

 Windows 10

# Where to **start?**



How Windows 10 IoT helps device makers seize the digital business opportunities in retail.



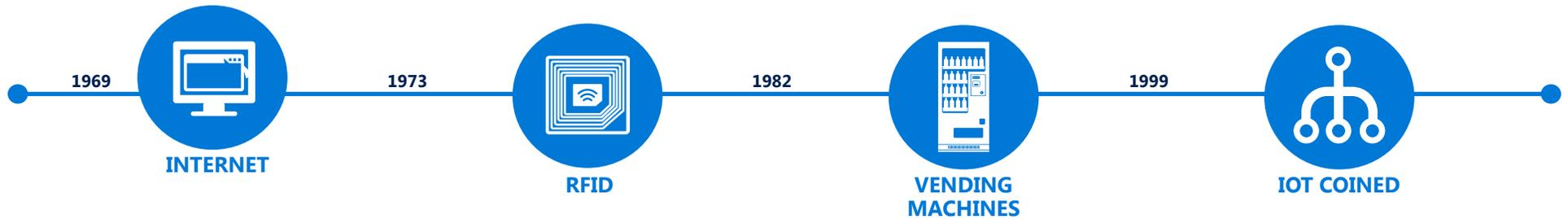
# INTRODUCTION

Imagine connected prescription bottles that ensure people follow their required healthcare regimen. Wearables that track a loved one's routine with any abnormal activity triggering alerts on your smartphone. Connected street lights that dynamically adjust lighting to help reduce energy consumption, cost, and maintenance while providing real-time information to drivers via digital signage. From the "driverless car" to the "smart factory," bits and pieces of Internet of Things (IoT) scenarios are starting to move from storyline to mainstream in our everyday consumer and industrial lives.

For years, IoT has been revered for its potential to capture insights, drive productivity, and simplify complex processes. For just as long, the hype has exceeded reality with showcase examples like the "smart refrigerator" trotted out repeatedly as proof of the vision. Hindered by fragmented and disconnected technologies and lacking standards, IoT has yet to come fully into its own.

But change is in the air. A perfect storm is propelling the long-awaited promise of IoT into reality: hardware is cheap, connectivity is ubiquitous, and business is hungry for the next technology wave. The only thing missing is the next generation of smart, connected devices. Your devices. Your *things*.

In this e-book, we look at the drivers compelling device manufacturers to rethink their device strategy, their business model, and their development platform. IoT is ready for prime time, and it's time to take your amazing imagination and great big ideas and build them out on the Windows 10 IoT platform to **get ready to change how business works**.



## IoT: Hype or reality?

When the automated teller machine (ATM) entered the marketplace in 1967, it revolutionized retail banking by solving the age-old consumer problem of accessing cash after hours. As technology advanced, the original machine transitioned from archaic cash dispenser into today's modern and sleek, multifunction ATM. Advancements like customer-friendly video display units and expanded functions freed bank employees to focus on higher-value services.

We've seen similar game-changing technology like radio-frequency identification (RFID) improve inventory control with a promise to "tag the world electronically." Throughout the 20th century, industrial robotics have been a vital part of the connected assembly line and as they become "smarter" they become capable of working without human intervention.

What makes an ATM or an RFID tag or an industrial robot relevant to IoT? All these *things* improved employee productivity and revolutionized the way the bank or store or factory worked. That's the real promise behind the Internet of Things. That's the real value of the next generation of smart, connected devices.

Within its 2014 technology "Hype-Cycle," Gartner balances IoT at a precarious, uncertainty-tainted point aptly titled the "Peak of Inflated Expectations." This is a period where a few inspirational success stories are highly lauded, but tales of failure blemish the concept; a time when some companies take action, but "many do not."<sup>1</sup> In short, we've been holding our collective breath, waiting to see what will happen. What's been missing is a catalyst to move IoT from expectation to production. From promise to reality.

# What's different now?

For the first time,  
imagination is not  
limited by hardware.

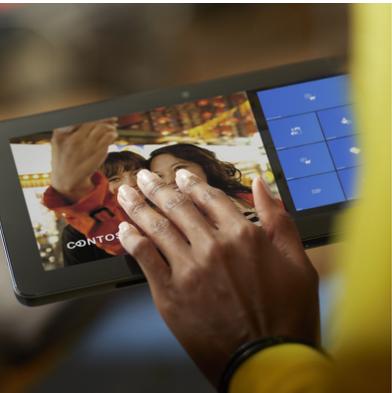
IoT is at an interesting inflection point—it's been around for a long time and been called a lot of different things. But there are a number of things currently intensifying its trajectory.





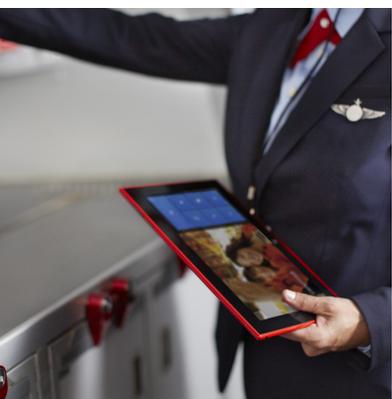
## Hardware is cheap

As chips get smaller and cheaper, and their energy footprint decreases dramatically, new landscapes for invention and growth emerge. Moore's law and Koomey's law are truer than ever: today it is both technologically possible and economically worthwhile to connect even the simplest of things and reap the benefits.



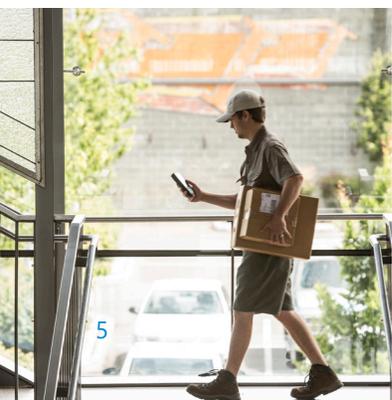
## Connectivity is pervasive

IoT is all about connections, from individual, low-power sensors to complex, automated systems. As public broadband continues to grow in availability, the cost of connecting different devices is going down—and fast. The inherent connectivity of Windows 10 IoT for device-to-device, sensor-to-device, and device-to-cloud make it an ideal platform for smart, connected devices as part of an overall IoT solution. And as characterized by Metcalfe's law, the more connected things, the more value. According to investment firm Goldman Sachs, the cost of bandwidth is 40 times less, and the cost of processing is 60 times less than 10 years ago.<sup>2</sup>



## Benefits fuel demand

Companies are realizing that there is huge value in small improvements. Small IoT efficiencies can bring big savings. General Electric believes using IoT to make oil and gas exploration and development just 1 percent more efficient would save the company \$90 billion.<sup>3</sup> A recent study by DHL and Cisco states that employee productivity improvements associated with IoT could drive savings of \$1.2 trillion.<sup>4</sup>



## Development is easy

It's quite easy if you let IoT development platforms do all the heavy lifting. The good news is that IoT app development is easier than you may imagine, thanks to ready-to-use IoT platforms like Windows 10 IoT and Azure IoT preconfigured solutions that accelerate IoT deployments.

## Moore's Law

Processing power for computers doubles every two years.

## Koomey's Law

The amount of electrical power needed to run an electronic device is cut in half every 18 months.

## Metcalfe's Law

Networks become more valuable the more people use them. The more things we connect, the more value the network (that is, the Internet) provides.

**Just as the Internet vastly improved our ability to use computing power by increasing connectivity between our systems, IoT connects these myriad devices to the Internet, giving people the power to build better lives and allowing organizations to transform the way they do business.**



## New, innovative scenarios are possible

Fueled by inexpensive hardware and fast development as well as readily accessible data, concepts that once seemed plausible only in sci-fi movies are possible now. Windows 10 IoT will drive the next wave of device innovation that is pushing devices past the traditional boundaries of design to create new capabilities. From powering new mobile devices for real-time access, to developing innovative devices that hang on the wall and stimulate collaboration, to incorporating holographic interfaces that inspire fresh ways to create, learn, and visualize, the possibilities are endless.

By integrating cloud technology and the Microsoft Azure platform, enterprises can have immediate, anywhere, anytime access to a wealth of operational data, enabling them to use data in new ways to respond more quickly and compete more effectively. While consumer devices currently garner a lot of attention, according to McKinsey & Company, the biggest market opportunity will be in the B2B arena with users reaping 70 percent of the economic value IoT creates.<sup>5</sup>

No longer hindered by chip or energy costs, device manufacturers can explore new, innovative ideas to bring smart, connected devices to market and drive value in ways we couldn't even comprehend five years ago. These devices are reducing production costs, improving efficiencies, and opening up new landscapes that change everyday work.

**Welcome to the era of virtually endless opportunity.**

# from billions to trillions

IoT isn't coming—  
the device revolution is already here.

## In 2008,

there were already more “things”  
connected to the Internet than people.<sup>6</sup>

Gartner predicts

## 25 billion

connected “things” will be in use by 2020.

Building IoT devices and applications is  
where the market is headed. IDC predicts  
it will grow to an estimated

## \$1.7 trillion

 in 2020.

## 70%

of value enabled by IoT will come from B2B  
scenarios according to McKinsey & Company.

**Smart, connected devices  
are reshaping the industry.**



## A closer look at **IoT** in **retail**



There's no industry as empowered by its people as the retail industry, and these workers need the right tools to be productive. Store managers and associates, merchants, and buyers alike can benefit from next-generation tools that enable them to be mobile, collaborative, and insightful. To win in this competitive new reality, retailers must differentiate the shopping experience, personalize the promotions and experiences of their customers, and effectively predict and prescribe what will sell, when, where, and to whom. It's the perfect setup for the **Internet of Things (IoT)** and the perfect use case scenario for the next generation of intelligent devices.

The potential that IoT brings to the retail industry is exciting and will open doors for retailers to nurture a deeper level of customer engagement and personalized marketing. Things like sensor-enabled shelves and food refrigeration units collect, monitor, and deliver alerts about areas like product availability and in-store traffic. This in turn can produce real gains in efficiencies and customer service. And when advanced analytics capabilities are used, valuable customer and contextual information—including purchase history, profile, favorites, and traffic and weather conditions—can be collected, combined, and measured to create meaningful insights and powerful predictive models. The knowledge driven by this insight can deliver more personalized shopping experiences that drive sales and behavior change.

What's more, wearable devices and connected products make a deeper intimacy with consumers possible. By tracking their needs, behaviors, and even their emotions, retailers can get in front of customers with personalized offers. In short, IoT can streamline business processes to enable new efficiencies and raise the standard of customer service.

IoT isn't coming. The device revolution is already here and growing. In fact, the IoT device and applications market is expected to expand from an estimated **\$1.7 trillion in 2020** to **\$3.9 to \$11.1 trillion in 2025** with as much as **\$1.2 trillion<sup>7</sup>** coming from retail environments. **Are you ready to build amazing devices with Windows 10 IoT?**

# From **billions** to **trillions**:

The smart device revolution picks up speed. For OEMs, the market opportunity is truly limitless.

Connected devices will grow to reach  
**21 billion**  
by 2020, and skyrocket after that.

By 2025 there may be as many as  
**\$1 trillion**  
objects connected to the Internet.<sup>8</sup>

The IoT device and application market is growing from an estimated  
**\$1.7 trillion in 2020 to \$3.9 to \$11.1 trillion in 2025.**

Digital signage use in retail outlets will grow  
**\$6 billion**  
in 2013 to **\$27.5 billion in 2018.**<sup>9</sup>

## IoT devices and applications can:<sup>10</sup>

Enable retailers to optimize store layouts to improve productivity, reduce costs, and raise sales, driving an economic impact of

**\$410 billion to \$1.2 trillion** per year in 2025.

Automate checkouts, reducing checkout queue times by 408 percent,

**\$150 billion to \$380 billion** a year in 2025.

Push real-time, personalized promotions leading to an economic benefit of  
**\$89–\$348 billion a year.**

Track inventory to reduce losses driving  
**\$23 billion to \$92 billion**  
per year in value to the global retail industry by 2025.

Help reduce inventory carrying costs by 10 percent  
**\$5–15 billion**  
per year by 2025.

# The device maker's guide to a smart start

Smart objects give industries like retail the vital data it needs to better manage inventory, drive more efficient operations, improve the customer experience, increase revenues, and maximize upsell and cross-sell opportunities.

The IoT market will grow so fast that you'll benefit most by thinking first about your long-term strategy. If you focus solely on making embedded devices for current and emerging needs, you're limiting your potential. As a device maker, where do you start?



# What to do



## Ask questions.

*Harvard Business Review*<sup>11</sup> says there are 10 strategic decisions device manufacturers need to make when developing a strategy. These include questions like “Which capabilities and features should we pursue?” and “What functionality should be in the device and what should be handled by the cloud?” and “What data do we need to capture?”



## Evaluate the gaps in the retail market.

Just let your mind go! Consider the formerly impossible and imagine the possible. We are all consumers and whether you shop in store or online, you understand what makes a good purchasing experience. So think about it. Where are the bottlenecks in service? Where do you experience the greatest frustration? What information or resources do you wish you had access to? Then determine how a next-generation device could help solve for it or improve it.



## Consider the cloud.

Determine how to incorporate cloud services, data analytics, and other apps with your devices to make inroads in retail’s digital universe.

The results of your exploration will likely trigger changes in your business model. In short, just as the next generation of devices is poised to transform the retail industry, developing devices has the power to transform your business, as well.

**Mapping your plan is the first step. The next is to determine the “how.”**

## How to get started

The **Windows 10 IoT** are designed specifically for a broad range of intelligent devices, from small industrial gateways to more sophisticated devices such as mobile POS and smart dressing rooms. Windows 10 IoT makes it easy to integrate richer experiences with your devices such as natural user interfaces and search. Tremendous efficiencies can be gained when devices and data can collect, present, and use real-time information in meaningful, actionable ways.

Connect your devices to the cloud with **Microsoft Azure IoT** services and you can help retail organizations capture and analyze untapped data and re-architect the customer journey. Retailers can see what’s overstocked, understocked, or under-performing. They gain insight about environmental conditions and time of day, online trending, and countless other potential variables.

Armed with this information, retailers grow more nimble because the information and insights they need are readily available. By building innovative tools, you can help transform the retail industry.

**To learn more contact your Microsoft representative.**

# Smart, connected devices are re-architecting the customer journey and transforming the retail industry.

Building IoT devices and applications is where the market is headed—that's an estimated \$1.7 trillion dollar market by 2020. Imagine the components and devices you can build to change the way retail operations work and enable you to grab a share of that opportunity.

Using the power of the cloud, data from the back office, the store floor, and logistics can be integrated to streamline the supply chain.



Smart power sockets report power usage to the front desk, initiating an alert for an outlet which is exceeding power consumption limits, indicating a problem.



Sophisticated sound monitoring devices analyze a noise pattern and identify sounds associated with an overflowing toilet or an unauthorized pet in a room.



Smart elevators alert and dispatch technicians for service before anyone even notices a problem.

Preventive HVAC systems register a motor that is showing signs of failing and report it to the maintenance department.

Using cloud data, the corporate office can continuously customize menu boards to rotate offerings or highlight certain promotions or higher-profit menu items.

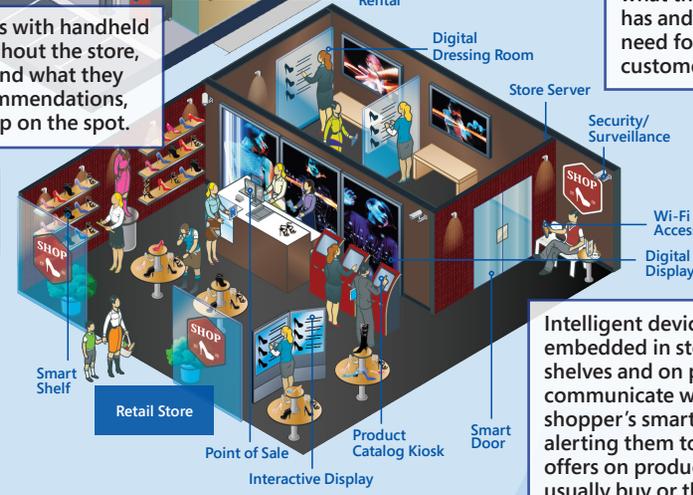


Reduce shrinkage with remote monitoring and predictive maintenance on equipment such as freezers and refrigerators to protect perishables.



Circulate employees with handheld POS devices throughout the store, helping shoppers find what they need, making recommendations, and ringing them up on the spot.

RFID tags embedded in clothing selections alerts a monitor in the fitting room to what the shopper has and what they need for optimal customer service.



Intelligent devices embedded in store shelves and on products communicate with the shopper's smartphone app, alerting them to special offers on products they usually buy or that fit their profile.



## Take part in the retail revolution

Smart, connected devices and IoT promise a future for retail that is more personalized and more rapid than ever before. The devices you imagine and build can transform the retail industry as you know it today, enabling new business models and vastly improving the customer journey. With Windows 10 IoT, one common platform, and Microsoft Azure, a platform to capture and analyze previously untapped data, your ability to impact the retail industry is bound only by your imagination.

Grab your share of this exploding market by building devices that transform the customer journey, optimize the supply chain, and uncover new opportunities like:

- Point-of-sale systems, cameras, readers, and beacons that help drive better, easier experiences for shoppers.
- Smart screens that provide customers with more information about what they're looking at, influencing buying decisions.
- Motion sensors or security cameras that send alerts to sales associates' mobile devices to dispatch assistance.
- Devices for product tracking and traceability such as RFID complete with security and fraud controls.
- Automated smart shelves and coolers for better inventory and asset management.
- Operational devices that monitor equipment performance and facilitate preventive maintenance.
- Devices that connect the store and home creating new value-based services opportunities.

Retail use cases of the Internet of Things not only streamline operations, but they can completely change the customer experience. With the next generation of devices you build, retailers can unlock the power of their data with insights previously available only to online retailers. IoT provides the bridge between digital and physical retailing, and we're just getting started.

Join Microsoft on this amazing, exciting journey and put the Internet of Things to work in retail today.

Visit: [InnovateOnWindows10IoT.com](http://InnovateOnWindows10IoT.com)

# How you approach IoT device development is up to you

Device manufacturing is undergoing unprecedented transformation—moving from technology hype to great business hope. You have the power and the tools to build IoT devices that can help you act now to capture your share of the exploding IoT market, but you first need to take a closer look at your strategy.

Physical, smart, and connected components all play a part in shaping smart, connected products. How you pull the elements together to deliver your next-generation devices depends on what's best for your business. Based on *Harvard Business Review's* "10 strategic decisions for OEMs," we've identified four tactical approaches you can consider to transform your business model.





## Build

- Components for the IoT devices.
- Embedded devices that transform enterprises' business.
- IoT tools that offer monitoring, control, optimization, and autonomy.
- Connected devices that plug into the existing enterprise infrastructure and harness the power of IoT.

## Borrow

- Existing platforms and use Windows 10 IoT, one common platform, to connect and amplify the impact of your components and devices.
- Software to personalize components and devices for end users.
- Partner capabilities and offerings to extend your solution suite.

## Blur

- The distinction between devices and services by building devices that use cloud technology to empower a mobile workforce.
- Maintenance requirements, with devices that can predict environmental and product changes and signal the need for proactive maintenance.
- The traditional definition of product performance, with continuously updating and optimizing devices.
- Traditional device sales to include ongoing technology evolution without changing hardware, DaaS, and other ongoing revenue streams.

## Blend

- Interoperable, intelligent components, configuring them seamlessly into next-generation devices.
- Autonomous and "dumb" devices that work in perfect harmony.
- Customer knowledge and device data to place strategic bets on new innovations.
- Products and product clouds for greater control and personalization.
- Partner relationships in new ways to serve enterprise needs for data-optimized processes and interconnected infrastructures.

Source: Harvard Business Review<sup>12</sup>

# Why Windows 10 IoT?

So how can Windows 10 IoT help you capture your share of the exploding IoT market?



## Streamline processes with one common platform

Using Windows 10 IoT, one common platform enables you to:

- Use one universal app platform, one security model, and one development and management approach to develop next-generation components and devices.
- Build and deploy apps using the same tools and code for PCs, phones, and other industry devices.
- Use device data and Microsoft Azure insights to acquire enterprise-wide transparency into your sales and operations, from a global to an individual product line.
- Access a steady cadence of innovations, with 10 years of support.



## Benefit from enterprise-grade security

As connected devices proliferate, security will become an even greater concern to enterprise CIOs and CTOs. You can use Windows 10 IoT to offer:

- Strong security controls that protect devices from unauthorized access or app downloads.
- Security-hardened devices with advanced lockdown capabilities, ensuring devices are only used for their intended purpose.
- Devices with two-factor identification and data encryption to enhance user and information security.
- Ongoing security updates to meet the latest generation of threats.



## Improve organizational productivity

Devices built on Windows 10 IoT increase your productivity. You can:

- Use a single development, deployment, and management approach to increase your organization's efficiency.
- Enable your developers to use their existing skill sets, reducing training and learning time for new employees, and improve image design time.
- Develop an app once and deploy it across a variety of device types and form factors.



## Harness the world of IoT connectivity

With Windows 10 IoT devices and components, you can move beyond the product sale and embed yourself in your customers' businesses. You can:

- Use the most appropriate Windows 10 IoT edition to develop your connected device, from simple gateways to complex industry devices.
- Connect your next-generation devices and customers' legacy assets with Windows 10 IoT.
- Enable your customers to tap into the power of Microsoft Azure services and access real-time data and visualization tools they can use to drive performance.
- Empower the enterprise to use preconfigured solutions for common IoT scenarios to accelerate time to value.
- Deliver device-as-a-service (DaaS) offerings with device telemetry, configuration and updates, preventive maintenance, supplies, and access to Microsoft productivity solutions.

# There's a Windows 10 IoT edition that's right for your strategy

Windows 10 IoT editions were designed for a wide range of smart, connected devices, from small industrial gateways to larger, more complex devices like point-of-sales terminals and ATMs. Build on Windows 10 IoT and experience the expanded opportunities that come from harnessing the full breadth of Microsoft technologies. And with Microsoft Azure IoT Suite, you can capture and analyze untapped data to help transform business.

## **Windows 10 IoT Core**

provides a great platform to build your small-footprint and low-cost industry devices with the enterprise-grade security, management, and servicing similar to the rest of the Windows 10 editions.

## **Windows 10 IoT Mobile Enterprise**

brings the capabilities of Windows 10 Mobile Enterprise to line-of-business mobile devices that are looking for a natural user experience with enterprise-grade security and manageability. Instantaneous application access, native support for bar-code scanning, and other peripherals as well as a security-hardened device experience enhance productivity for a variety of mobile scenarios.

## **Windows 10 IoT Enterprise**

brings the capabilities of Windows 10 Enterprise to a wide range of industry devices across retail, manufacturing, healthcare, finance, and other industries. Windows 10 IoT Enterprise devices run powerful line-of-business applications and perform a specialized function in a security-enhanced, reliable, and streamlined way to support mission-critical industry devices.

## **Microsoft Azure IoT Suite**

is a collection of integrated cloud services—analytics, computing, database, mobile, networking, storage, and web—that help you connect line-of-business assets and acquire, store, and convert different data types into powerful intelligence. Use preconfigured solutions for common IoT scenarios to start quickly, add your devices, and begin tailoring Azure to your needs.

# Some see devices and data. We see opportunity.

Whether you mark the birth of IoT at the creation of the ATM or on the day tech pioneer Kevin Ashton first uttered the phrase, the Internet of Things is here. It's real. And it's up to you to decide to make history or watch it happen.

Remember, it's not the Internet itself that makes IoT transformational, it's the next-generation things—the devices that you make, now bound only by your imagination. You have the platform and tools to reinvent your business. You have the potential to change how factories, stores, and healthcare organizations work. And you can reap the benefits.



Your amazing ideas + Windows 10 IoT = endless opportunity.

## Get building

Get started with Windows 10 IoT. Visit us at [www.InnovateOnWindows10IoT.com](http://www.InnovateOnWindows10IoT.com) and start building today.

<sup>1</sup> <http://www.gartner.com/technology/research/methodologies/hype-cycle.jsp>

<sup>2</sup> <http://www.goldmansachs.com/our-thinking/pages/iot-infographic.html>

<sup>3</sup> [http://www.ge.com/docs/chapters/Industrial\\_Internet.pdf](http://www.ge.com/docs/chapters/Industrial_Internet.pdf)

<sup>4</sup> [http://www.dhl.com/en/about\\_us/logistics\\_insights/dhl\\_trend\\_research/internet\\_of\\_things.html#VqXFKPrLIU](http://www.dhl.com/en/about_us/logistics_insights/dhl_trend_research/internet_of_things.html#VqXFKPrLIU)

<sup>5</sup> Johannes Deichmann, Matthias Roggendorf, and Dominik Wee, "Preparing IT Systems and Organizations for the Internet of Things," McKinsey, [http://www.mckinsey.com/insights/high\\_tech\\_telecoms\\_internet/preparing\\_it\\_systems\\_and\\_organizations\\_for\\_the\\_internet\\_of\\_things](http://www.mckinsey.com/insights/high_tech_telecoms_internet/preparing_it_systems_and_organizations_for_the_internet_of_things).

<sup>6</sup> <http://www.fool.com/investing/general/2015/02/06/17-internet-of-things-statistics-you-dont-know.aspx>

<sup>7</sup> [http://www.mckinsey.com/insights/business\\_technology/the\\_internet\\_of\\_things\\_the\\_value\\_of\\_digitizing\\_the\\_physical\\_world](http://www.mckinsey.com/insights/business_technology/the_internet_of_things_the_value_of_digitizing_the_physical_world)

<sup>8</sup> [http://www.slideshare.net/McKinseyCompany/no-ordinary-disruption-the-four-forces?utm\\_source=slideshow&utm\\_medium=ssemal&utm\\_campaign=weekly\\_digest](http://www.slideshare.net/McKinseyCompany/no-ordinary-disruption-the-four-forces?utm_source=slideshow&utm_medium=ssemal&utm_campaign=weekly_digest)

<sup>9</sup> <https://www.idc.com/getdoc.jsp?containerId=prUS25633215>

<sup>10</sup> McKinsey Global Institute "The Internet of Things: Mapping the Value Beyond the Hype"

<sup>11</sup> <https://hbr.org/2015/10/how-smart-connected-products-are-transforming-companies>

<sup>12</sup> <https://hbr.org/2014/11/how-smart-connected-products-are-transforming-competition>