

A HARVARD BUSINESS REVIEW ANALYTIC SERVICES REPORT



**Harvard  
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# INTERNET OF THINGS: SCIENCE FICTION OR BUSINESS FACT?

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Each year the leading industry analysts publish their predictions for the technologies that will have the biggest impact in the coming years. Since 2012, the Internet of Things (IoT) has featured heavily, and the same is likely to be true this year. Forecasts for the number of connected devices in a few years' time are in the tens of billions. If you're anything like us, you'll find the stories about as-yet unbuilt smart cities in the desert and the driverless cars of the future fascinating. But you'll also probably be wondering how IoT applies to you, today.

From our conversations with organizations across a wide range of industries, it's clear that they want to cut through the hype and find out how IoT can help address their challenges right now. This research suggests that the majority of the companies that have adopted IoT are already seeing some measurable benefits. Respondents to the survey reported seeing benefits in customer responsiveness, internal collaboration, insight, and productivity. Those that are already using IoT are looking to extend their investments—in areas such as remote asset tracking, security, energy management, and fleet management.

While IoT is definitely not science fiction, it's not something that's available off the shelf. It's not that the technology is cutting edge; most of it is actually very familiar. But building an IoT application requires the selection and integration of multiple components: sensors, communications modules, and networks as a start. And turning the data that you collect into something useful will typically involve cloud computing, analytics, integration with core systems, and process changes. Taking smart cities as an example, modern cities already have sensors monitoring traffic, air quality, and many other things. But connecting and integrating these projects to create a super efficient, smart city is a major undertaking. In our experience, clear leadership and close collaboration between IT and business teams to steer the organization together through changes to underlying business processes, and even business model transformation, are crucial to ensure the success of an IoT project.

Respondents within the study noted that IoT initiatives must plan for the privacy, compliance, and security implications of collecting new kinds of data, often about customer behavior. And yet only 56 percent of respondents that have deployed IoT or are in the process of doing so, said that they have an IoT strategy. This reflects the fact that IoT maturity has a long way to go.

Many organizations know they will need outside help to get the most out of their IoT investments—one of the top challenges that respondents cited was lack of skills. The right IoT partner will bring not just devices, applications, and network connectivity, but an ecosystem of partners, development, and management services, and insights drawn from hundreds of previous projects. With this support, organizations can not only achieve their immediate objectives, but accelerate their transformation and get ready for the future, now.

A handwritten signature in black ink that reads "Mark Bartolomeo". The signature is written in a cursive, flowing style.

Mark Bartolomeo  
Group Vice President  
Verizon Connected Solutions - IoT

# INTERNET OF THINGS: SCIENCE FICTION OR BUSINESS FACT?

*The rapid proliferation of connectivity, availability of cloud computing, and miniaturization of sensors and communications chips have made it possible for more than 10 billion devices to be networked.\* Whatever you choose to call it—Internet of Everything, Machine-to-Machine communications, and Industrial Internet are just some of the names being used—there’s plenty of talk about how the Internet of Things (IoT) could revolutionize how we do business. But the number of deployments is still relatively small, and there are concerns around privacy and security. Harvard Business Review Analytic Services surveyed 269 business leaders/early IoT adopters to see what impact they expect IoT to have and when.*

**ESTIMATES SUGGEST THAT** IoT could be adding tens of trillions of dollars to GDP within ten years. It goes far beyond wearables, smart meters, and connected cars. Organizations worldwide are pushing ahead with deployment and reaping benefits such as enhanced customer service, increased revenue, and improved use of assets in the field. In addition, IoT has broad implications for sustainability, providing ways for consumers and businesses to use resources such as water and energy more efficiently.

IoT is far from new. Companies have been using sensors and networks to provide a steady stream of information about where devices are, how they’re being used, their condition, and the state of their environment for more than 20 years. What’s helping to bring it to the forefront today is the explosive growth in mobile devices and applications and the broad availability of wireless connectivity. Other factors include the emergence of the cloud as a way to store and process large volumes of data cost-effectively, and the rapid deployment of analytics technologies that enable enterprises to manage and extract useful information from large volumes of data, quickly and cost-effectively.

\*Source: ABI Research 2013

## SEEKING A COMPETITIVE EDGE

Conducted in September 2014 on early IoT adopters, the survey shows that companies are seeing important benefits as they deploy IoT-based initiatives. Among the reasons they most frequently gave for adopting IoT were enhanced customer service (quoted by 51 percent), increased revenue from services and/or products (44 percent), improved use of assets in the field (38 percent), and acquiring more information to support big data/analytics efforts (35 percent). [Figure 1](#)

Respondents said that they have deployed or plan to use IoT in many areas, including asset tracking, security, fleet management, field force management, energy data management, and condition-based monitoring. And they give it high marks. For example:

- 62 percent say IoT somewhat increased or significantly increased their customer responsiveness
- 58 percent say it increased collaboration within the business
- 54 percent credit it with increasing market insight
- 54 percent believe it increased employee productivity

## CHANGING BUSINESS MODELS

But IoT isn't just about streamlining internal operations and managing remote assets and people. Many of the survey respondents said that IoT had enabled them to change their organization's core strategy and business model.

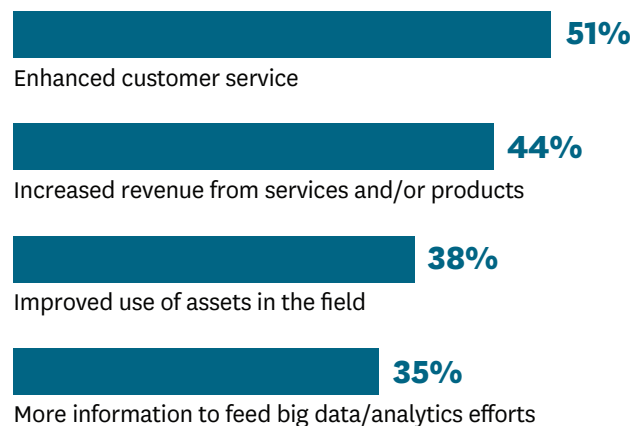
In some cases, IoT can change a company's business model by allowing it to offer new services along with their products. In other cases it helps them to enhance existing services such as predictive maintenance. "When you're able to connect products and understand what's happening with them, you can gather insight into how customers are using them and when they need to be maintained," said Michele Pelino, principal analyst at Forrester Research.

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**FIGURE 1**

### REWARDS FROM THE INTERNET OF THINGS

What benefits is your organization seeing, or does it expect to see, from using these solutions?



PERCENT CITING BENEFIT AS ONE OF THE TOP THREE

# 62%

of respondents say IoT increased their customer responsiveness.

“One of the big changes we’ll see is product-focused companies transforming into service-focused organizations,” Pelino continued, citing proactive maintenance as an example. Instead of just selling a jet engine, a manufacturer can now rent out the engine, charging by load and hours of use. The airline benefits from utility-based pricing, and the manufacturer can use its expertise and feedback from the connected engine components to optimize engineering design and reduce running costs, thereby increasing its profitability. This “servitization” model is being applied to many different types of products, from cars (moving from owning to sharing, e.g., Zipcar) to animal feed (providing the optimal mix, e.g., Richard Keenan & Co.).

As well as enabling new business models, IoT has the potential to give companies greater insight into how customers are using their products. And collecting valuable data can foster more collaboration with customers and business partners than ever before.

Whereas in the past M2M solutions were generally stand-alone—one set of sensors gathering data for one application, such as fleet management—companies now see the value in the massive amounts of information collected. For example, location data gathered for fleet management could also be useful for improving employee safety or analyzing traffic patterns.

IoT can enable “an incredible unlocking of information about processes that companies never had before,” said Vernon Turner, senior vice president of research and IoT executive lead at International Data Corp. (IDC). Companies that take the time to review and analyze these workflows will quickly find that there are significant opportunities to be found, such as increased efficiency. But the biggest change IoT brings to consumer companies is the increased contact with customers, Turner said.

## CHALLENGES TO OVERCOME

When considering an IoT-based initiative, companies have a number of concerns. At the top of the list is ensuring privacy and regulatory compliance (cited by 46 percent of respondents). [Figure 2](#) This is not surprising given the massive volumes of data involved and the increased concern about privacy—and both factors likely explain for why healthcare is one of the leading areas of interest. Most current legislation and industry regulation predates the widespread use of IoT, leaving companies to interpret how rules affect their initiative and what the public will accept as well as addressing the security needs that go with any new IT project.

Another challenge is acquiring the skills needed to turn the wealth of data generated by IoT-based projects into actionable intelligence (cited by 39 percent) and managing the growing volumes of data (35 percent).

To fully leverage the potential benefits of IoT, organizations will need to change the way they develop products and how they interact with customers. This can present multiple challenges, such as the need to have customer service processes and people in place to address the feedback they receive from connected products. They also need to have mechanisms in place to provide insight into new product development and customer support. Some of these issues can be addressed automatically through product alert systems, Pelino said.

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FIGURE 2

### OBSTACLES BLOCKING INTERNET OF THINGS DEPLOYMENT

Which obstacles is your organization facing, or does it expect to face, in deploying Internet of Things (IoT) technologies?



Ensuring privacy and regulatory compliance



Acquiring the needed skills to leverage IoT data



Managing the growing volumes of data



Securing IoT sensors and their data

PERCENT CITING OBSTACLE AS ONE OF THE TOP THREE

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FIGURE 3

### AREAS FOR DEPLOYMENT IN NEXT 18 MONTHS

Does your organization plan to deploy IoT solutions for any of these areas over the next 18 months? [TOP FIVE MENTIONS]



Remote asset management and/or asset tracking



Security (e.g., 4G cameras)



Energy data management



Condition-based monitoring



Fleet management

# 36%

of respondents plan to deploy IoT solutions for remote asset management or tracking during the next 18 months.

These challenges clearly aren't discouraging companies from investing in IoT technology. Many are planning to deploy a variety of IoT projects to support different areas of their business over the next 18 months. These include remote asset management and/or asset tracking (36 percent), security (23 percent), energy data management (22 percent), condition-based monitoring (21 percent) and fleet management (19 percent). [Figure 3](#) The interest in fleet management is likely to be a reflection of its high existing penetration and the fact that many organizations have had systems for many years and don't think of it as IoT even when looking at new solutions.

## TOP INFLUENCERS

Achieving IoT success requires teamwork across multiple departments and disciplines. IT has a huge role to play, but the research shows that in many cases these efforts are being driven by senior executives and line-of-business managers working together.

The survey shows that a number of departments and groups within organizations are having an impact on IoT initiatives. On a scale of 1-10, where 10 is "extremely influential" and 1 is "not at all influential," senior management was the highest ranked influencer, followed by business units/lines of business and IT. About 59 percent said senior management is influential (8-10 rating) when it comes to IoT strategy, compared with 51 percent for business units and 44 percent for IT. This reflects the strategic importance of the issues that organizations are looking to address with IoT-based initiatives.

## IoT IN ACTION

IoT is generating a lot of interest in a wide range of industries. Here are a few examples of some significant early adopters:

- In the healthcare field, medical device manufacturer Varian Medical Systems is seeing a 50 percent reduction in mean time to repair their connected devices. With IoT, Varian reduced customer service costs by \$2,000 for each problem resolved remotely, with 20 percent fewer technician dispatches worldwide.
- Tire maker Pirelli is using IoT to gain valuable insights about the performance of its products in near-real time. The company is using an analytics platform to manage the huge amounts of data gathered directly from sensors embedded in the tires in its Cyber Tyre range. The system allows the pressure, temperature, and mileage of each tire to be monitored remotely. By keeping these factors in range, fleet managers can have a significant impact on fuel economy and safety. In a trial covering nearly 10 million miles, Cyber Tyres saved the equivalent of \$1,500 per truck per year.
- Ford Motor Company's Connected Car Dashboards program collects and analyzes data from vehicles in order to gain insights about driving patterns and vehicle performance. The data is analyzed and then visualized graphically using a big data platform. Among the goals are better vehicle design and improved safety for occupants.

# \$1,500

savings per truck from IoT devices  
embedded in tires by Pirelli

- In the public service sector, the Boston police department operates a “real-time crime center” that receives dozens of feeds from street cameras and other sensors around the city. The resulting data gives researchers the ability to analyze and match videos from incidents to help identify suspects, mobilize resources, and even map evacuation routes during emergencies.

## CHANGES AHEAD

IoT has the potential to transform the way companies make products, track goods and assets in the supply chain, monitor the performance of systems in the field, provide security for employees and facilities, and provide services to customers. Clearly, it’s enabling transformation in both the private and public sectors. “I firmly believe that there is not a single industry that won’t benefit from IoT,” Turner said.

IoT is also changing the way businesses impact society and the environment. “Overall, the world needs better and more sustainable ways to live,” said Stephen Miles, research affiliate at the Center for Biomedical Innovation at the Massachusetts Institute of Technology. “To accomplish this, companies need better, more holistic models that capture a complete picture of what is happening so that they can better access and optimize these systems.”

IoT technologies “are enablers for achieving better visibility and control across a wider spectrum of systems than was possible previously,” Miles said. “The companies that are able to do this are changing the world by managing and making [new products and services] available to customers.”

At the same time, IoT presents challenges for organizations, not least of which are finding the right skills and expertise and ensuring the security and privacy of information. But these challenges are common to any transformative project, and they can be addressed. They shouldn’t stop any company from exploring and deploying technologies that can help them better serve customers, gain a competitive edge, and have a positive impact on the environment.



## **METHODOLOGY AND PARTICIPANT PROFILE**

Harvard Business Review Analytic Services conducted an online Pulse survey about trends in the Internet of Things (IoT, also known as machine-to-machine interface or M2M) in September 2014, using lists from *Harvard Business Review*. In all, 269 self-selected respondents participated across a wide range of industry sectors. Altogether, 30 percent of respondents identified themselves as executive management, 32 percent as senior manager/director, 18 percent as manager/supervisor and 20 percent “other.” In addition, 39 percent came from enterprises with 5,000 or more employees. Respondents were well distributed around the world, including 38 percent from North America, 27 percent from Asia/Pacific, 22 percent from EMEA, and 12 percent from Latin America.

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