

CFO Insights

Capitalizing on the promise—and the power—of the Internet of Things

Over the last 20 years, the Internet has been nothing short of transformative. And judging by the numbers, the Internet of Things (IoT)—a suite of technologies and processes that allows data to be tracked, analyzed, shared, and acted upon through ubiquitous connectivity—may have the same impact in half that time. Consider the following:

- Estimates are that there will be 25 billion embedded devices and intelligent systems by 2020.¹
- Some 44 trillion GBs of data will be emitted from those devices.²
- On a global basis, the IoT will enable some 4.4 billion people to be connected.³
- Overall, the global IoT market is expected to reach \$4.3 trillion by 2024.⁴

How did this happen? In short, the IoT evolution has been driven by a variety of developments across technology platforms. Consider the falling costs of computing power and data storage as well as the emergence of the cloud and advances in analytics, and you can see how sensors can now be placed on almost any device. Marry that with bandwidth, ubiquity, and mobility, and you have all of the ingredients of an ecosystem with endless commercial applications.

Moreover, the speed with which this ecosystem has evolved has allowed scalability and a rapidly rising interest in harnessing the power of the IoT. The result is that almost every company, regardless of sector, needs to think about the potential applications of the IoT—from cost avoidance to supply-chain efficiency to fundamental disruptions of business models. And for C-suite executives, and CFOs in particular, understanding the IoT and developing a point of view regarding its potential ramifications is essential.

In this issue of *CFO Insights*, we will examine how the IoT can influence business models both in terms of cost saving and asset efficiency and in driving top-line growth. In addition, we will address the components of an effective IoT strategy and the metrics needed to truly embrace how the IoT is attracting and engaging customers.

Broad applications, endless opportunities

The potential of the IoT is certainly not lost on the C-suite. In a recent survey, nearly 75% of executives reported exploring or adapting the IoT either ad hoc or in a disciplined, strategic effort.⁵ Moreover, those efforts are creating opportunities in unexpected ways, including Internet-connected wearable fitness monitors, pill bottles that know when you've opened them, manufacturing and retail supply-chain efficiencies, and even tennis racquets that offer information to improve your stroke. Consider some of the following examples:

- Take **health care**. Driven by data- and information-sharing, the potential exists to move from a diagnosis and treatment environment toward a prescriptive monitoring of personal wellness. For the one-third of Americans with chronic illnesses,⁶ for example, there are a number of IoT-enabled devices (stationary, wearables, implantables) available to monitor diabetes, heart conditions, and other ailments; the devices monitor clinical data (for example, blood glucose or heart rate),

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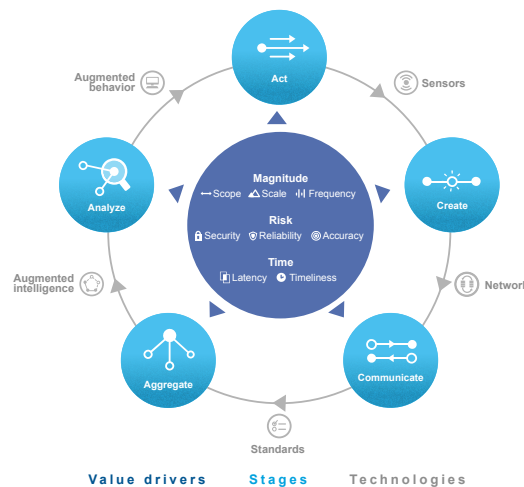


adherence data (for example, taking medications as prescribed), and consumer health data (for example, physical activity).⁷ Feedback to patients can help them engage and make better health and wellness decisions in real time, decreasing the need for costly doctor visits, tests, and hospitalizations and reducing the rate of progression of their disease.

- In **manufacturing**, sensors are tracking complex global supply chains in terms of effectiveness and efficiency. The data is even allowing some manufacturers to convert their primary revenue stream from the actual sale of products to so-called outcome-based services. One of the better known examples is GE, which is extracting data from sensors placed on its aircraft engines and used to optimize performance, utilization, and maintenance. After an initial set-up cost, customers pay for time used rather than equipment or service moving from a large fixed cost to a variable cost aligned with usage (charging for “power by the hour”).⁸
- **Retailers** are seeing the benefits of the IoT in proximity marketing. They are piloting beacon technology, whereby customers entering stores can be detected and pitched relevant offers to enhance their in-store experience and increase their purchases. While that may seem an invasion of privacy to some, 63% of shoppers see digitally targeted coupons as the most valuable form of mobile marketing.⁹ In addition, the overall system can track an individual’s traffic within the store. Then a company can examine heat maps of customer traffic over different time periods (24-, 48-, 96-hours) to figure out whether their staging and floor flows are working or not.

What all these examples highlight is that, in the IoT, it is the information that creates value (see sidebar, “Unleashing the Analytics of Things,” page 4). To model that information flow and understand exactly how it creates value there are the five stages of the “Information Value Loop” associated with the IoT (see Figure 1). The technology of the IoT allows the *creation, communication, aggregation, analysis, and use* of information from real-world objects by real-world objects. Therefore, the value created by the IoT is governed by the flow of information through a system. The Value Loop models this information flow, providing a framework for companies to view their current and potential IoT use. As companies seek to realize the benefits and overcome the challenges raised by the evolution of the IoT, the loop can prove a valuable tool in defining a company’s place in its ecosystem and how it can capture at least its fair share of value. In short, the Value Loop can help companies understand *where to play and how to win*.¹⁰

Figure 1. The Information Value Loop



Source: Deloitte University Press. DUPress.com

Creating a comprehensive IoT strategy

In fact, embracing the new challenges of information-based value creation without abandoning the time-tested tools of value capture—where to play, how to win—is a powerful first step in creating an effective IoT strategy (see “[The more things change: Value creation, value capture, and the Internet of Things](#)”). Companies and their CFOs should understand the marketplace, the technology, and their combined potential in order to make informed decisions. In addition, some of the other elements of a successful IoT strategy include the following:

Define the art of the possible. When designing and implementing an IoT strategy broadly, having an understanding of how it might affect your customer relationships, product quality, and metrics can inform your investment criteria and the scope of your IoT roll-out. In addition, knowing who the ecosystem players are and their role in it is critical. For example, manufacturers producing better and better smart tools have to work with software and mobility developers to ensure the necessary connections for customized products can be made.

Identify the pitfalls. The strategy also has to articulate the pitfalls that need to be addressed. With the advent of more data, and more *sensitive* data, available across a broad network, the risks can be higher and data breaches could pose significant dangers to individuals and enterprises alike. For example, sensors are susceptible to counterfeiting (fake products embedded with malware or malicious code); data exfiltration (extracting sensitive data from a device via hacking); identity spoofing (an unauthorized source gaining access to a device using the correct credentials); and malicious modification of components (replacement of components with parts modified to generate incorrect results or allow unauthorized access).¹¹ Any or all of these compromises would leave the sensors vulnerable. There is also the question of privacy. In health care, for example, how does the IoT strategy take into consideration HIPAA requirements, and is there informed consent? Another pitfall is interoperability, whereby systems are not able to talk to one another to take advantage of the IoT.

Be inclusive. The implications of the IoT can be far-reaching. Consequently, embracing its potential typically requires broad-based support internally as well as constant communication and information-sharing. Take smart meters, for example. For a utility to decide to manufacture, install, and implement five million smart meters is not just an IT decision or even a business-unit decision. Questions will need to be answered, such as: How much money will we save with remote meter readings as opposed to the manual logging of usage amounts? Or how much can be saved by understanding in real time any outages in the network? Such questions require input not only from finance and the business units, but also from HR, IT, and supply-chain leaders. And it is up to the CFO to bring the necessary parties together. Internally as well as externally, companies that embrace the IoT often become players in an ecosystem of many players—no one can do it alone.

Start with a pilot. Once you identify the areas where the IoT can have an impact, find a use case that is relatively low risk to implement. For example, an employee wellness program could subsidize the use of wearables in order to capture data that promotes healthy living. The goal is to prove the value and gain momentum around the IoT without an extraordinarily long adoption timeline—say a few weeks instead of a few months. Piloting with a use case that is relatively contained also reduces the investment and risk exposures associated with such an implementation.

Other considerations for CFOs

For their part, many finance chiefs are well positioned to make significant strategic contributions by gaining a working knowledge of the IoT. In fact, the possibilities offered by the IoT give CFOs a platform to truly be an “architect” of an associated strategy (see “[The Strategist CFO: Four orientations for engaging in the strategy process](#)”). Given both the financial ramifications inherent in adopting the IoT as well as the CFO’s broad reach across the organization, finance chiefs are positioned to champion IoT by jointly working to shape strategy choices and applying a financial lens that maximizes the value of the chosen strategy.

Unleashing the Analytics of Things

The phrase “Internet of Things” (IoT) suggests that the most important attribute of distributed sensors is connectedness. While it’s undeniably useful to connect inanimate objects and sensors to the Internet, that’s only a first step in doing something useful with those connected devices. “The Analytics of Things” (AoT) are just as important, if not more so.

The AoT term points out that IoT devices generate a lot of data, and that data must be analyzed to be useful. It also suggests that analytics are necessary to make connected devices smart. Connection, on the other hand, isn’t required for intelligent action.

Take, for example, a “smart” thermostat. These thermostats sense not only room temperature, but also whether people are in a room, patterns of activity, and so forth. In order to make sense of such data and take action on it, smart thermostats have embedded analytics that help them decide when to turn themselves up or down. So they’re smart enough—without being connected—to save energy with little or no user involvement.

Smart thermostats can also be connected to the Internet through Wi-Fi, and there are potential benefits. Remote monitoring and control is one. You can turn up your thermostat during a trip home from work, or check remotely to make sure your pipes won’t freeze.

This is useful for controlling remote devices, but connection also yields more data and more potential for analytics. The primary virtue of connected analytics is that you can aggregate data from multiple devices and make comparisons across time and users that can lead to better decisions.

What other types of AoT are there?

- **Understanding patterns and reasons for variation** – developing statistical models that explain variation;
- **Anomaly detection** – identifying situations outside of identified boundary conditions, such as a temperature that is too high or an image depicting someone in an area that should be uninhabited;

- **Predictive asset maintenance** – using sensor data to detect potential problems in machinery before they occur;
- **Optimization** – using sensor data and analysis to optimize a process, as when a lumber mill optimizes the automated cutting of a log;
- **Prescription** – employing sensor and other types of data to tell front-line workers what to do, as when weather and soil sensing is used for “prescriptive planting” by farmers;
- **Situational awareness** – piecing together seemingly disconnected events and putting together an explanation, as when a series of oil-temperature readings in a car, combined with dropping fuel efficiency, may indicate that an oil change is necessary.

This partial list of AoT possibilities begins to suggest their elements in common. One is that they are often a precursor to informed action. Comparative usage statistics, for example, might motivate an energy consumer to cut back usage; predictive asset maintenance suggests the best time to service machinery. Another common element is the integrated display of information—pulling together IoT information into one place so that it can be monitored and compared.

As these connected devices proliferate, we’ll learn much more about the AoT. We’ll learn how to extract the data from them for analysis, and where best to locate the analytics. We’ll learn what kinds of analytical functions are most helpful. For now, it’s just useful to remember that the Internet of Things is only useful if those things are smart, and that will happen through the Analytics of Things.

Adapted from “The Analytics of Things,” written by Tom Davenport, the President’s Distinguished Professor of Information Technology and Management at Babson College, a Fellow of the MIT Center for Digital Business, and an independent senior advisor to Deloitte Analytics. It was published by DU Press on December 17, 2014.

That financial lens should also be applied to the following questions:

- **Who is involved in developing the strategy?**

Typically, the larger the transformation and the larger the amount of investment, the broader the number of constituencies required to execute, finalize, champion, and deliver. While the CFO may play an “architect” role, he or she has to identify the players vital to execution of an IoT strategy—IT, tax, business-unit leaders, finance, COO, CEO, and so on—and decide whether the solution needs ownership, sponsorship, or just the support of each.

- **What business value drivers influence IoT decision making?**

There are several drivers behind the push for expanding IoT. Whether your strategy is focused on operational efficiency, product improvement, or increased revenues, however, as CFO, you will have to make the trade-off decisions necessary to ensure adequate funding for success.

- **Should the focus be on improvements in financial or operating metrics?**

There is no doubt that IoT can have an impact on financial metrics (for example, increase in revenues, decrease in cost/expenses, reduction/improvement in asset utilization) and operating metrics (for example, improvements in facilities/asset life cycle, product life cycle, customer life cycle). Improvements gained through IoT are not mutually exclusive, however, and both metrics should be considered and targeted. For example, by tracking the location of equipment, such as portable vitals monitors, a hospital can find the equipment and provide care to patients more quickly, improving key operating metrics. However, they can also get a more accurate picture of the utilization rate for that equipment, allowing hospitals to rent or buy only the monitors needed, improving financial metrics as well.

- **Have you considered the tax implications of IoT?** In any business-model transformation, tax considerations should be taken into account. If you are creating services, for example, those are going to be taxed differently than product sales. Therefore, knowing and understanding how your revenue streams will be taxed is an important part of your strategic design so that you can collect and remit applicable transaction-based taxes and plan for income tax requirements. Those design decisions also need to consider required documentation and support for audits and reviews by regulatory authorities around the world.

- **How do you measure ROI?** Embarking on an IoT strategy represents an IT investment—in sensors, networks, standards, and augmented intelligence. Measuring the ROI on those investments, however, will depend on the problem being solved. For example, if the problem is customer retention and the issue identified is service responsiveness or product outages, maybe the IoT solution is assessed by reduction in the response time, pre-identification of product failures, or ultimately customer turnover—or all of the above.

In the end, however, the biggest question is, “When do we start?” When it comes to the IoT, there is a risk to doing nothing. Ignoring the rapidly evolving developments of the IoT may put you at risk of being disrupted by a nimble organization that is thinking broadly about how all of these technologies come to market, impact customer behavior, and redefine how value is defined and created. A solid understanding of the promise and the power of the IoT—as well as the acceptance that it can fundamentally change your business model—will allow you to capitalize on this next phase of the evolving data world.

For more information on how the IoT may affect your industry or business strategy more broadly, please see [Deloitte’s Internet of Things Collection](#).

Endnotes

- ¹ "Gartner Says 4.9 Billion Connected "Things" Will Be in Use in 2015," Gartner, November 2014.
- ² "Expanding digital universe: transformative opportunities," [EMC Digital Universe Study](#), April 2014.
- ³ IC Insights, April 2015.
- ⁴ "The global IoT market opportunity will reach USD4.3 trillion by 2024," Machina Research, April 2015.
- ⁵ "The Internet of Things Business Index," *The Economist*, October 29, 2013.
- ⁶ The CDC estimates that in 2010, 86 percent of all health-care spending was related to chronic diseases. See www.cdc.gov/chronicdisease/overview/, accessed June 17, 2015.
- ⁷ A number of companies offer solutions integrated with communication devices; interesting examples include Glooko and InfoBionic. InfoBionic's MoMe system is a remote patient-monitoring system for early detection of cardiac arrhythmia. Patients wear a sensor-equipped heart-rate monitor as a necklace that sends data in real time to the provider monitoring system. With the ability to remotely transition between Holter, Event, and MCT modes, the care provider can easily detect early symptoms of cardiac arrhythmia. The device has built-in alert systems to notify the care provider of irregularities. See <http://infobionic.com/the-system/>; GlySens is a continuous glucose-monitoring system aimed at monitoring and preventing diabetes attacks in patients. It consists of an implanted sensor that continuously tracks patient glucose levels and transmits the data wirelessly to a receiver. The system has built-in alert systems, and the data collected can be easily shared with care providers and used for analysis. See <http://glysens.com/>; Proteus Digital Health FDA-approved ingestible devices aim to improve the effectiveness of existing pharmaceutical treatments. Using sensor-equipped pills that transmit data to a wearable patch can help capture patient response to medication. See www.proteus.com/.
- ⁸ "The future of manufacturing: Making things in a changing world," Deloitte University Press, 2015.
- ⁹ "How proximity marketing is driving retail sales," *Forbes*, October 8, 2014; data based on JiWire (now NinthDecimal) research.
- ¹⁰ "The more things change: Value creation, value capture, and the Internet of Things," *Deloitte Review*, Issue 17, July 2015, Deloitte LLP.
- ¹¹ "Safeguarding the Internet of Things: Being secure, vigilant, and resilient in the connected age," *Deloitte Review*, Issue 17, July 2015, Deloitte LLP.

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