Microsoft

Limitless: How device manufacturers are building a new future with smart connected devices

Executive Summary

The Internet of Things (IoT) has split the manufacturing business wide-open, blurring the distinction between hardware and software and creating a once-in-a-lifetime opportunity for original equipment manufacturers (OEMs). For OEMs who have experienced cost and commoditization pressures, the news couldn't be better. Finally, they have the tools and ability to reinvent their businesses.

OEMs can empower their developers to innovate quickly, using Windows 10 IoT, a common platform to scale expertise and investments across a wide range of devices. OEMs have the opportunity to use smart, interoperable components that integrate with existing infrastructure, building on existing technology investments. By integrating cloud technology and the Microsoft Azure platform they can provide anywhere, anytime access to a wealth of operational data, enabling informed decision making and driving business results.

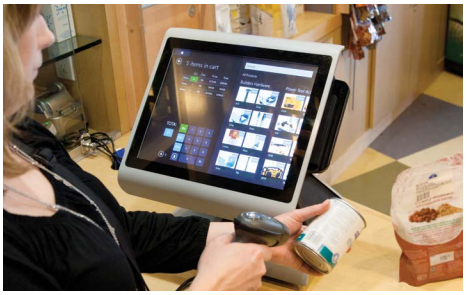
Like most new market opportunities, the greatest growth will be experienced by those who make early strategic bets on high-value industry use cases, using their experience to rethink their strategy and product portfolio, pushing devices past the traditional boundaries of design to create new capabilities and use data in new ways. OEMs' businesses are being transformed as they adopt new business models that enable them to respond to market demands, increase speed-to-market, and compete more effectively against a wider array of suppliers.

IoT isn't coming...
The device revolution
is already here.

By 2025, the IoT market
will reach $3.9 trillion
to $11.1 trillion.[1]

FROM BILLIONS TO TRILLIONS:
The smart connected device revolution picks up speed

It's hard to believe that the Internet of Things term was coined back in 1999 by technology pioneer Kevin Ashton.[2] This market has moved rapidly from technology hype to great business hope, as original equipment manufacturers (OEMs) create embedded products and enterprises seek to build connected businesses.



The distinction between IT and products has blurred. "IT is becoming an integral part of the product itself," wrote Michael E. Porter and James E. Heppelmann in a recent Harvard Business Review report.[3] "These new types of products alter industry structure and the nature of competition, exposing companies to new competitive opportunities and threats. They are reshaping industry boundaries and creating entirely new industries. In many companies, smart, connected products will force the fundamental question, 'What business am I in?'"

Operational effectiveness, said Porter and Heppelmann, is table stakes. OEMs will need to use standardized processes and agile software development methodologies to develop IoT products. Certainly, OEMs can reformulate components and devices. But they need to go beyond simply updating their product portfolio and harness smart connected device capabilities—monitoring, control, optimization, and autonomy[4]—in exciting ways to create new sources of value and increase competitiveness. Customizing products to specific market segments and personalizing devices to enterprise users will become increasingly critical, as will empowering customers to access and analyze device data with IoT services. In addition, OEMs can provide device as a service (DaaS) offerings, with subscription or use-based pricing and other services such as updates, patching, and maintenance to create ongoing revenue streams.

Connected things need to be able to communicate seamlessly to unleash their full value. McKinsey says that interoperability is required to unlock 40 percent of the value IoT will create by 2025,[5] and that new standards will be required before an IoT ecosystem can truly flourish. Windows 10 IoT provides one common platform for developing, managing, and maintaining a system of multiple device types and form factors across diverse platforms, enabling enterprise customers to use real time data across their entire infrastructure.

The smart money says move now to grab share of the IoT market. Connected devices will grow to reach 25 billion by 2020[6], and skyrocket after that. McKinsey states that by 2025 there may be as many as 1 trillion objects—devices, components, and sensors—that are connected to the Internet.[7] For OEMs, the market opportunity is truly limitless.

The biggest market opportunity will be in the B2B arena. McKinsey says that B2B users will reap 70 percent of the economic value IoT creates,[8] despite all the hype around consumer applications. Enterprises operating in industries such as healthcare, manufacturing, and retail, among others, need help simplifying their businesses and infrastructures. Connected devices can bring clarity to formerly complex processes: identifying opportunities for driving sales, delivering superior service, and reducing cost and waste.

Windows 10 IoT is the technology platform for making the game-changing shift to an IoT device manufacturing business. OEMs can use Windows 10 IoT, one common platform to build and deploy next-generation devices that connect with customers' legacy IT assets. OEMs can also use Microsoft Azure to extend the devices' intelligence, enabling enterprises to connect, capture, store, and make sense of data from line-of-business assets—anywhere, anytime—increasing their agility.

To succeed with smart connected devices, start with the strategy

The IoT market will grow so fast that OEMs should think about their long-term strategy, rather than just making embedded devices for current and emerging needs. They will be competing not just with traditional hardware companies, but with IoT startups who identify market gaps and use cloud services, data analytics, and apps to gain traction.[9]

OEMs don't just need to rethink their product lines by adding sensors to components or building interoperable devices. Most will need to evolve their business models. How can they add the most value to their partners and customers?

Harvard Business Review says there are 10 strategic decisions that OEMs need to make, which revolve around product capabilities, platforms, partnerships, data, and distribution.[10] It's clear that OEMs will be taking a hard look at their strategy to see how they can evolve to capture their share of the exploding IoT market.

Tactics for transforming your business model

So what are some tactics you can put to immediate use?

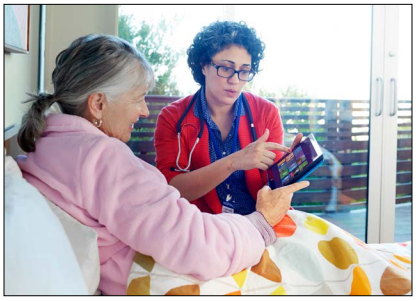
Build	Borrow	Blur	Blend
Components for IoT devices. Embedded devices that transform enterprises' businesses. IoT tools that offer monitoring, control, optimization, and autonomy. Connected devices that plug into the existing enterprise infrastructure and harness the power of IoT.	Existing platforms and 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.	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.	Interoperable, smart 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.

How smart connected devices are reshaping industries

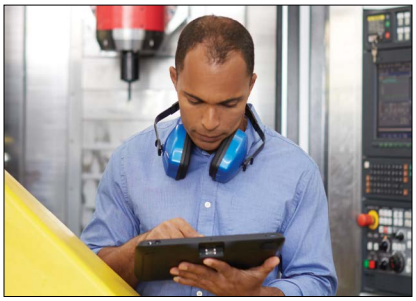
Building IoT devices and applications is where the market is headed. It's growing from an estimated $1.7 trillion in 2020[11] to between $3.9 trillion and $11.1 trillion in 2025.[12]

Connected devices address important enterprise needs, including:



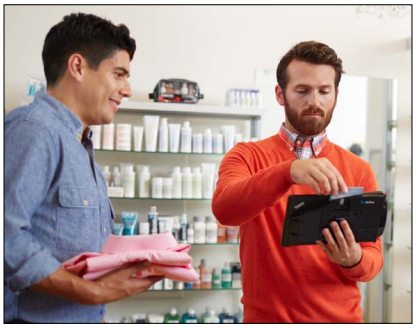
Healthcare

- Improving patient care outcomes by providing real-time access to electronic health records (EHRs) and patient data and enabling remote consultations with specialists.
- Empowering patients to manage chronic diseases and conditions with wearables and mobile testing and reporting devices that take advantage of cloud technology.
- Using patient-generated data to reduce readmission rates and plan for changing population needs.



Manufacturing

- Developing smart connected factories that can adjust production volumes swiftly or make different items on the same production line.
- Integrating data from the back office, to the factory floor, to logistics in order to streamline supply chains.
- Using connected systems to customize products for market segments or personalize them for end users.
- Using fully connected embedded systems and devices to conduct remote monitoring and predictive maintenance.



Retail

- Using connected devices and digitized processes to develop rich customer profiles that are updated in real time and link virtual and physical commerce more seamlessly.
- Using smartphones, wearables, and beacon technology to power personalized offers in stores, when customers are highly motivated to spend.
- Increasing in-store cross-selling and upselling with smart mirrors, smart dressing rooms, and mobile point-of-sale devices.

Get the latest healthcare, manufacturing, and retail insights.

Integrating cloud technology provides pervasive connectivity that helps companies reap the full value of big data.

- Just 1 percent of device data is currently being used,[13] meaning there is a wealth of opportunity to capture, understand, and monetize IoT data.
- Enterprises will also need help processing, visualizing, and using their data.
- Microsoft Azure provides robust tools, from device connectivity and management, to data stream processing and predictive analytics, to workflow automation and visualization, to turn raw data into actionable insights.
- Adding DaaS services to devices creates an ongoing relationship and revenue streams from enterprise customers.

Windows 10 IoT and Microsoft Azure can make OEMs agile and responsive. With data-driven innovation, they can:

- Accelerate product rollouts, using one common platform and universal apps to speed development.
- Enable easy, cost-effective customization of devices for greater market share.
- Proactively optimize their own business processes with visualization tools that uncover sources of waste or inefficiency.
- Provide enterprises with a steady stream of innovations, reducing the need to replace costly hardware and increasing customer loyalty.

Sources: Gartner, Harvard Business Review, and McKinsey.

How Windows 10 IoT meets industry needs for the "new technology stack"

In Harvard Business Review, Porter and Heppelmann discuss the "new technology stack" that must emerge for companies to exploit the potential of IoT. Here's how Windows 10 IoT address these imperatives.

New product hardware	OEMs deliver next-generation devices
Embedded software	OEM, Microsoft, and enterprise solutions
Connectivity	Wireless provider, cloud platforms, and WAN technology
Cloud Infrastructure	Microsoft Azure and Microsoft Cloud Platform
Security tools	Embedded in all Microsoft technology
Gateway for business intelligence	Windows 10 IoT, one common platform
Integration with business systems	Next-generation embedded devices that integrate with current infrastructure

With Windows 10 IoT, one common platform, OEMs can meet price and upgraded feature needs, reducing their internal development costs while developing higher-value customized products their customers will pay more for.

Why use Windows 10 IoT?

So how can Windows 10 IoT help you capture market opportunity?

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, which reduces training and learning time for new employees, and improves 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 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 smart connected device, from simple gateways to complex industry devices.
- Connect your next-generation devices with customers' legacy assets by using 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 them to use the preconfigured solutions for common IoT scenarios to accelerate time to value.
- Offer device-as-a-service (DaaS) offerings with device telemetry, configuration and updates, preventive maintenance, supplies, and access to Microsoft productivity solutions.

Conclusion

Device manufacturing is undergoing unprecedented transformation. OEMs now have the power—and the tools—to build IoT devices that help them escape the cost and commodity trap. Instead, by rethinking their businesses and developing next-generation strategies, they can become premium product and service providers, as well as trusted partners in simplifying complex industry processes.

The smart connected device is just a stepping stone on the path to exponential growth. While important, the data it produces is what will fuel business transformation for the OEMs who produce them and the enterprise customers they serve.

With Windows 10 IoT, one common platform, and Microsoft Azure, a platform to capture and analyze previously untapped data, OEMs now have the keys to the kingdom. How they will use these tools is up to each OEM.

What is common to all OEMs is the need to think deeply about what IoT means to their business and whether they're willing to stake their future growth and leadership on this monumental technology revolution. IoT isn't just the latest buzzword: It will forever shift the way companies do business, and partners interact.

IoT will change everything. Are you ready to grab your share of this amazing market opportunity that will reach $1.7 trillion by 2020 and skyrocket after that?

Some see devices and data. We see opportunity. *Start today—and race into the future.*

Windows 10 IoT editions

Microsoft offers three Windows 10 IoT editions, enabling you to choose the version that's right for your devices:

Windows 10 IoT Enterprise

Windows 10 IoT Enterprise is a full version of Windows 10 with advanced lockdown capabilities that power a range of industry devices. Windows 10 IoT devices run powerful line-of-business applications and perform specialized functions in a security-enhanced, reliable, and streamlined way.

Windows 10 IoT Mobile Enterprise

Windows 10 IoT Mobile Enterprise is the next generation of the leading Microsoft platform for line-of-business mobile applications built on Windows 10. Microsoft reimagines a rich user experience, improving manageability, and streamlining application development and collection. Windows 10 IoT Mobile Enterprise increases productivity by providing a security-enhanced device experience, instantaneous application across devices, and excellent battery life to enable a variety of mobile scenarios.

Windows 10 IoT Core

Windows 10 IoT Core is the version of Windows that is optimized for smaller, lower-cost industry devices. It is designed to power devices such as IoT gateways or micro-kiosks that run a single application. Windows 10 IoT Core extends the flexibility of Windows 10 to a wider range of specialized devices.

Additional Microsoft IoT Products and Services

Microsoft Azure IoT Suite

Microsoft Azure IoT Suite offers a comprehensive solution to connect your devices, integrate your business solutions, and provide the insights that transform your business. Use preconfigured solutions for common IoT scenarios to start quickly, add your devices, and begin tailoring Azure to your needs. Microsoft Azure IoT Suite offers data visualization capabilities to help you identify and exploit opportunities to fuel business growth or streamline operational processes.

Windows SQL Server 2014

Windows SQL Server 2014 provides the backbone of manufacturers, achieving breakthrough performance and faster insights across the cloud and on-premises datacenters. Build and run mission-critical applications using high-performance, in-memory technology across OLTP, data warehousing, business intelligence, and analytics. Use a common set of tools to deploy and manage databases, wherever they are housed.

Put the Internet of Things to work for your business today. *Visit: ww.microsoft.com/en-us/windows*

[1] James Manyika, Michael Chui, Peter Bisson, Jonathan Woetzel, Richard Dobbs, Jacques Bughin, and Dan Aharon, "Unlocking the Potential of the Internet of Things," McKinsey, June 2015. http://www.mckinsey.com/insights/business_technology/the_internet_of_things_the_value_of_digitizing_the_physical_world.

[2] "Facts and Forecasts: Billions of Things, Trillions of Dollars," Siemens Website, undated, http://www.siemens.com/innovation/en/home/pictures-of-the-future/digitalization-and-software/internet-of-things-facts-and-forecasts.html.

[3] Michael E. Porter and James E. Heppelmann, "How Smart, Connected Products Are Transforming Competition," Harvard Business Review, November 2015, https://hbr.org/2014/11/how-smart-connected-products-are-transforming-competition.

[4] "How Smart, Connected Products Are Transforming Competition," ibid.

[5] "Unlocking the Potential of the Internet of Things," ibid.

[6] "Gartner Says 4.9 Billion Connected `Things' Will Be in Use in 2015," http://www.gartner.com/newsroom/id/2905717

[7] "No Ordinary Disruption: The Four Forces Breaking All the Trends," SlideShare Deck, McKinsey, April 13, 2015. http://www.slideshare.net/McKinseyCompany/no-ordinary-disruption-the-four-forces?utm_source=slideshow&utm_medium=ssemail&utm_campaign=weekly_digest.

[8] 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.

[9] "Startups And Small Vendors Are Driving Innovation In The Internet of Things," Gartner, Forbes, November 25, 2015, http://www.forbes.com/sites/gartnergroup/2015/11/24/startups-and-small-vendors-are-driving-innovation-in-the-internet-of-things/.

[10] Michael E. Porter and James E. Heppelmann, "How Smart, Connected Products Are Transforming Companies," Harvard Business Review, October 2015, https://hbr.org/2015/10/how-smart-connected-products-are-transforming-companies.

[11] Nathan Eddy, "Gartner: 21 Billion IoT Devices To Invade By 2020," InformationWeek, November, 10, 2015, http://www.informationweek.com/mobile/mobile-devices/gartner-21-billion-iot-devices-to-invade-by-2020/d/d-id/1323081.

[12] "Unlocking the Potential of the Internet of Things," ibid.

[13] Ibid.