in order to enhance health and well-being. Similarly, Ralph Lauren offers the Polo Tech shirt, which also transmits biometric data. Self-driving cars will allow people to leave the driving to machines, and IoT-capable smart cars