

# Internet of Things

Microsoft Practice  
Development  
Playbook



[aka.ms/practiceplaybooks](http://aka.ms/practiceplaybooks)

# About this Playbook

This playbook is intended for the business and technical leadership of new and existing Microsoft partners that are adding or expanding an Internet of Things (IoT) - focused practice to their business.

## Objectives

The goal of this playbook is to help you accelerate or optimize your IoT-focused practice and understand how to define your practice strategy, hire and train resources, go to market, and optimize and grow your practice. We did not re-write the existing body of detailed guidance on how to perform any given recommendation; instead, we point you to resources that will help you.

For the business side, this playbook provides valuable resources for driving new revenue opportunities, developing strategies for marketing, selling, and lead capture, as well as building deeper and longer term engagements with your customers through potential new service offerings like managed services.

For the technical side, the playbook offers guidance on a number of topics that range from the technical skills your team will need, to resources that you can use to accelerate learning, as well as an explanation of some of the key opportunities for technical delivery to focus on as you get started and grow your practice.

## How this playbook was made

This playbook is part of a series of guidance that was written by Microsoft Partner, [Solliance](#), while working in conjunction with Microsoft One Commercial Partner and 12 other successful partners who have volunteered time and information to provide input and best practices to share with the rest of the partner community.

To validate the guidance provided in these playbooks, we conducted a survey of 743 partners from around the world with MDC Research. In this survey, we gathered insights on a range of topics, including how partners hire, compensate and train resources; their business model, revenue and profitability; what practices and services they offer; and what skillsets they have in place to support their offers. The results of this survey are provided in-line with the guidance found within this playbook.

### CONTRIBUTING PARTNERS AND IOT EXPERTS

[Arrow Electronics](#)

[ArtisConsulting](#)

[Avnet](#)

[Bright Wolf](#)

[Codit](#)

[Crayon](#)

[Fathym](#)

[ICONICS](#)

[New Signature](#)

[Softline](#)

[TechData](#)

[Xoriant](#)

[Zinnov](#)



## Using the playbook effectively

Quickly read through the playbook to familiarize yourself with the layout and content. Each section includes an executive summary and key actions for that specific topic. Review these summaries first to decide which areas to focus on. Go over content several times, if needed, then share with your team.

### TO GET THE MOST VALUE OUT OF THIS PLAYBOOK:

- Get your team together and discuss which pieces of the strategy each person is responsible for.
- Share the playbook with your sales, marketing, support, technical, and managed services teams.
- Leverage the resources available from Microsoft to help maximize your profitability.
- Share feedback on how we can improve this and other playbooks by emailing [playbookfeedback@microsoft.com](mailto:playbookfeedback@microsoft.com).

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# Partner Practice Development Framework

The partner practice development framework defines how to take an IoT practice from concept to growth in five stages. It is the foundation of this playbook, and each phase of the framework is covered in a dedicated chapter.



## Define Strategy

Define your offer, benchmark your practice, and identify required resources.



## Hire & Train

Hire talent, train resources, and complete certifications.



## Operationalize

Prepare for launch with systems, tools, and processes in place.



## Go to Market & Close Deals

Execute your sales and marketing strategy to find your first customers and close deals with winning proposals.



## Optimize & Grow

Collect feedback, identify expansion opportunities, optimize your practice, grow partnerships, and refine your offer.

# What is the Internet of Things?

The Internet of Things (IoT) describes the practice of interconnecting the physical world with cloud services through the use of electronic devices, software, and sensors.

## IOT OVERVIEW

IoT applications can be described as **Things** (or devices), collecting data or events that are then used to generate **Insights**, which translate into **Actions** implemented to help improve a business or process. An example is an engine (a thing), sending pressure and temperature data used to determine if the engine is performing as expected (an insight), which is then used to proactively schedule maintenance on the engine (an action). The end-goal of all IoT solutions is to take action on business insights found through gathering data from assets.



-image from the [Azure IoT Reference Architecture Guide](#)

"By gathering data from sensors instead of people we can focus those people on more effective and efficient things that drive value back to our owner."

Mark Bryant, PCL Construction

## DISCOVER THE BENEFITS OF IOT

With IoT being a relative newcomer to technology trends, its benefits, to some extent, are unclear or misunderstood by many existing or potential clients.

The implementation of IoT can help businesses realize many benefits, from improved productivity and increased profits to deeper insights into how their products are being used. In fact, many organizations are already benefiting from automated approaches to common workforce tasks that traditionally have been performed manually. From remotely monitoring sensors anticipating maintenance needs to acting as a sales tool on a retail floor, IoT has the potential to directly impact the bottom line.

At the root of these benefits is access to and analysis of more data. Data collection and analysis allows organizations to become substantially more responsive.

## IOT WILL ASSUME JOB TASKS, NOT NECESSARILY ELIMINATE THE JOB

An IoT solution should be perceived as an enhancement, rather than a threat, to the human workforce. Using IoT to automate mundane or repetitive tasks that are typically performed by an employee allows for the customer to re-target the focus of the employee to more fruitful tasks that directly target the bottom line and improve all-over productivity. As an example, a construction company building a high-rise deploys sensors to multiple areas of the building that report on temperature, humidity and pressure. These readings were previously manually gathered by personnel. With the implementation of the IoT solution, these employees are now freed up to tackle other tasks.

# The IoT Opportunity

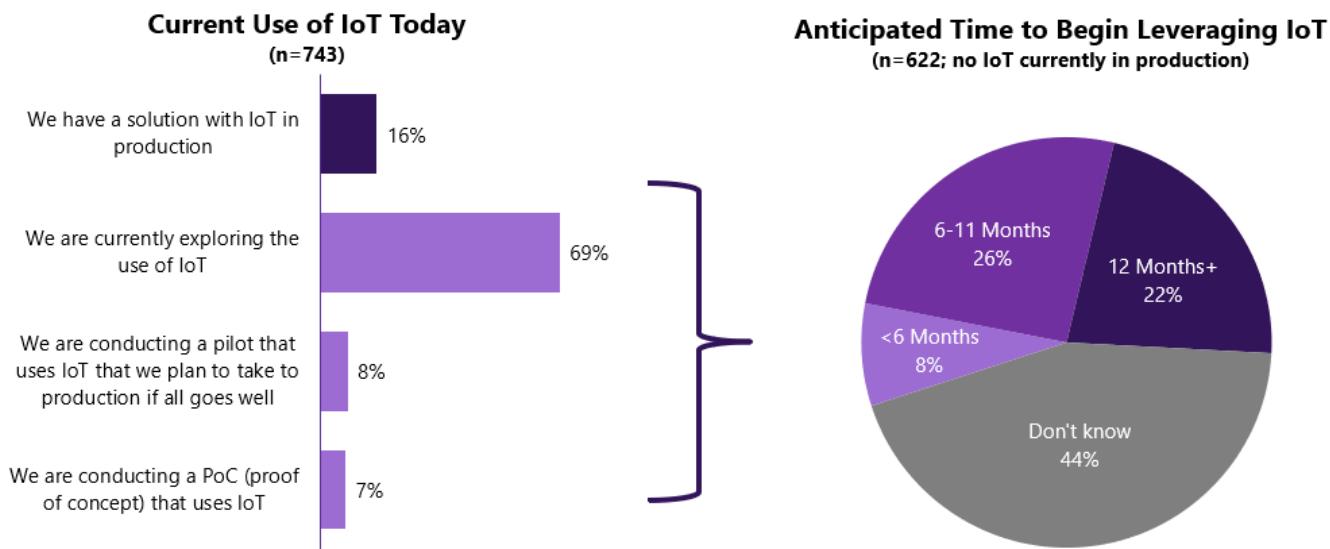
Today's biggest opportunities are enabled by data collected from connected technologies.

While IoT is a relative newcomer to the technology landscape, it is important to note that it is not emerging, it is already here! IoT is a booming market which is growing at an incredible pace. According to research published by Zinnov, they estimate IoT expenditures will increase from \$201 billion in 2018 to \$500 billion in 2023. Other lofty projections from large companies such as Accenture, GE and CISCO predict that it will become a [\\$14 trillion industry by 2030](#).



Source: IoT Market Landscape, Zinnov, December 2018

In the near future, use of IoT will be assumed, and practices will differentiate by their skill in the pragmatic application of IoT. Interestingly, the IoT market today is still largely open, with many organizations just beginning to understand the capabilities and explore the use of IoT. Of the 743 survey participants in the MDC Research study, only 16% of partners reported having an IoT solution in production today.



Source: Microsoft IoT Playbook Study, MDC Research, December 2018.

Interest in IoT solutions is experiencing a boom, even though actual IoT adoption by companies is still in its infancy. This presents a huge opportunity for technology providers that can meet customer needs. By strategically placing themselves at the forefront of this burgeoning market, partners with existing or new IoT practices have an incredible chance to take advantage of this wave of growth and profitability, and to become leaders in a marketplace ripe with opportunity.

This playbook will assist you in taking steps necessary to correctly establish and grow an IoT practice.

# Industry Opportunities

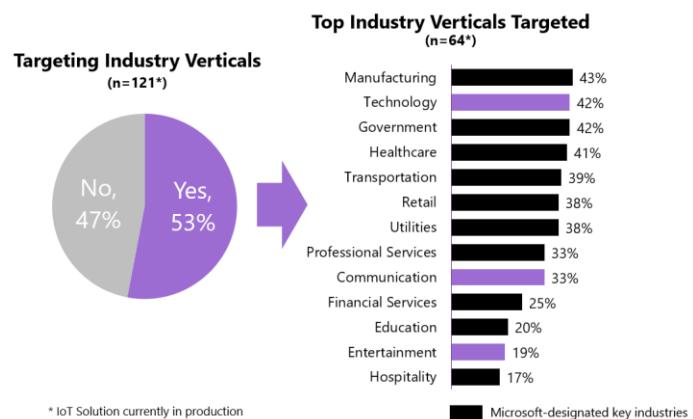
Irrespective of the industry, IoT opportunities are omnipresent and significant.

Adoption of IoT is widespread across many industries, and it continues to grow as the possibilities of IoT are better understood. As you begin the process of building or expanding your IoT practice, it is important to evaluate the industry or industries which your IoT services and solutions will address, taking into account your existing domain expertise and skills. The industry or industries you choose to target matters for IoT because delivering complete end-to-end IoT solutions requires a deep understanding of the needs and challenges of your target audience.

## TARGET SPECIFIC INDUSTRY VERTICALS

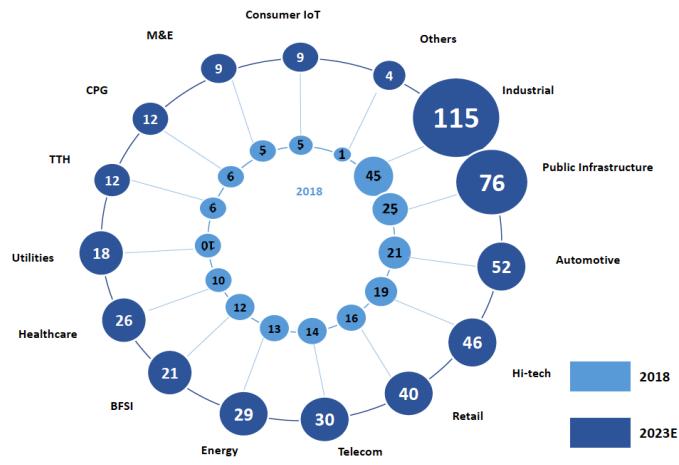
IoT opportunities exist across a wide range of industries, and existing IoT providers are taking advantage of these opportunities. However, according to MDC Research, over half of the partners interviewed with IoT solutions currently in production target specific industry verticals.

This is an important aspect to consider when building and growing your IoT practice. Focusing on a fewer industries, or a single industry, allows you to learn more about the specific challenges of those industries that can be addressed by IoT, and more easily anticipate those needs in delivering your IoT solutions and services.



Source: Microsoft IoT Playbook Study, MDC Research, December 2018

## TOP INDUSTRY VERTICALS FOR IOT



While opportunities for partners with an IoT practice cut across industry verticals, industry selection can be critical in the IoT market.

Research from both Zinnov and MDC shows that industrial manufacturing, government, technology, and automotive/transportation are the areas where the majority of IoT spend and opportunity currently resides, with manufacturing outpacing other industries by a wide margin. According to Zinnov, these are also the areas expected to see the most spending growth through 2023.

MDC's research also places Europe and the United States as the regions with the most perceived market opportunity for IoT related services.

Source: IoT Market Landscape, Zinnov, December 2018

# The Manufacturing Opportunity

As MDC and Zinnov's research indicated, manufacturing is the largest industry for IoT spend. Downtime for industrial equipment can be prohibitively expensive, and industrial IoT solutions can provide insights to help improve customer experience.

## LEVERAGING BIG DATA FOR BIG SAVINGS

Rolls-Royce currently has more than 13,000 engines deployed in active service in commercial aircraft. A single disruptive event, such as unplanned maintenance, could end up costing an airline over a million dollars a day.

[Rolls-Royce is increasing customer satisfaction](#) by equipping each engine with thousands of sensors, capable of generating terabytes of data on long haul flights. This mountain of data is then aggregated and analyzed to provide actionable insights into engine performance and operational efficiency. Advanced analytics help optimize fuel economy, anticipate maintenance needs and avoid costly downtime and delays. Furthermore, by leveraging cognitive services and machine learning, fuel cost efficiency is being improved through the combination of existing forecasts, reference tables and historical trends with other factors such as flight path, weather, and discretionary fuel. Fuel efficiency is one of the highest yielding areas their customers are targeting, making up 40% of their total costs.



## PREDICTIVE MAINTENANCE

Chevron, one of the world's leading energy companies, already had multiple sensors deployed in their environment centered around controlling their facilities, but they lacked insights on reliability and energy consumption. To help solve this issue they [started a partnership with Microsoft](#) to deploy sensors to heat exchangers in order to supplement data already being gathered by the safety and control systems. This data is then analyzed and used to prevent unscheduled outages and to optimize equipment cleaning schedules based on need rather than a time interval. This successful pilot has the potential impact of millions of dollars a year in savings when scaled to the entire organization.

## PROTECTING PEOPLE AND ASSETS THROUGH REMOTE MONITORING

PCL Construction, a 112 year old company out of Alberta, Canada, has taken [a modern approach with IoT technology](#). They utilize IoT sensors to monitor temperature, humidity, pressure, and air quality. They also use IoT for menial tasks, such as tracking building materials at a job site and whether or not the lights were left on in a specific area of the building. By employing an IoT solution, they've been able to redirect employees to more important tasks, reduce warranty claims, improve employee safety, and greatly reduce IT infrastructure costs, including a reduction of CAD2.5 million a year on storage and server costs.

## BRIDGING THE GAP BETWEEN THE PHYSICAL AND DIGITAL WORLD

ThyssenKrupp embedded thousands of sensors in its elevators and connected them to Azure to gain real-time visibility in product performance and rapid, remote diagnostic capabilities using Hololens. ThyssenKrupp has been able to reduce maintenance costs and has given their 20,000 technicians the ability to visualize and diagnose problems prior to arriving on the job site. While on a service call these technicians also have access to hands-free technical documentation.

# The Transportation Opportunity

IoT can be leveraged in many ways in the transportation industry. Utilize IoT in a fleet of business vehicles by predicting and monitoring maintenance needs, making fixes before they become problems, and proactively scheduling the maintenance during downtime. Optimize business routes by monitoring for road delays and delivery unit location in real-time. Implement IoT to enhance traffic infrastructure and controls to assess road conditions and ease overall congestion.

## PREDICTING WEATHER AND IMPROVING HIGHWAY SAFETY WITH HYPER-LOCAL TELEMETRY

Winters in Alaska are no joke, with snowfall of up to 100" and -80F temperatures – every roadway treatment decision holds a lasting impact. The Alaska Department of Transportation and Public Facilities (ADOT&PF) has over 1,500 lane miles of roadway. Treatment can be expensive – and an error in judgement could impact safety for the remainder of the winter season. In the last 6 years, Alaska has experienced warmth and rain during a portion of the

winter, resulting in large amounts of rain then a rapid refreezing. In 2010, this resulted in a sheet of 2" thick ice on the highways that were impenetrable by chemicals, scraping and plowing for the duration of winter. Had they been better able to predict the weather, they could have gotten in front of the ice and prevented it from bonding to the pavement, thus avoiding the five-month ice slick which greatly impacted maintenance and safety. In 2013, [ADOT&PF introduced sensors](#) on trucks that monitor conditions in the sky, and on the road – thus providing hyper-local telemetry of current conditions. Along with historical models and this locally aware data, they are now able to eliminate guesswork and accurately predict where crews are needed and what type of service should be applied. This has greatly increased public safety and positively impacted the budget. Usage of the hyper-local telemetry is not only useful in the winter, it's also used during orange-barrel season to best predict windows of opportunity to schedule maintenance work, dodging rain and snow flurry conditions.



# The Smart Spaces Opportunity

IoT helps enable safer cities, by regulating traffic and ensuring efficient emergency response times. At the same time, IoT can help smart cities improve service efficiency such as identifying broken street lamps to optimizing garbage truck routes. Build smart buildings and offices by connecting devices to control room environments based on whether there are occupants and conditions, such as room temperature and humidity.

## IMPROVING WORKSPACE USAGE AND PRODUCTIVITY

Steelcase, an industry leader of workspace design, looks to help companies optimize their office real estate investments. Many offices can see up to 46% of their space going unused, and only 13% of employees being highly engaged in their work. By using infrared sensors, [Steelcase implemented a system](#) that provides real-time insights with actionable results. By layering their expertise with the data collected, they developed an immersive spacial experience to help shape a workplace where people want to work. Integration with Office 365 also allows for employees to locate one another and determine the best places to meet, so they spend less time searching and more time creating.

## APPLYING SMART-CITY SCENARIOS IN A STADIUM MICROCOSM

Croke Park stadium has a capacity for 82,300 people and is one of the largest stadiums in Europe. It is home to the Gaelic games, the headquarters of the Gaelic Athletic Association (GAA) and hosts numerous high-profile international sporting, cultural and music events. Croke park is also the [first Smart Stadium](#). Together along with

Dublin City University (DCU), Intel and Microsoft, they embarked on a project to improve fan experiences, safety, and reduce their carbon footprint, while at the same time driving efficiencies and becoming more cost-effective. Strategically-placed sensors and gateways feed enormous amounts of data into Microsoft Azure. DCU researchers then applied Azure IoT solution accelerators to define dashboards for management and analyze the data to provide actionable insights. These insights include:

- Measuring noise levels, to remain compliant with parameters established by the county
- Wind monitoring, to ensure safety of guests taking the 17<sup>th</sup> story Skyline tour
- Monitoring crowds to detect crowd movement and make event management aware of any health or safety issues
- Maintaining the pitch using machine learning algorithms to identify areas of the pitch to light at specific times of the day for optimal growth. They also detect flood probability through the use of water-level sensors in drainage systems

" This kind of technology and the understanding of groups of people and how they're moving and why they're moving can be transplanted directly out of the stadium into a city-wide environment - for example, helping to make our cities easier to manage and safer places to live. "

Professor Neil O'Connor, DCU

# The Retail Opportunity

Determine the effectiveness of store layout, product presentation, and forecast inventory with IoT. By using devices such as smart shelves, beacons, digital kiosks, and mobile apps, retailers can ensure positive customer service, effectively allocate staff, and improve operational efficiency.

## SMART SHOPPING

Coop Italia, Italy's largest grocery store cooperative [implemented a concept store](#) in collaboration with partners Accenture and Avanade. Leveraging motion sensors to detect shopper movements and engage with them in the store with informational displays relative to the product the shopper is interacting with. The system also ensures the retailer keeps the shelves stocked and analyzes customer shopping patterns and buying choices to improve sales.

## CONNECTING VENDING MACHINES TO THE CLOUD

Mars Drinks, a global manufacturer of food products such as M&Ms®, Snickers®, Doublemint® and MARS® bars, is passionate about providing beverages to people in the workplace to foster "Workplace Vitality™" to improve collaboration, well-being, engagement and productivity. [The scalable, world-wide solution](#) provides predictive maintenance, monitoring and prediction of stock levels, as well as route optimizations for service experts who restock product.

## SMART-HOME INNOVATION

Kohler, a manufacturer of kitchen and bath fixtures, is [a digital leader in the smart-home revolution](#). They have developed an IoT system called Kohler Konnect along with multiple consumer products, including:

- Numi, the intelligent toilet that offers personalized settings from ambient lighting, to Bluetooth music, along with a heated seat and foot warmer. It also provides hands-free flushing, and personalized cleansing as well as exceptional water efficiency.
- DTV+ showering system allows users to adjust water temperature, control shower heads, body sprays, music, lighting, steam and shower duration using voice commands.
- Bathroom Heater is equipped with ventilation, light, heater and deodorizing functions. It interacts with the connected tub, toilet, and shower. For instance, when you turn on the shower in the summer, the ventilation turns on, in the winter, the heater turns on.
- Veil Lighted Suite offers illumination and color changes that echo the timing of the sunrise and sunset. The lights also automatically turn on when a person is present, and off when they leave.
- Verdera Voice Lighted Mirror is a voice controlled lighted mirror that allows dimming and brightening. It also integrates with other Kohler Konnect products.
- Sensate kitchen faucet turns the faucet on and off, and will also dispense specific amounts of water (ex. 2 cups) using voice commands or hand movements. It also monitors water usage.

When implementing their first POC, they were able to develop an end-to-end solution in two months.

" From zero to demo in two months is incredible. We easily cut our development cycle in half by using Azure platform services and infrastructure while also significantly lowering our startup investment."

Fei Shen, *Kohler*

# The Healthcare Opportunity

IoT is evolving the healthcare industry. Patients can be monitored away from the hospital and in their own home using wearable sensors. In the hospital or medical offices, the use of IoT improves staff efficiency by tracking and managing supplies, monitoring and providing equipment with proactive maintenance, as well as ensuring maximum patient comfort and safety through the use of bed sensors and monitoring room temperatures.

## DIAGNOSING DISEASE WITH IOT

Roche Diagnostics, an industry leader of in vitro diagnostics (IVD) uses its IVD portfolio to help clinicians detect diseases, determine causes, monitor patient progress and improve outcomes. An estimated 60% of the world's medical decisions are made with the support of IVD. [Roche has developed a series of devices](#) to aid in clinical chemistry and immunoassays, urinalysis, point-of-care testing, patient self-testing, and laboratory automation. Through the use of IoT, Roche Diagnostics is able to remotely monitor and manage IVD assets distributed over a large geographical area. This allows for the monitoring of customer supply usage, and predictive maintenance capabilities. By monitoring the activities of the customer, Roche is able to recommend additional solutions to improve efficiency and provisioning at the customer site.

## MONITORING AND IMPROVING CARDIOVASCULAR HEALTH

More than 17 million people in the world die of cardiovascular disease each year. The reason for these

high numbers is that people fail to report their symptoms to their doctor until it's too late. Ruppiner Kliniken and ccc.Center for Connected Health Care UG and partner ixto GmbH [established a an IoT solution](#) called the Digital and Analog Companions for an Aging Population (digilog). This solution involves wearable sensors that collect readings like ECG data and blood pressure. Using sensors, physicians can have a more accurate view of the actual health of the patient, and can identify early-on if lifestyle changes are required. Patients and physicians can utilize a smartphone app or web portal to see dashboards and KPI's built with Microsoft Power BI, giving an in-depth overview of the patient's heart and overall cardiovascular system health.

*" We can analyze very large amounts of information to get a real-time understanding of a patient and understand where that person is heading, from a health perspective, based on their current path . "*

Professor Kurt J.G. Schmailzl, *Ruppiner Kliniken*



# The Natural Resources Opportunity

Using IoT to obtain insights on equipment performance allows customers to predict and optimize its utilization, maintenance, and support – thus improving efficiency, saving energy, reducing waste, and reducing costs. IoT also increases safety and efficiency of work crews by closely monitoring individual and local working conditions.

## ENSURING SUSTAINABILITY

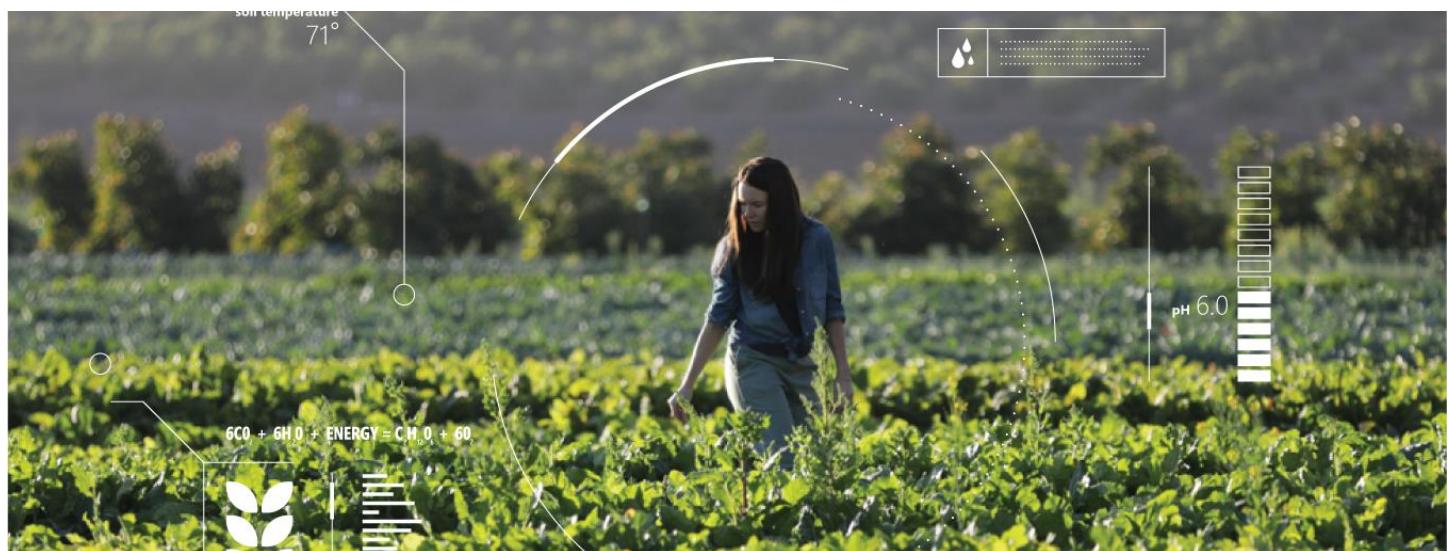
Farmers Edge is a global leader in decision agriculture, and [has thousands of IoT devices](#), providing telemetry to cutting edge machine learning and artificial intelligence algorithms, to help customers maximize productivity and profitability. With a growing population, Farmers Edge is using IoT to ensure sustainability in crops. With deployments of sensors on combines, a custom weather network and soil sampling devices allows farms to introduce variable rate technology that provides recommendations on where to apply fertilizer for higher yields, determine the optimal day to seed, whether a chemical should be applied, when it should be applied, and what crop type should be going down in order to maximize ROI in the fall. ROI is calculated based on market conditions or estimated based on how the crop is expected to perform.

## MONITORING INDOOR AIR QUALITY

Johnson Controls, the original developer of the electric room thermostat in 1885, has [developed a new top of the line modern thermostat named GLAS](#), which is the first of its kind to monitor both ambient temperature as well as air quality. With emphasis on creating a better user experience that is also secure, they decided upon using the Windows IoT Core operating system for GLAS, reporting up to Azure. They also utilized Xamarin to implement mobile applications on all platforms. GLAS supports both homeowners as well as building managers by continuously analyzing data and providing alerts if air quality strays from desired parameters.

“ Security is a key factor for us as we follow this trend of integrating more solutions into on-premises equipment and putting processing power wherever it makes the most sense—whether it’s on the device or the cloud. One of the reasons we selected the Microsoft platform is the ability to connect Windows 10 IoT Core with Azure and ensure secure connections.”

Paul Mulcahy, *Johnson Controls*

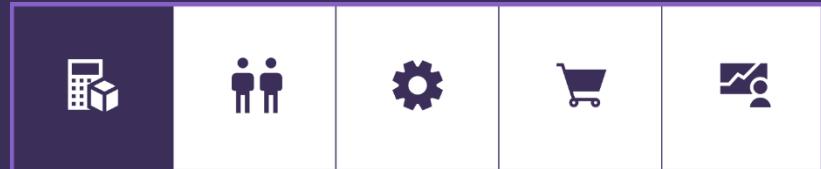


Microsoft  
Partner  
Network

# Define Your Strategy

## Internet of Things

[aka.ms/practiceplaybooks](http://aka.ms/practiceplaybooks)



# Executive Summary

Now that you better understand the opportunity before you in building an IoT practice, the next step is to define the strategy you will use to build your practice. Like the foundation of a house, thinking through your strategy is critical to the long-term success of your practice, and it will be time well spent.

We begin by providing an overview of the current IoT landscape, followed by foundational concepts required to develop a successful and profitable IoT practice. Your practice may have expertise in just one of the areas, across multiple areas, or all areas. For each area, we provide details about the nature of the business opportunity, and the key Microsoft products and services leveraged in delivering solutions that capitalize on the opportunity.

Then we will guide you through the process of defining your offer and its value proposition. This is a critical piece of your strategy – specifically, the definition of what you will sell and why customers will want to buy it. Along the way we will review three IoT business models (project services, managed services, and packaged intellectual property services), their respective profitability, and how you can assess the profitability of your own practice. For project services, managed services, and intellectual property, we provide you guidance on what other successful partners are selling, as well as recommendations on what to include in your own project, managed services and intellectual property offerings.

We will help you drill into how to price your offer, including what pricing strategy to use to drive adoption of

your offer, and how to minimize your risk by establishing up-front fees and payment terms. The ultimate goal is to help you build a solid business plan that addresses your team, marketing, sales, and financial aspects.

Then we dive deeper into sales to help you define your pre-sales and post-sales engagement process, and how to compensate sales executives.

If you are not yet a Microsoft Partner, we will give you a walking tour of the Microsoft Partner Network, the programs you can leverage to grow your practice, how to earn competencies that yield additional benefits, and how to maximize the benefits you get from the program.

After that, we'll give you a head start in how to identify potential customers when starting your practice, as well as potential service offerings.

We'll conclude this section by helping you understand support – how to support your customers, Microsoft's support offerings, and the support-related benefits you get from establishing competencies in the Microsoft Partner Network.

Let's get on to defining your practice strategy.

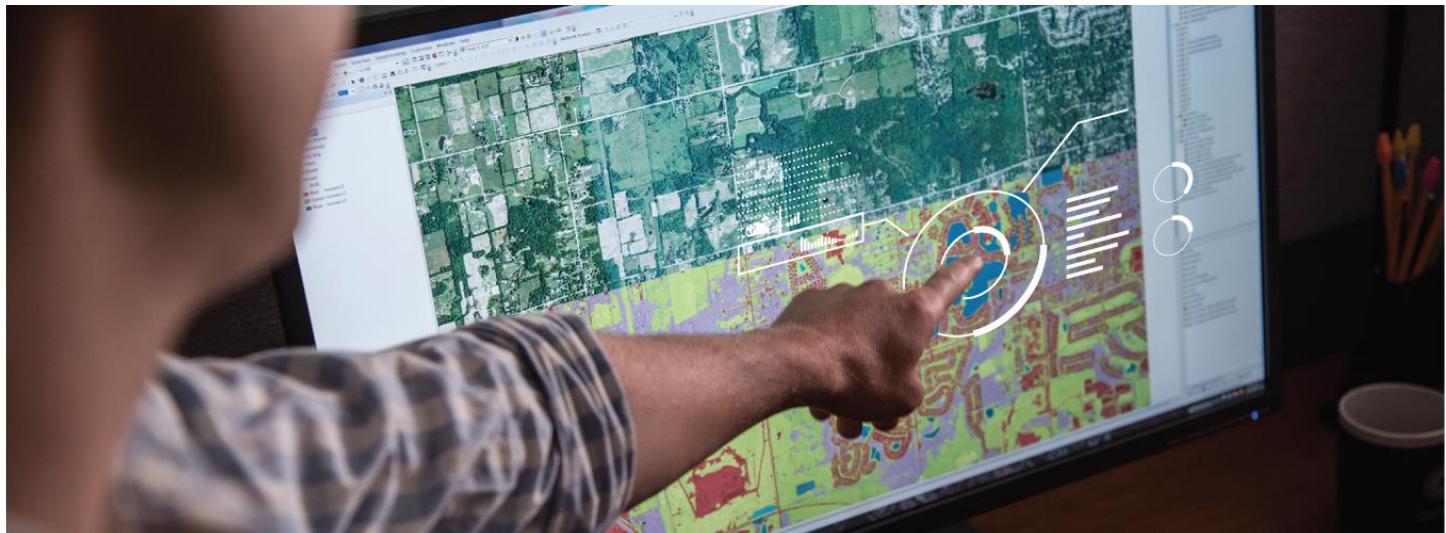
## Top 5 things to do

Here are the top 5 things you should absolutely do when defining the strategy for your practice.

- Define your practice focus
- Understand the IoT practice
- Define business model
- Define and design the solution offer
- Develop your engagement process

# Define Your Practice Focus

Through your IoT practice, you can help your customers create solutions that provide business value and cost savings with intelligent connected technologies.



Hardware



System Integration



ISV



Security

Connected devices and sensors are the heart of IoT. Customers want to sense and act upon the physical world, and they look for certified devices to gain peace of mind for their IoT solutions. Microsoft provides step-by-step instructions for device manufacturers on how to certify, test, and promote devices in the device catalog.

Service integration partners can help customers successfully undertake this transformation by serving as trusted advisors all the way from solution design to implementation and management.

Assist in the modernization process to move legacy systems to IoT and SaaS offerings for the customers and domains that you know best.

Security matters – and is in the forefront of customers' minds as they embark on implementing an IoT solution. Security for an IoT solution encompasses device manufacturing, hardware integration, solution development, cloud operations, data security and privacy management. Expertise in this area is in very high demand.

# Understanding the IoT Practice

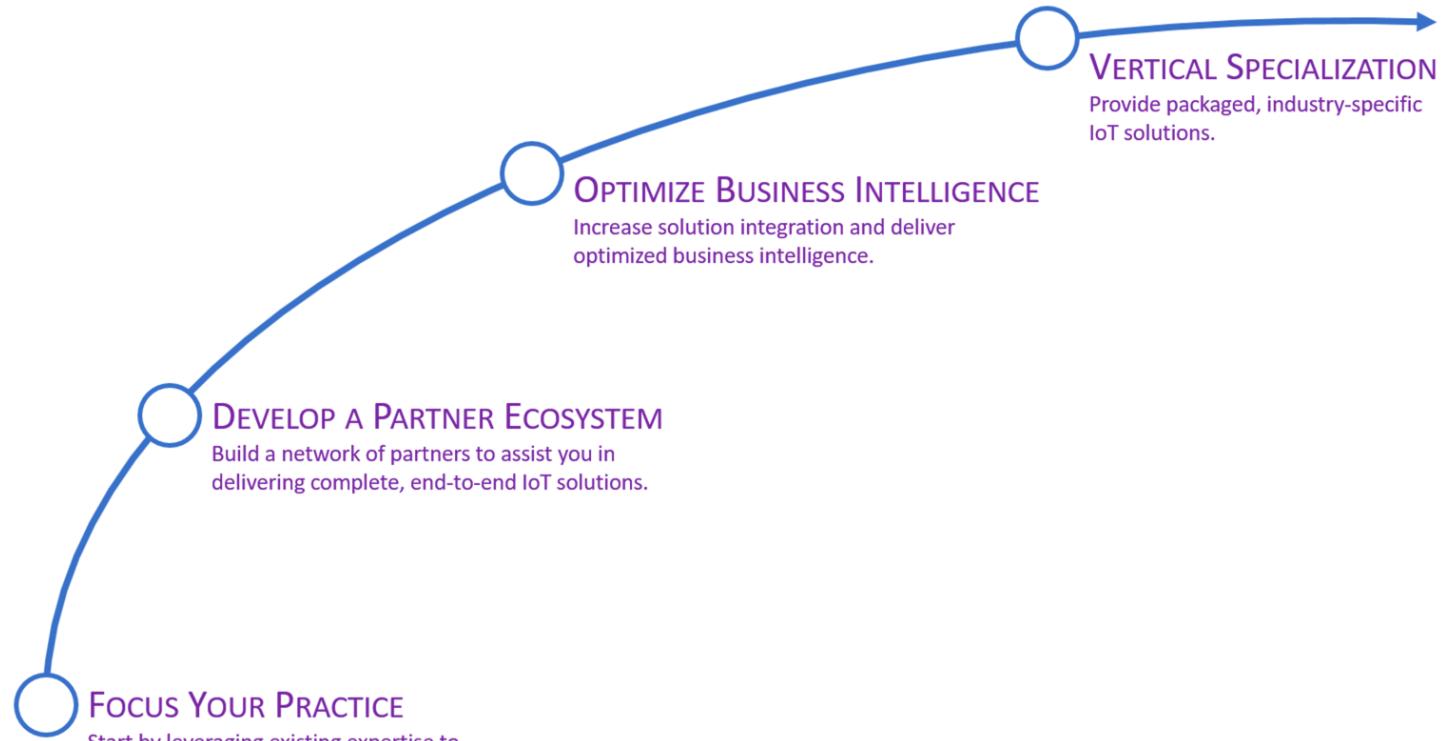
How do you start and grow your IoT practice?

The demand for IoT products and services spans almost all industry verticals, providing nearly unlimited opportunities to establish or expand an IoT practice. Partners of all types, from system integrators to hardware manufacturers, are finding their use of IoT is rapidly becoming a key differentiator for their service offerings and a chance to re-engage customers with end-to-end solutions that learn from data and experiences to deliver new insights, efficiencies, and innovations. IoT is a game-changing enhancement to the technology landscape, and massive opportunities await partners that can strategically place themselves at the forefront of innovation by establishing an IoT practice.

With so many possibilities, knowing how and where to start can be challenging. The typical IoT practice aims to use data collected from connected devices and sensors to derive actionable business insights and understanding, and proactive and predictive capabilities. By using insights gained from collected data, their customers can benefit from increased revenues and reduced costs through streamlined operations, improved regulatory compliance, and improved customer experiences, to name a few. But, how do partners get to the point of delivering such capabilities in the first place?

## The IoT Practice Maturity Model

For some partners, their IoT practice is an extension of an existing practice, building upon years of knowledge, skills, and expertise derived from working with customers. For others, an IoT practice is a new initiative starting completely from scratch. Regardless of where your journey begins, you will likely take an iterative approach to developing an offering, working with partners and targeting specific industry verticals. The IoT Practice Maturity Model outlines a general progression of practice development and growth, with each phase providing the foundations to grow and evolve your IoT practice. The sections that follow explain each step in more detail.





## FOCUS YOUR PRACTICE

As you start building an IoT practice, the first and perhaps most important step to creating a viable practice is to identify a narrow focus for the practice. No partner can do it all, so start by picking one thing, and focus on doing it well. With such a wide range of opportunities in the IoT market, however, it may seem intimidating to think about all the possible directions that you can take. Should you be a service provider or solution integrator, assisting your customers to implement and benefit from IoT? Should you be an IoT device designer and manufacturer, create software to enable customers to collect data and gain insights from connected devices, or focus on providing compliance and security services? This is a decision which will define the future of your IoT practice.

With so many possibilities, how do you decide what is right for your practice? We found that generally partners had the most success by leveraging their existing capabilities and expertise. In this approach, you build your practice based on existing products, services, or practices, utilizing your existing staff, partnerships and networks, and augmenting where needed with new partnerships and training. If your background is in hardware or device design and manufacturing, build your practice around that. If you have established expertise in advanced analytics, consider keeping your practice focused on delivering those aspects of an IoT solution. By focusing on delivering IoT solutions that build upon what you already know and do well, you can help expedite the path to profitability and minimize the frustration of breaking into new markets and technologies.

In many industries, the relative newness of IoT, and a lack of understanding about the benefits it can deliver, frequently results in long sales cycles. Customers want reassurances that your solution will work in their environment and provide the specified benefits. They are also looking for answers about the length of time before they will see a return on their investment. Partners have reported success by working with their existing, loyal customers to build expertise via discounted services. By leveraging an already established relationship, you may be able to expedite the sales cycle.

## OPTIMIZE BUSINESS INTELLIGENCE

As partners grow and specialize their practices, we found that generally what evolved was the sophistication with which they deliver IoT capabilities and integrate with customer systems. At this level, partner solutions are becoming more deeply embedded into customer processes, incorporating and analyzing more customer data, and driving a higher return on investment for customers. Through tight integration with customer systems and a better understanding of their customer's needs, partners can focus on collecting and acting on the "right" data, optimizing the business intelligence delivered to their customers and increasing the value of their services.

## DEVELOP A PARTNER ECOSYSTEM

The next level of maturity we found partners demonstrating was leveraging partnerships to deliver complete end-to-end IoT solutions to customers. As your practice grows, you will quickly realize that most IoT projects involve complex and disparate components that require expertise across a wide spectrum of services and technologies, each of which demands in-depth knowledge of rapidly evolving cutting-edge technologies. Few partners, however, have the staff, expertise and infrastructure required to handle all aspects necessary to deliver a complete end-to-end IoT solution. So, how do you go about delivering complete solutions for your customers? This is where developing strong partnerships with other vendors in the IoT pipeline is critical.

Given the broad range of knowledge and skills required to deliver a complete end-to-end IoT solution, it is quite common for IoT projects to involve multiple partners working together to achieve customer goals. Each partner contributes expertise in their specific area of focus. For partners just getting started in their IoT practice, understanding this is especially important, and forming partnerships early on can help drive success. There is a good chance that many of your existing partners and vendors are already investigating how IoT fits into their own business models, so they may be the best place to start. It is also likely that you will need to develop new relationships to fill in any gaps in expertise that may not be covered by your existing partnerships. These areas

might include development of devices and sensors, management platforms for IoT devices, connectivity, cloud services, data analytics and business intelligence, and security.

## VERTICAL SPECIALIZATION

While opportunities abound across almost every industry, the highest level of maturity we observed in partners was specialization in an industry vertical. That is, they are fully integrated with their ecosystem of partners to deliver complete, end-to-end, packaged, industry-specific IoT solutions. Partners that specialize in a specific industry can develop a deep domain expertise which allows them to better discern and anticipate the needs of customers. Many IoT project fail to reach beyond the proof-of-concept state due to a lack of business vision and variety of test cases. Domain specialization helps to enable partners to develop stronger business use case driven models for delivering IoT projects. This model provides one of the fastest and best growth strategies.

As you work to establish and grow your practice it is recommended that you start by staying close to what you already know. Look at industries you already serve, your existing customer base and strengths, and use what you already know and do well. Many industries offer very compelling applications for IoT but chasing new or unfamiliar areas as you get started will very likely slow progress and may increase the level of frustration.

# Business Model Transformation

IoT is one of the disruptive solutions driving digital transformation. The delivery of IoT solutions gives your customers the ability to think in different ways about how they operate their businesses, and how they make money. It can fundamentally change a customer's business model.

## THE FOUR STAGES OF DIGITAL TRANSFORMATION

The process of digital transformation through IoT solutions occurs in four stages: business insights, operational efficiencies, new business models, and new features and revenue streams.

1. **Business Insights** – Many businesses begin with this stage, where new data is gathered, stored and processed, and new business insights can be presented from that previously inaccessible data.
2. **Operational Efficiencies** – The second stage is where your customers use insights from the first stage to optimize production or business operations to reduce cost and time to market.
3. **New Business Models** – The third stage occurs when your customers are finding new ways to make money, and new business models emerge. A partner example might be provisioning services alongside your existing device business, or delivering your solution offering as a service.
4. **New Features & Revenue Streams** – The final stage is creating new revenue streams through enablement of ancillary businesses, new businesses and transformed businesses.

Most businesses will experience at least one of the phases of digital transformation as they consider new IoT offerings. Digital transformation can change your market offering, P&L, and customer relationships as shown below:

MARKET OFFERING	PROFITABILITY	CUSTOMER RELATIONSHIPS
<ul style="list-style-type: none"><li>• From "MRI Scanner" to "Remote diagnostics subscription"</li><li>• From "Industrial Machine" to "Machine uptime subscription"</li><li>• From "Thermometer" to "Temperature Control Service"</li></ul>	<ul style="list-style-type: none"><li>• From hardware margin to subscription margin</li><li>• From capex to capex+opex</li></ul>	<ul style="list-style-type: none"><li>• From transaction relationship to annuity relationship</li><li>• From procurement relationship to business owner relationship</li></ul>

## IOT ECOSYSTEM INNOVATION: PARTNERS AND SOLUTIONS

Microsoft relies on the partner-to-partner imperative in delivering customer transformation through IoT. Setting up partners for greater success is central to our approach.

One of the ways we do this is through our partner matchmaking which takes place during our [IoT in Action Series](#). This allows partners to supplement their core expertise with that of others to extend their opportunities and accelerate solutions for customers. Breaking down silos and enabling partners to focus on what they do best is a key part of this ecosystem.

Solution accelerators comprise the second component of IoT ecosystem innovation. Open-source, preconfigured solution accelerators built by Microsoft help expedite the development of secure, differentiated IoT solutions for a specific vertical or use case. These first-party accelerators provide a common architectural framework relevant to several IoT use cases (horizontal and vertical) upon which partners and customers can build their solutions. They serve to minimize risk, decrease development costs and drive resource efficiency, so partners can focus on more strategic innovation.

Microsoft's partners are also creating third-party, open-source solution accelerators. These accelerators focus on energy management, asset tracking, digital signage, and more – some of which are being used by companies to fast-forward their IoT solution development and bypass upfront development costs.

The third component of IoT ecosystem innovation are solution aggregators. Aggregators are partners with the in-house capability to pull together the multitude of partner components, services, and solutions needed to bring an end-to-end IoT solution to market. These partners have deep expertise in channel distribution with significant reach to bring all the needed components together for commercial deployment.

## ACCELERATING TIME TO VALUE

When partners embrace business model transformation, they stand to offer customers a much faster time to value.

Leveraging a common architecture and repeatable solutions through accelerators and aggregators can eliminate up to 80 percent of the development work. And teaming up with compatible partners offers greater speed, scalability, and depth of expertise. Customers get their IoT solutions up and running faster — hastening ROI and increasing profitability.

To help guide you in finding the IoT practice focus that best suits your area of expertise and existing skillsets, we will evaluate the current IoT landscape, providing information about how IoT is being used today, and look what industries are spending the most on IoT. After that, we will look at some use cases across various industries to help you better understand how you might be able to apply IoT. Finally, we will discuss the different types of IoT practices you might consider, strategies for driving revenue with IoT, and then move on to how you can get started.

## RESOURCES

- ➔ [IoT in Action Series](#)
- ➔ [1<sup>st</sup> Party Solution Accelerators](#)
- ➔ [3<sup>rd</sup> Party Solution Accelerators](#)

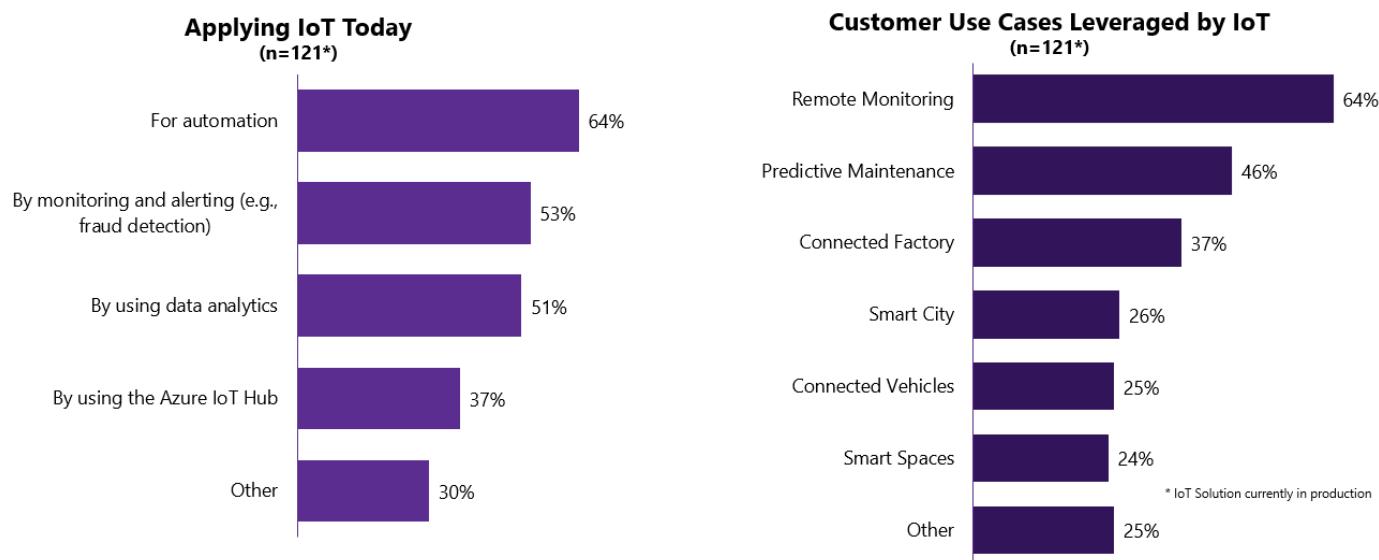
# The Current IoT Landscape

As you begin your IoT practice, one of the first things to research is the current IoT landscape. You should evaluate current application offerings and use cases for IoT. You can also look into the types of products and services organizations are currently building and selling, and how those are being used across various industries. Each of these aspects can help influence your decision on the type of IoT practice you build, and the types of products and services you will provide. We will also take a look at several barriers to IoT adoption among customers that you should be aware of as you begin your practice.

As you review the current landscape, think about the skills and industry-specific knowledge your team already has, and how that can be applied towards providing IoT products and services across the various industries.

## IOT APPLICATIONS & USE CASES

The application of IoT technologies may be limited only by your imagination and ingenuity, but to provide some insight into how IoT is being successfully and profitably applied today, MDC Research asked partners about their production applications and customer use cases. Their responses reveal that the most popular reasons for using IoT today include automation, monitoring, and data analytics. In addition, the most popular use cases are remote monitoring, predictive maintenance, and connected factories.



Source: Microsoft IoT Playbook Study, MDC Research, December 2018.

It is interesting and important to note that the majority of responses suggest the survey participants are working mainly in the industrial space, and there is also a large and growing market for direct-to-consumer IoT products.

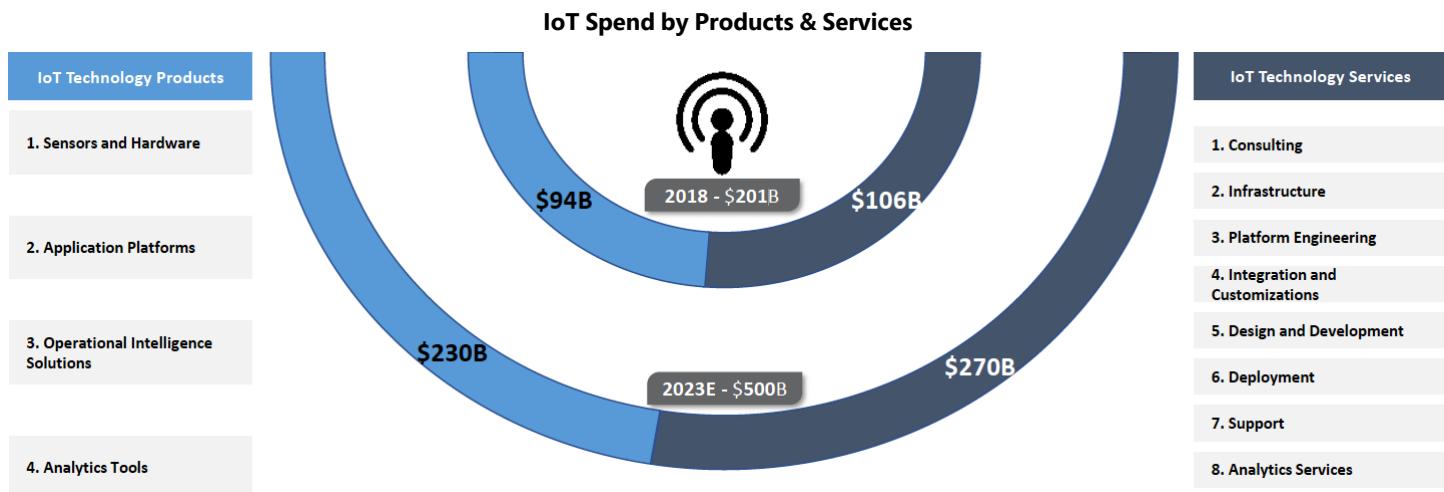
These applications and use cases are further broken down in five major categories by Zinnov. Percentages indicate the proportion of total IoT investment across each category.

CONNECTED PRODUCTS	INDUSTRY 4.0	CONNECTED ASSETS	CONNECTED LOGISTICS	CONNECTED WORKERS
15-20%	15-20%	20-25%	15-20%	5-6%
Performance visibility, usage insights, and precision marketing	Enhanced visibility and transparency of operations	Reduced downtime due to predictive maintenance and location monitoring	Efficiency and visibility across the supply chain	Enhance worker productivity and safety

The major theme across the defined categories is increased visibility and insight into current operations through the use of connected technologies. This falls directly in line with the results reported by MDC Research.

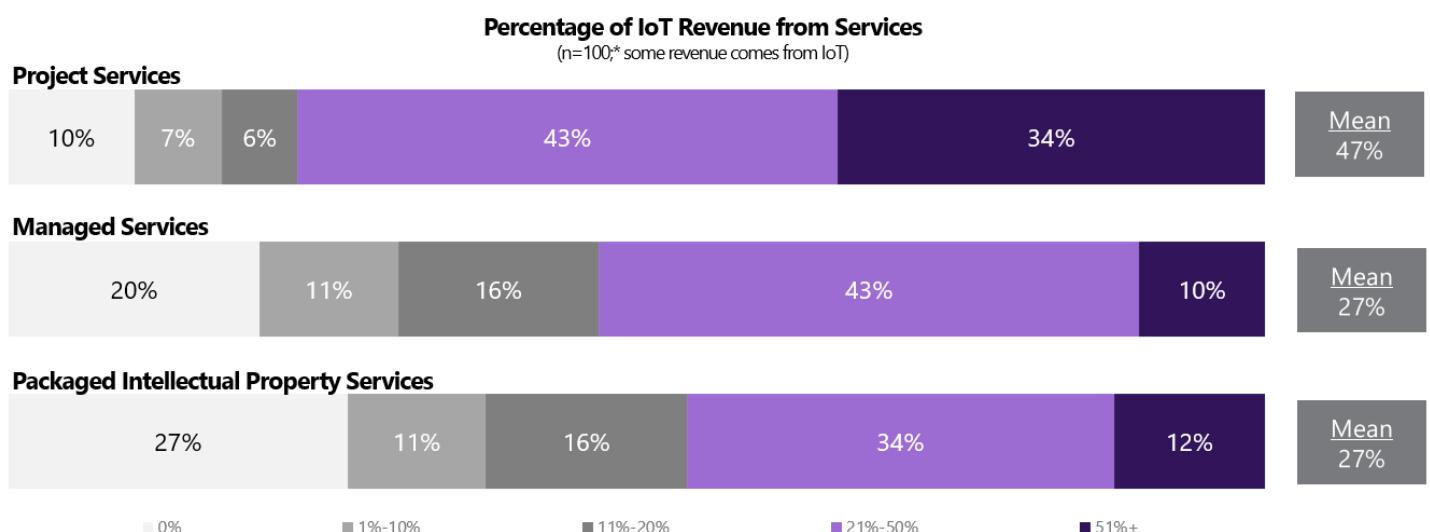
## PRODUCTS OR SERVICES?

Another key decision you will make as you build your IoT practice is whether you will be a products or services organization, or possibly both. Services is currently the leader from a spend perspective, according to research provided by Zinnov. They predict that IoT spending will increase to \$500 billion by 2023, with IoT technology services receiving 54% of that revenue. In the graphic below, they have broken down of spend between IoT technology products and services.



Source: IoT Market Landscape, Zinnov, December 2018.

As with deciding the type of service provider your IoT practice will be, you can use this research to help drive the focus areas of the products and services you intend to provide. In an MDC Research survey of 100 partners with IoT solutions currently running in production, participants reported nearly half of their IoT-related revenue is derived from providing project services, with managed services and packaged intellectual property services tied at 27%.



Source: Microsoft IoT Playbook Study, MDC Research, December 2018

While this may imply that project services represent a bigger market, it can also mean opportunities exist to fill unmet demand by providing either managed or packaged intellectual property services. We will explore each of these service areas in more detail below, but for now it is important to give consideration to each of these as you evaluate potential opportunities within the IoT market, and where your organization may fit.

To further break things down, the table below, furnished by Zinnov, provides insight into the types of technologies, products and services being employed today.

SENSORS & HARDWARE	APPLICATION PLATFORMS	OPERATIONAL INTELLIGENCE	ANALYTICS & INSIGHTS
<ul style="list-style-type: none"> <li>Sensors, smart devices, wireless, wearables, AR/VR devices, medical devices, etc.</li> <li>Protocol gateways, PLC controllers, RTU and SCADA systems</li> <li>Mobile handhelds, industrial tablets, PDA and smart phone devices</li> <li>BLE, Zigbee, LoRa, RFID, UWB, GPS, Z-wave, BACNet, Modbus, etc.</li> </ul>	<ul style="list-style-type: none"> <li>Cloud-to-edge application development and workflow "sense &amp; respond" engine</li> <li>Distributed database and micro-services software architecture</li> <li>Real-time M2M and complex event processing (CEP) engine</li> <li>Open standards /SOA based software development platform</li> <li>Integrated mobility services and reporting engine</li> <li>Remote management &amp; monitoring device gateway services</li> <li>Security and policy services for authentication, authorization and device integration</li> <li>Hardware and application independent software development platform</li> </ul>	<ul style="list-style-type: none"> <li>Real-time operational intelligence with predictive analytics</li> <li>Real-time work-in-process tracking, analytics and optimization</li> <li>Asset performance management (APM)</li> <li>Machine learning and M2M automation</li> <li>Near real-time actionable decision intelligence, visual dashboards &amp; alerts</li> <li>Real-time asset tracking to reduce exceptions and improve productivity</li> <li>High availability, scalable and robust (99.999% uptime) solutions for industrial environments</li> <li>Integrated security and policy services</li> </ul>	<ul style="list-style-type: none"> <li>Multi-source (ERP, IOI, Weblogs, etc.) and enterprise wide data analytics</li> <li>Forecast and predictive analytics improving operations and customer satisfaction</li> <li>Artificial intelligence, data science analytics to predict exceptions</li> <li>Real-time collaboration between trading partners directly from operations</li> <li>End-to-end supply chain traceability and compliance audits</li> <li>Integrate real-time operational data to provide highly accurate business insights</li> </ul>

## BARRIERS TO IOT ADOPTION

As you begin the process of establishing a new IoT practice, or growing an existing one, there are a few key challenges about which you should be aware. Security, integration with existing technologies, and lack of clarity around a return on investment are among the top concerns of customers surrounding to the adoption of IoT solutions. Each of these barriers is addressable, but you should be prepared to provide answers on how you will overcome them.

SECURITY	INTEGRATION	RETURN ON INVESTMENT
		

Secure transmission of data

Integration with existing technologies

Timeline around return on investment

### SECURITY

Similar to other areas of information technology, security is one of the top concerns for customers when considering adding IoT products and services into their systems. Because IoT solutions represent a powerful connection between the digital and physical worlds, building secure systems is a necessary foundation for building safe systems. Addressing concerns around security with IoT devices and data transmission is key to customer adoption and growing a practice. Among the partners interviewed by MDC Research, security was listed as the top challenge in delivering IoT services, and among respondents, encryption was listed as the most-used security measure.

Understanding the security requirements of your target verticals and being able to address those concerns will be critical in gaining, and retaining, customers.

### INTEGRATION WITH EXISTING TECHNOLOGIES

Due to the relatively new introduction of IoT technologies, integration with existing technologies can still present difficulties for IoT providers and customers. It can be helpful to take the time to learn more about typical implementation challenges in your target industry verticals, as well as about emerging standards in IoT, such

as those provided by [ISO/IEC JTC 1](#). Understanding your customer and their challenges can help you to offer more complete end-to-end solutions. A common approach for this is identifying customer needs and introducing the concept of IoT solutions with a pilot or proof of concept project that demonstrates how IoT integrates with existing technologies so the customer can safely realize the benefits IoT can bring to their organization.

### RETURN ON INVESTMENT

As many customers are still trying to understand where IoT fits into their enterprises, there remains a high level of uncertainty around the potential return on investment for IoT. With so many different use cases and applications of IoT, determining when customers will see a return on their investment can be difficult. Making sure you understand where and how your IoT solutions can provide strong returns for your customers will be important in your practice success. For example, remote monitoring solutions can be a quick win in many industries, as they provide quick insights into ongoing operations, and allow customers to respond quickly, without the need to tie the incoming data into existing systems.

# Types of IoT practices

Many IoT practices can be broken down into three broad categories: hardware providers, system integrators, and security practitioners. Below we provide a short description of each of these. This is not meant to be an all-inclusive list of the of IoT practices, but instead to provide a brief overview of common practice types to help you decide what kind of practice you want to build.

## HARDWARE PRACTICES

Hardware is the foundation of IoT. Sensors and devices are what detect and feed data about the environment into IoT systems, so no IoT solutions is complete without hardware. Hardware experts are critical to bridging the gap between the digital and physical world that defines IoT. When designing and developing hardware, special consideration is made in the overall design to ensure quality telemetry as well as physical and digital security. One way to ensure these requirements are met is to certify the device. Microsoft provides a certification program that verifies developed hardware, and upon successful verification, lists the device in the Microsoft Azure IoT Device Catalog. The catalog is indexed and searchable through a variety of filter criteria making the discovery of your device by prospective customers easy. Not all companies or partners have hardware expertise, make your product and consulting services discoverable and available through the IoT Hardware partner program (covered later in this book).

## SYSTEM INTEGRATION PRACTICES

Customers digitally transforming their businesses with IoT recognize that doing so requires a fundamental shift in their business strategy and operations. Service integration partners can help customers successfully undertake this transformation by serving as trusted advisors all the way from solution design to implementation and management. This can involve supporting, recruiting, hiring training staff, engaging customers, and monetizing your solutions, etc. Advisory services play many critical roles in developing and implementing an IoT solution.

From a technical implementation perspective, IoT solutions include many components that must seamlessly integrate with each other and also with existing systems and processes. Customers need a system integrator to help them with end-to-end solution design and implementation.

Over time, build a repeatable solution that can be sold as a paid service or product. Microsoft will help promote your services via marketplaces so you can start reaping a new ISV-like revenue stream. Target your Office 365 and Dynamics 365 offerings through the App Source and make your solution available to 100 million users worldwide. Leverage Azure Marketplace to promote your consulting services and specialized Azure-based applications.

## INDEPENDENT SOFTWARE VENDOR PRACTICES

The adoption of IoT is also an exciting time for existing ISV partners. Assist in the modernization process to move legacy systems to IoT and SaaS offerings for the customers and domains that you know best. It is a good decision to position yourself at the forefront of this technology evolution as the forecasted size of the SaaS marketplace is \$99.7 Billion by the year 2020, fueled in part by the IoT movement.

## SECURITY PRACTICES

IoT technology receives a lot of scrutiny surrounding security. As this is more of an emerging market, there seems to be large discrepancies in the security skillset varying from company to company. Security areas range from IoT device manufacturing, hardware integration, solution development, solution deployment, cloud operations, data security, and privacy management. Some auditors may have expertise in some, and others in all of these areas. A holistic portfolio for the above areas is not required, but deep understating of your specific area is a must.

## Driving Revenue with IoT

As the IoT market continues to grow and evolve over the next several years, how your IoT practice reacts to change and customer needs will be critical. Opportunities exist for new, nimble market entrants to bypass established competitors that fail to move quickly enough. Existing IoT practices can continue to take market share as they expand their offers and gain deeper understanding of their customers' needs.

There are multiple opportunities to drive revenue selling IoT-related solutions and services, and they can be found in all sectors, ranging from automated predictive maintenance, failure notifications, and self-healing procedures to policy adherence, such as ensuring hardhats and safety vests are being worn by personnel.

When thinking about revenue for your IoT practice, consider the benefits of delivering complete end-to-end solutions. If your services stop at helping them build the solution, what will their internal teams do when something goes wrong? IoT solutions can be complicated, and a customer may not have the internal team capable of supporting them. Providing management, monitoring, and support for IoT solutions creates a great opportunity for recurring revenue. Additionally, with expertise in Big Data and Analytics, you can help customers leverage their data to identify trends that can positively affect their business, thus increasing customer satisfaction with your services.

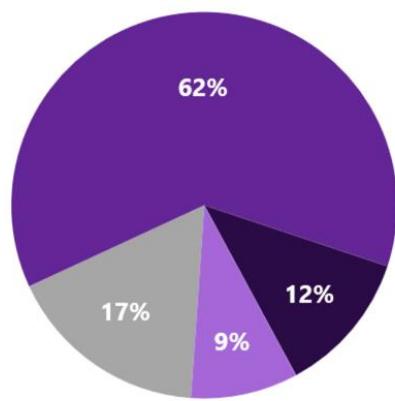
To understand how to take advantage of these opportunities, it is helpful to understand the high-level process for delivering IoT solutions, since the two are related.

1. **Envision IoT:** The first step in delivering IoT is to help your clients envision the possibilities of IoT and what that could mean for their organizations – helping them see a roadmap where IoT becomes more and more a part of their daily operations and the benefits this brings.
2. **Pilot IoT:** The second step is helping your customers implement pilot IoT solutions. Whether this means building and installing hardware prototypes or implementation of a Proof of Concept, the goal is to allow your customer to see how IoT will work with their systems, and the benefits it can provide.
3. **Deploy IoT:** The final step is helping your customers deploy IoT solution into production and providing ongoing support for those solutions.
4. **Secure IoT:** Security is one of the largest areas of concern where IoT is concerned so offering security auditing and implementation services will go a long way in establishing a successful practice.

As IoT becomes more and more integrated into the daily operations of an increasing number of organizations, partners with IoT practices will be differentiated from those who do not. IoT will not only create significant opportunities for partners, but also give them competitive advantages.

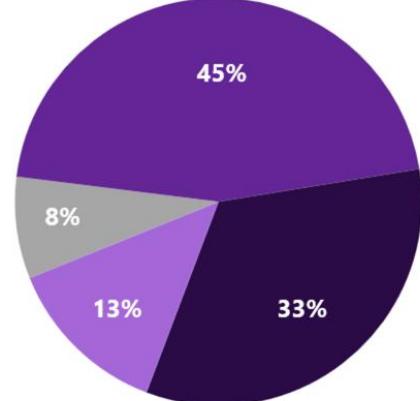
In an MDC Research survey of 121 partners with IoT solutions currently in production - IoT accounts for 16% of all organizational revenue, with a projection of nearly doubling that revenue in the next two years.

**Current Proportion of Revenue from IoT Today**  
(n=121\*)



Currently, an average **16%** of revenue is generated from IoT offerings

**Projected Proportion of Revenue from IoT in 2 Years**  
(n=121\*)

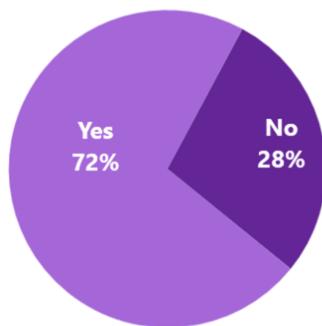


In two years, an average **27%** of revenue is projected from IoT offerings

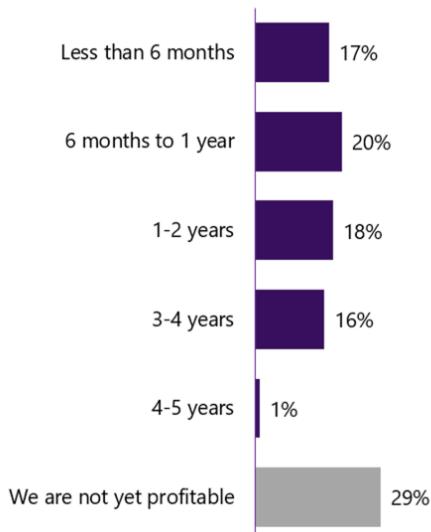
Source: Microsoft IoT Playbook Study, MDC Research, December 2018

Among those partners surveyed, the majority (72%) reported an increase in business profitability corresponding to the implementation of IoT services, with one third reporting reaching profitability within one year.

**Increased Profitability With IoT Services**  
(n=121\*)



**Length of Time to Reach Profitability**  
(n=121\*)



Source: Microsoft IoT Playbook Study, MDC Research, December 2018

## Where should you begin?

A critical requirement in any IoT solution is to have staff that is well-versed in the domain of the customer. Having domain knowledge puts your organization in a position to identify potential gaps or enhancements that will benefit your customer's processes and bottom line. The first step to ensuring a successful project is to have a domain expert that is also versed in high-level IoT concepts.

As for implementation, where you should begin largely differs based on the history of technology adoption of your customer. If your customer has already implemented an IoT solution, you need to verify that they are leveraging telemetry data appropriately. By enhancing their existing solution with dashboards, machine learning, and alerts, there is a large possibility that further sensor/device needs will be identified.

In many cases, customers are not aware that IoT can be leveraged to automate and/or improve many of their existing processes. An IoT solution is typically introduced to them via an upsell from another type of project. Many of these projects deal with the Big Data problem, heavily focused on analytics, machine learning, and KPIs. It is important to identify how IoT device telemetry can be used to augment their data accuracy, pinpoint equipment failure, and improve business processes.

Over the years, Microsoft and its partners have assisted in bringing multiple IoT solutions to fruition. With this experience, they have provided an [Azure IoT Reference Architecture Guide](#) to assist you step-by-step in building an IoT system on Azure from scratch.

Microsoft has also identified foundational common scenarios. Among these scenarios are remote monitoring, connected factory, and predictive maintenance. These solutions have been extracted and provided to you free of cost as IoT solution accelerators. Each of these accelerators have been built in alignment with the Azure

IoT Reference Architecture and each have been designed to be scalable, extensible, modular, understandable, and secure as well as being fully customizable to implement your exact requirements. They are easily deployed to an Azure account using the [Microsoft Azure IoT Solution Accelerators site](#), or by using the command line. Utilize these solution accelerators as a starting point, or as a reference for a from-scratch solution.

[Azure IoT Central](#) is available to be leveraged if you wish to have a SaaS solution where Microsoft manages all cloud infrastructure for you.

### REFERENCE ARCHITECTURE

The IoT reference architecture should be leveraged in all projects, however it is very important to have a good understanding of these concepts when implementing a specialized custom solution from scratch.

### SOLUTION ACCELERATORS

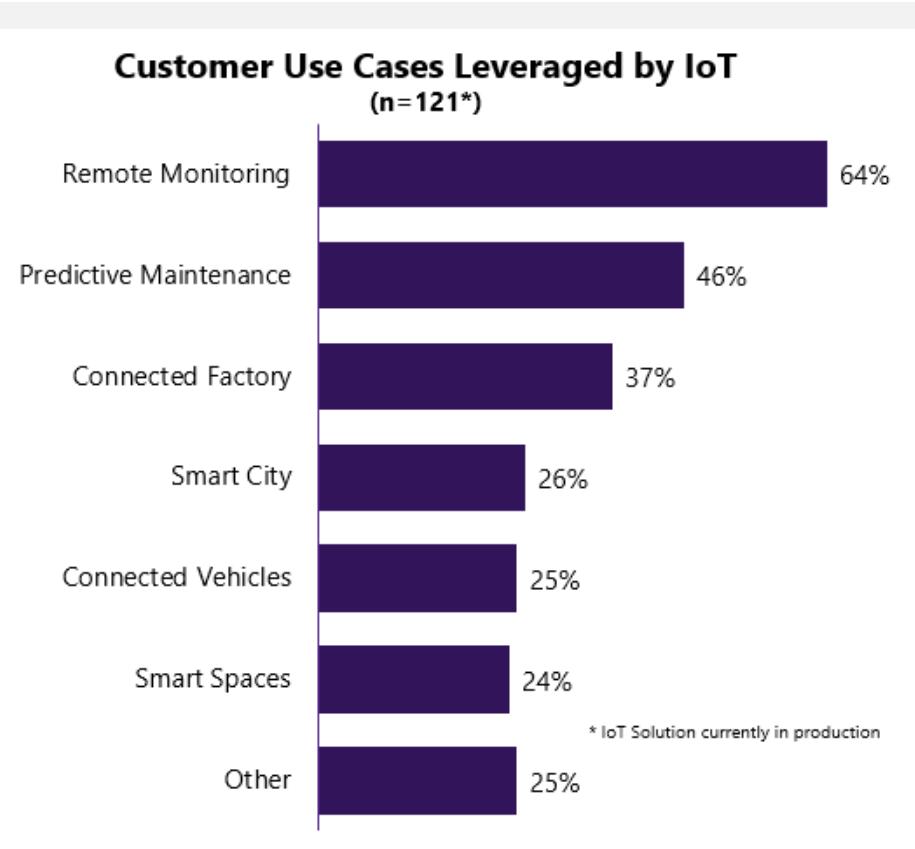
Common IoT scenarios include Remote Monitoring, Connected Factory, and Predictive Maintenance. If your solution generally matches these scenarios – they can be customized and leveraged to fit your needs. The solution accelerators also includes a Device Simulator accelerator that should also be leveraged in all projects.

### AZURE IOT CENTRAL

Build an enterprise-grade, scalable, and secure Azure IoT solution without the need for cloud development expertise. Start in minutes and have a complete solution up and running in a matter of hours. This is a full SaaS offering, meaning that Microsoft handles all of the infrastructure for you.

## What specific use cases should you start with?

Remote monitoring is the predominant use case for customers that currently have an IoT Solution in production, followed by predictive maintenance and connected factory. Partners can get up and running quickly using [Solution Accelerators](#) provided by Microsoft on the Azure platform to form the basis of a pilot project or POC or to be used as a reference. Furthermore, hardware may also be simulated prior to procurement or manufacturing using the Device Simulator accelerator. Each solution accelerator has been developed to adhere to the recommendations provided in the Azure IoT Reference guide.



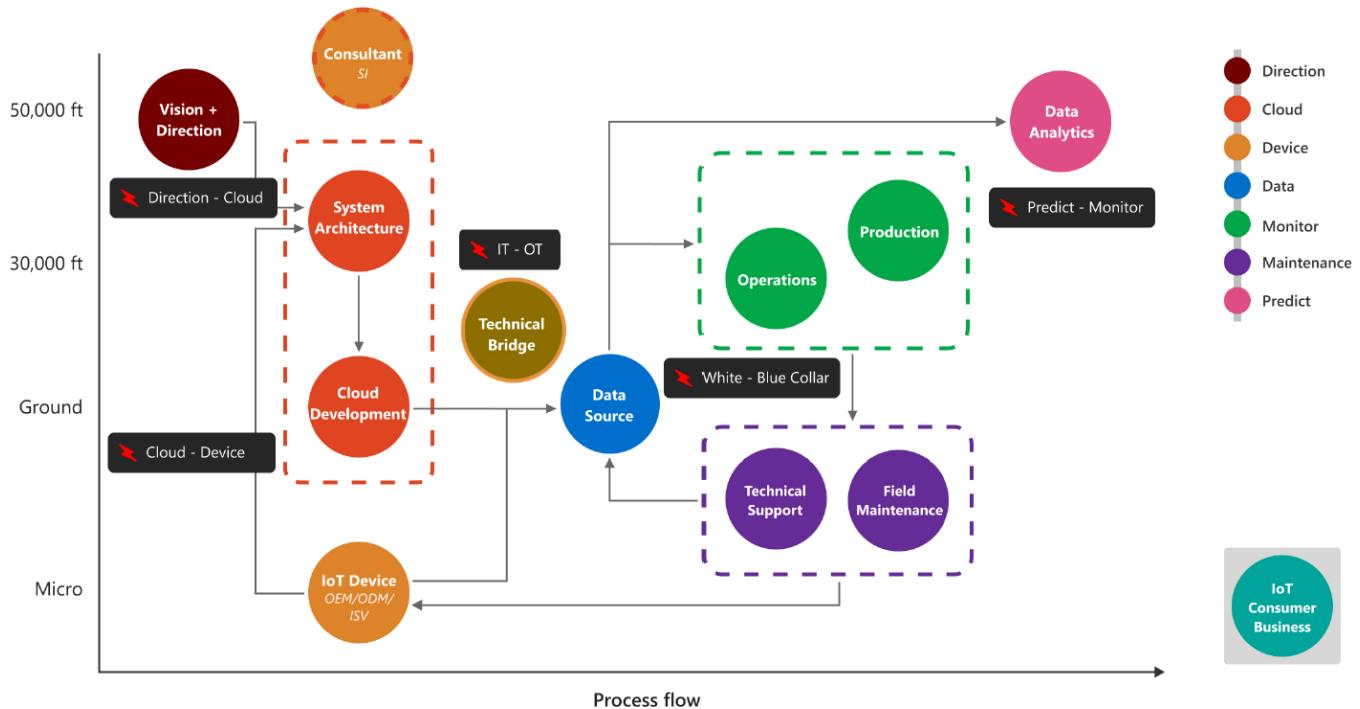
Source: Microsoft IoT Playbook Study, MDC Research, December 2018

# The Azure IoT User Model

Many different roles are required in your practice to develop, deploy, and maintain IoT solutions. The Azure IoT User Model simplifies role mapping and provides a high-level view of these roles.

Building great IoT experiences requires us to know who our customers are and what they do. The Azure IoT User Model includes common IoT customer language and describes how each user role works together to create a complete IoT system. It was developed using a systematic and rigorous process, studying IoT industries independent of IoT solutions. It will help you understand your customers' goals, pain points, skills, experiences, and group interactions.

## THE IOT SIMPLIFIED ROLE MAP



## VISION + DIRECTION ROLE

Industry titles typically associated with the Vision + Direction role are: BDM, C-Level, Chief Technology Officer, Chief Operations Officer, VPs, Directors.

This role is responsible for the decision to invest in IoT and provides vision and direction for IoT-related projects. They're responsible for approving project scope (timeline and scale) as well as budget (salary, headcount, and equipment).

The Vision + Direction role typically works closely with and relies on System Architecture and Cloud Development roles to do the bulk of the IoT research, and to inform their final decision on whether to fund and pursue an IoT project.

## CLOUD AND DEVICE ROLES

Designs and builds the IoT solution (including PoC and production), and is responsible for all software and cloud updates. Roles associated with the cloud are System Architecture, and Cloud Development.

IoT device industries (Silicon Vendors, ODM, OEM, ISV) provide the physical devices and firmware updates.

## SYSTEM ARCHITECTURE – CLOUD ROLE

System Architecture, is one cloud role that is typically associated with the following industry titles: System Architect, Process Engineer, Cloud System Architect, Cloud Architect, Experienced Senior Consultant, IT Manager.

This role is responsible for designing the IoT solution. System Architecture determines the scope of the project and the problem space along with all of the solution requirements.

The System Architecture role works in conjunction with the Vision + Direction role to establish an IoT implementation strategy, along with input from the Operations role to determine requirements and which device solutions to use. System Architecture will then send the final specs to Cloud Development role for creation.

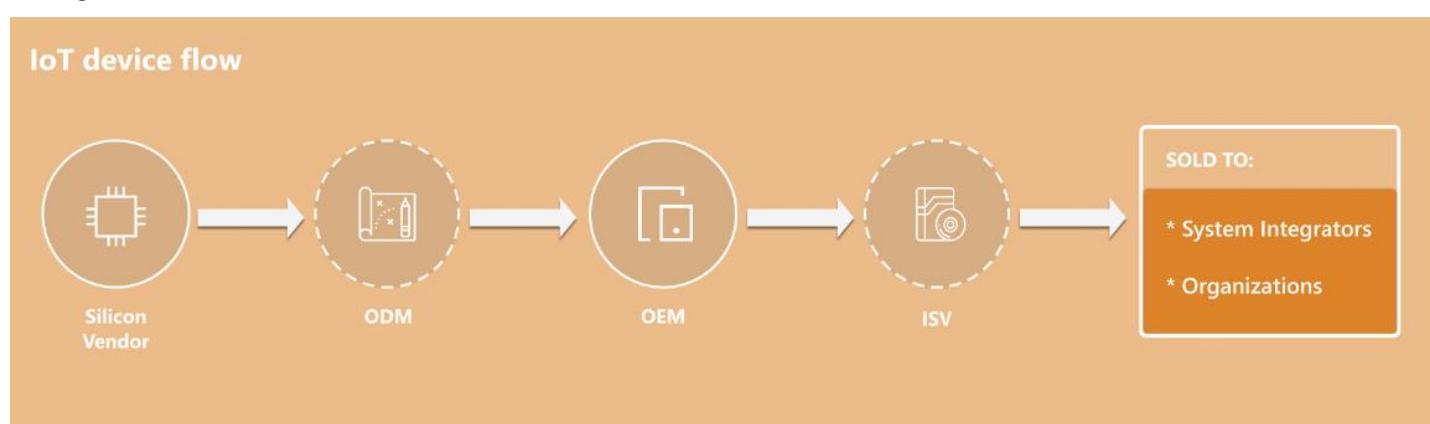
## CLOUD DEVELOPMENT – CLOUD ROLE

Cloud Development is typically associated with the following industry titles: System Architect, Cloud Architect, Process Engineer, Senior Engineer, Software Engineer, and IT Specialist.

The Cloud Development role is responsible for creating and maintaining the cloud portion of an IoT system. This role is closely linked to that of the System Architecture role and, in fact, may be performed by the same person in small- to mid-sized companies.

## HARDWARE + IMPLEMENTATION PARTNERS – DEVICE ROLE

The hardware and implementation partner role is made up of four sub-roles. Silicon Vendor, Original Design Manufacturer (ODM), Original Equipment Manufacturer (OEM), and Independent Software Vendor (ISV).



- **Silicon Vendor** – the Silicon vendor builds and sells a variety of highly capable chips and processors meant for smart devices, both large and small.
- **Original Design Manufacturer (ODM)** – the ODM creates the designs that the OEM manufacturer uses to build devices. ODM collects royalties from the designs and blueprints they produce.
- **Original Equipment Manufacturer (OEM)** – the OEM builds and sells devices at scale with processing capabilities that are meant for use by other companies.
- **Independent Software Vendor (ISV)** – the ISV provides specialized development expertise focused on coding for IoT-capable devices.

These four sub-roles working together come up with a solution to sell to system integrators, consultants, or organizations. These may be partial or complete IoT solutions. System Integrators may also partner with in-house organization cloud roles to encourage an IoT sales pitch to the Direction + Vision roles.

## DATA ROLES

The origination point from device data flowing into the system. There may be direct human interaction (for example, a person initiates data collection from a device), or the process can operate independently, without human knowledge or awareness.

## DATA SOURCE ROLE

This role can take on many titles, including Nurse, Driver, Porter, Factory Floor worker, Farmer, and more. Essentially, anything – or anyone that generates data. They are responsible to interacting with devices or being the subject of performance metrics being read by devices. They can feel as if telemetry may show them in a negative light, and therefore are usually not motivated to initiate data collection or to correct issues that may result in inaccurate data. This can lead to poor device performance, and cause data collection issues for Operations, Production, Data Analytics, Technical Support, and Field Maintenance roles.

## MONITOR ROLES

Monitors IoT data to ensure the system is operating as expected, and responds to issues that impact quality or safety. Monitor roles include the Production role, and Operations role.

- **Production Role** – the production role is typically associated with the following industry titles: Quality Assurance; Industrial, Mechanical, Chemical, or Bio Engineer; Production Engineering.

This role is responsible for product quality and safety. IoT data drives process changes that create a better and safer products, services, or environments.

Industries with a high degree of regulatory oversight, (such as food and beverage, pharmaceuticals, and defense contractors) typically have more people in this role.

It is best to introduce the production role early in the planning phase of an IoT project. They tend to bring to the table more project requirements beyond the technical. They are engaged in monitoring devices and analyzing data to determine how well the project is progressing, and whether corrections are necessary.

- **Operations Role** – the operations role is typically associated with the industry titles Mechanical/Industrial/Chemical/Control Engineer, Technical Operator, Director of Operations, Facility Manager, and Assets Coordinator.

This role is responsible for managing and maintaining devices. Operations is the first responder for malfunctions and errors, they also identify opportunities to increase efficiency. These roles are typically (but not always) performed in a location separate from the device location. If action is required, Operations contacts Field Maintenance or Technical Support to troubleshoot further.

## MAINTENANCE ROLES

Troubleshoots software, network, and device issues. May escalate to Cloud or Device depending on issue type and severity. Maintenance Roles include Field Maintenance and Technical Support.

- **Field Maintenance Role** – the field maintenance role is typically associated with the following industry titles: Technical Support Engineer, Electrician, Plumber, Contractor.  
  
This role is responsible for troubleshooting, maintaining and repairing field devices, and fixing network issues. The field technician is highly specialized, and usually focuses on one specific part of the system (like truck maintenance, security cameras, wireless equipment, etc.). The Field Maintenance role also performs proactive, regular maintenance for safety reasons.
- **Technical Support Role** – the technical support role is typically associated with the Technical Support Engineer industry title. This role is responsible for remotely troubleshooting and acting as the first line of support for software and networking issues. These issues are either resolved or escalated using a tiered system. This role differs from the field maintenance role as they deal with software and networking issues whereas field maintenance deals with the physical device.

## PREDICT ROLES

Creates models using large data sets to improve system performance and reduce costs.

## DATA ANALYTICS ROLE

The Data Analytics role is typically associated with the following industry titles: Data Scientist, Data Engineer, Data Analyst.

This role is responsible for collecting, analyzing, storing, and cleaning large amounts of data, and also creates predictive models to forecast outcomes and identify trends and insights that can help overall operational efficiency.

Based on interviews with select IoT partners, it is common to find IoT early adopters with devices deployed to the field, but with insufficient capabilities on how to leverage the data. It is vitally important to have expertise in machine learning as well as data analytics and visualization to round out any IoT solution. Helping customers reach the true potential of their data is one approach to entering the IoT space.

A second approach is to have the need for IoT grow organically from an already existing data analytics, visualization, or machine learning project. An IoT solution may grow organically from projects already established with customers in the cloud data space. Partners with expertise in IoT have been able to identify how an IoT solution can supplement existing data practices and be used as a datasource to their existing data solutions, and as a result greatly benefit their customers organizational business practices, and in turn their bottom line. They key is that customers may not be specifically seeking out an IoT solution, nor do they know that they need one. It is quite common to work with customers that are unfamiliar, confused and/or overwhelmed by IoT concepts. Partners must identify the need, introduce the concept of IoT, and recommend a pilot or proof of concept project so the customer can safely realize the benefits IoT can bring to their organization.

## TECHNICAL BRIDGE ROLES

This is a very important role in an IoT practice, as there is typically a large divide and lack of communications between Information Technology (IT) and Operational Technology (OT) departments. The Technical Bridge role bridges this communication gap to avoid a breakdown in communication. This role is typically associated with the industry title of Program Manager or Chief Engineer.

## IOT CONSUMER BUSINESS ROLE

The IoT Consumer Business Role is responsible for planning, building, installing, and maintaining IoT devices in residential installations. The devices in these solutions tend to be off-the-shelf, but are adapted and customized. These solutions include things like security cameras, thermostats, and home assistants.

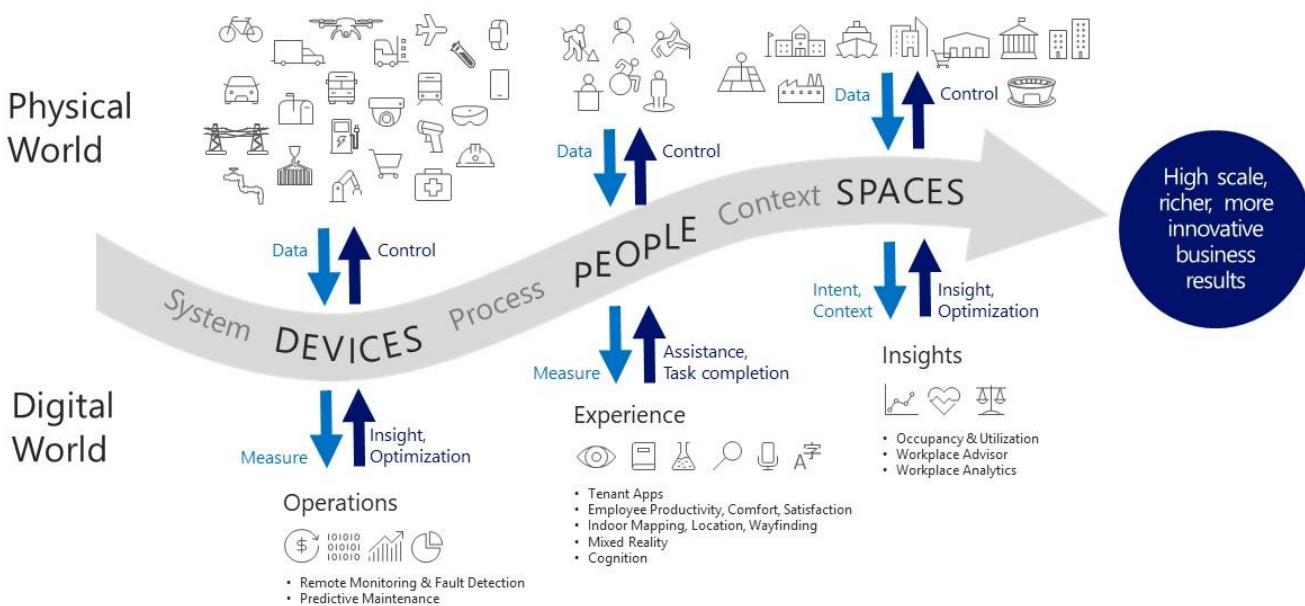
Industry titles, skills and experience requirements, and training and recruiting are covered in the Hire and Train chapter.

# The Evolution of IoT

Early IoT solutions were based on lists of devices connected to Azure and monitoring them or predicting their maintenance needs.

We are seeing the beginning of a new trend in IoT solutions: customers want to model a physical environment first, using an approach called "digital twins," and then keep the model up to date with incoming data. We're finding this is a more natural approach for building IoT solutions.

## Digital Twins: Fusing physical and digital

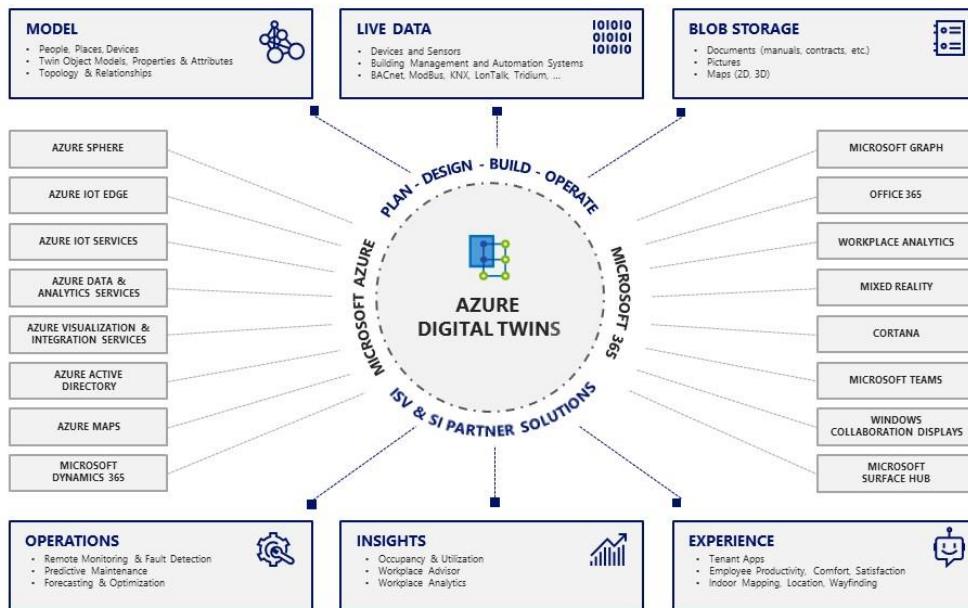


## Azure Digital Twins

To build the next generation of IoT solutions Azure digital twins are used to virtually represent the physical world and model the relationships between people, places, and devices. Partners can use the predefined twin object models to build contextually aware solutions for their industry domains, and then replicate those solutions across multiple tenants. Actions can be automated with custom functions that send events and/or notifications to endpoints based on incoming telemetry.

The diagram below shows how Azure Digital Twins can be used to model a smart spaces IoT solution:

## Azure Digital Twins for Smart Spaces



# Understanding How IoT Systems Are Created

Once a business problem or enhancement has been identified. You are now able to start putting together your IoT solution. As seen in the Microsoft IoT Solution Architecture, there are three main areas of focus in any IoT project – device connectivity, data processing and analytics, and presentation, and each of these is encompassed by one larger area – security.

## 1 Device connectivity

**Step 1:** Determine what types of telemetry should be recorded and sent for further analysis to solve the business problem. Identify devices and sensors that adequately fulfill this requirement. Then, determine connectivity needs, is a gateway (or Edge) device required? Does it make sense to offload cloud connectivity, and some cloud functions (like analytics, and machine learning) to the gateway? Typically end devices that have their own proprietary communication protocols, or if offline capabilities are required, a gateway will be required. Finally, determine the best communication protocol to deliver telemetry data to the cloud. Device provisioning, security, and connectivity options are reviewed in this document in the next section.

## 2 Data processing and analytics

**Step 2:** Once data is received, streaming analytics, hot/cold storage, machine learning/AI solutions all come into play. Ensure that you are hyperfocused on the goal and be certain to best leverage the data you have coming in to improve business process, increase productivity, and improve efficiency.

## 3 Presentation (and action)

**Step 3:** Creating useful dashboards is a reasonable expectation for any IoT solution. This can take the form of a custom web application, a mobile app, or through the use of existing products, like PowerBI or Dynamics 365. It is also equally important to ensure IoT solution manageability by providing the means to communicate required actions remotely back to an IoT device. The more automated the IoT solution is, the more cost savings you will incur.

## 4 Security

**Security** is a critical consideration in each of the subsystems. Protecting IoT solutions requires secure provisioning of devices, secure connectivity between devices, edge devices, and the cloud, secure access to the backend solutions, and secure data protection in the cloud during processing and storage (encryption at rest). As stated previously, we recommend using Azure IoT Hub which offers a fully-managed service that enables reliable and secure bi-directional communication between IoT devices and Azure services such as Azure Machine Learning and Azure Stream Analytics by using per-device security credentials and access control. For storage technologies we recommend using Azure Cosmos DB for warm path storage and Azure Blob Storage for cold storage both of which support encryption at rest. For user management, such as authenticating user credentials, authorization of user UI capabilities, reporting and management tools users have access to, and auditing application activities we recommend Azure Active Directory. Azure Active Directory supports the widely used OAuth2 authorization protocol and OpenID Connect authentication layer.

# The Microsoft Approach to IoT

Microsoft is committed heavily to IoT.

Microsoft has identified IoT as a critical phase and turning point in technology. So much so, Microsoft is committed and heavily invested in IoT. Between 2018 and 2022, Microsoft is investing \$5 billion dollars to support continued innovation of the technology platform through research and development, and to introduce new customer supporting programs, in an effort to grow the partner ecosystem. Research and development will focus on key areas, such as security, development tools, intelligent services, and the edge.

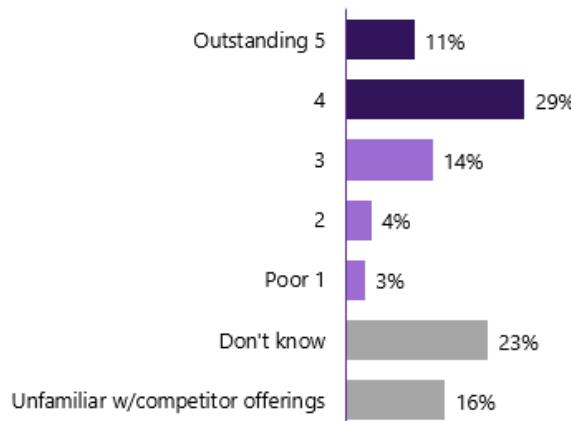
## WHY PARTNER WITH MICROSOFT FOR IOT?

Today, Microsoft offers compelling and reliable services for IoT solutions. Everything that a business requires to get started, ranging from operating systems for devices, cloud services to control and secure them, advanced analytics to gain insights, machine learning and artificial intelligence to enable predictive solutions, and business applications that enable intelligent action and visualize big data.

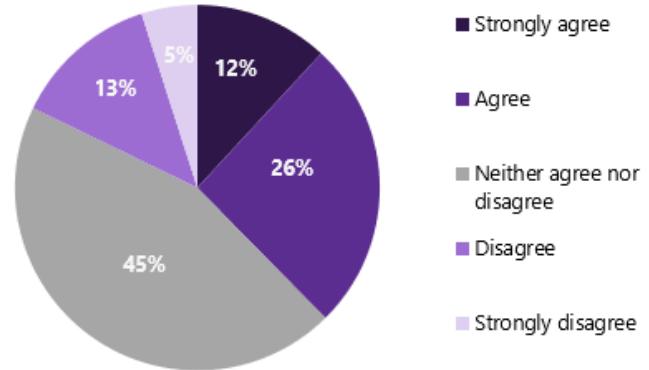
Microsoft also has a proven track record with many companies having transformed their businesses with increased reliability, increased customer satisfaction, increased revenue, improved efficiency, and provided the means to launch new products and services on the IoT platform.

Based on the MDC Research survey conducted for this book, partners who have a solution with IoT in production are significantly more likely to say Microsoft's IoT solutions are outstanding compared to competitors (40% vs 23%).

**Microsoft IoT Solutions Compared to Competition**  
(n=121\*)



**Microsoft is an IoT Solution Leader**  
(n=121\*)<sup>a</sup>

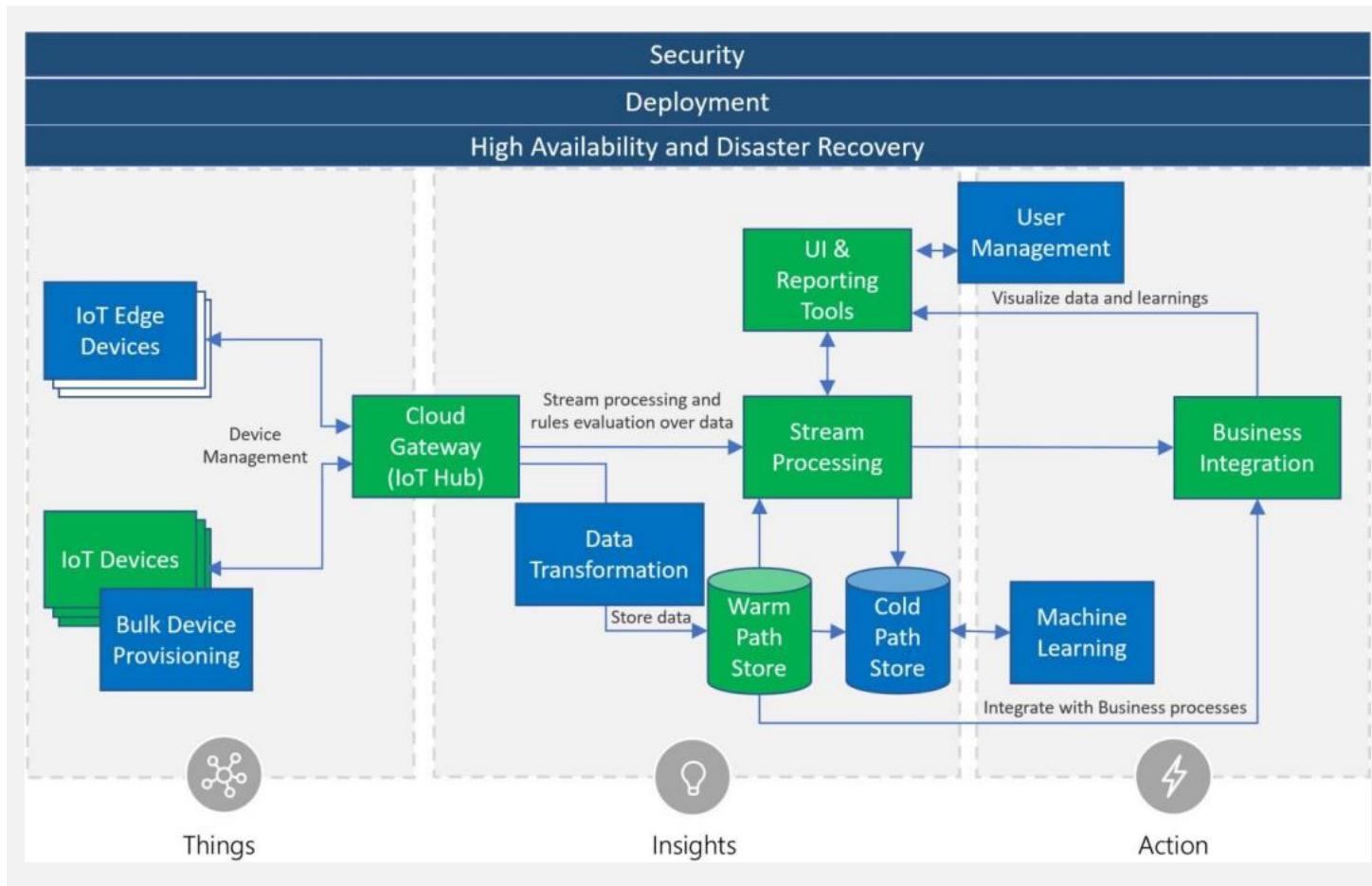


Source: Microsoft IoT Playbook Study, MDC Research, December 2018

It is important to realize that the Microsoft IoT platform builds upon the strengths of the Microsoft cloud, notably:

- Microsoft is the only cloud provider that combines a Hyper Scale cloud offering, a truly hybrid platform, and an enterprise-level support for your cloud-based IoT workloads with enterprise-level SLAs.
- Microsoft is considered by Gartner as a leader in six<sup>1</sup> of the nine cloud-related Magic Quadrants.
- Microsoft is industry leading with security, privacy and compliance. All of Microsoft's services are independently verified to meet legal and compliance requirements, are financially backed, and offer transparent information on their availability.

## MICROSOFT IOT SOLUTION ARCHITECTURE



<sup>1</sup> Magic Quadrants: [Cloud Infrastructure as a Service](#); [Public Cloud Storage Services](#); [Access Management](#); [Server Virtualization Infrastructure](#); [Disaster Recovery as a Service](#); [Enterprise Application Platform as a Service](#)

# Establish an IoT Practice using Azure IoT

In the sections that follow, we will explore the key services, compute options, and tools from the Microsoft Internet of Things platform and how they can help you develop custom IoT solutions.

When establishing an IoT practice, one of the first opportunities is to provide a solution to reign in and manage thousands of potential IoT devices. This involves the ability to identify, secure, monitor and update these devices remotely - all of which is possible with Azure IoT.

In addition to the management of physical devices, opportunities exist for data analytics. Data scientists can utilize tools such as Azure Stream Analytics and Azure Machine Learning to discover patterns and apply them for things like predictive maintenance.

Custom software development is also key in providing the customer with useful data visualizations in the form of dashboards, reports and mobile applications.

Furthermore, the ability to provide sound testing of the behavior of downstream IoT components is also critical. Often times, certain environmental or data scenarios are

difficult to reproduce. Having the proper tooling in place to automate this testing will help avoid surprises come time for production as well as providing regression testing for established systems.

Monitoring the health of the devices in the field and the backend systems that they depend on provides another practice opportunity. Many organizations lack the resources and knowledge to troubleshoot and solve problems as they arise.

Azure IoT provides a mature platform with which to satisfy and automate many of these requirements. This greatly reduces time to market and heightens the chances of deploying a successful IoT solution. The following sections will walk through some of the core Azure IoT features that an IoT practice can take advantage of when building an IoT solution.

## Azure IoT Technologies and Solutions

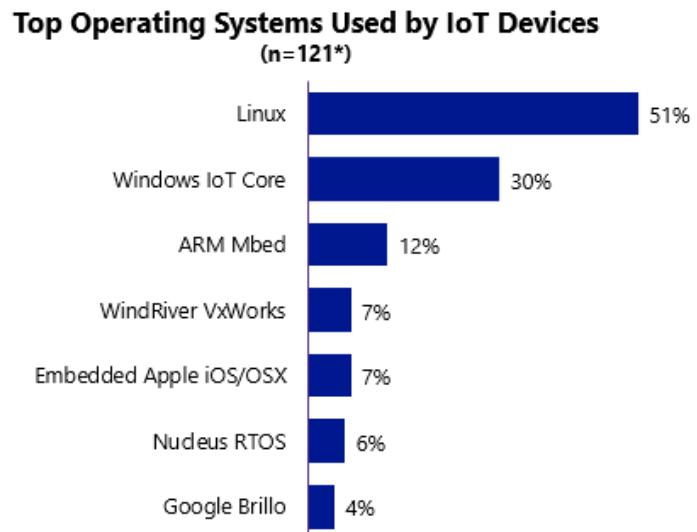
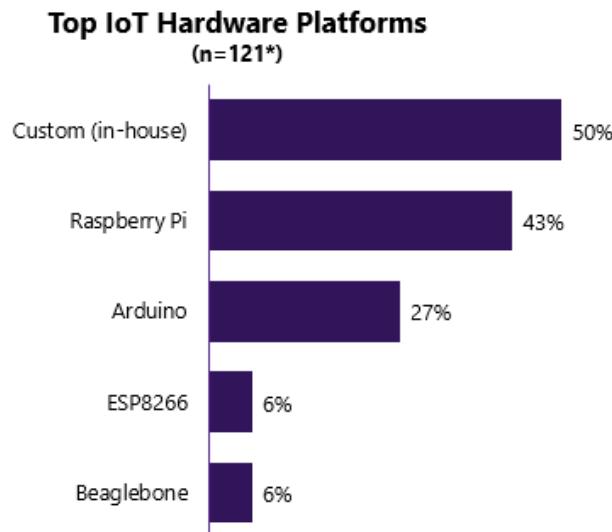
(PaaS) Solutions	(SaaS) Solutions
<b>Azure IoT solution accelerators (PaaS)</b> Preconfigured solutions for common IoT scenarios	<b>Azure IoT Central (SaaS)</b>  <b>Microsoft Dynamics Connected Field Service (SaaS)</b>
(PaaS) Technologies	
<b>Device support</b> <ul style="list-style-type: none"> <li>Azure IoT Device SDK</li> <li>Azure IoT certified devices</li> <li>Security Program for Azure IoT</li> <li>Windows 10 IoT</li> <li>Azure Sphere</li> </ul>	<b>IoT</b> <ul style="list-style-type: none"> <li>Azure IoT Hub</li> <li>Azure IoT Edge</li> <li>Azure Time Series Insights</li> <li>Azure Sphere</li> <li>Azure Digital Twins</li> <li>Azure Maps</li> <li>IoT Hub Device Provisioning Service</li> <li>Azure Functions</li> <li>Azure Machine Learning</li> </ul> <b>Data and Analytics</b> <ul style="list-style-type: none"> <li>Azure HD Insight</li> <li>Azure Data Lake</li> <li>Azure Cosmos DB</li> </ul> <b>Visualization and Integration</b> <ul style="list-style-type: none"> <li>Microsoft Flow</li> <li>Azure Logic Apps</li> <li>Azure Web App</li> <li>Notification Hubs</li> <li>Azure Active Directory</li> <li>Microsoft Power BI</li> <li>Azure Monitor</li> </ul>

## THE IOT DEVICE LIFECYCLE



## Device Hardware

Hardware is a critical component in an IoT solution. Its sensors are responsible for telemetry, and it's configured to communicate with an Edge device or cloud to provide the foundation for downstream services, visualizations, and applications. There are choices to make, whether to design and manufacture custom hardware, outsource the design and manufacturing of a device, or identify a device in the marketplace that is suitable. From the partners interviewed, most develop their own custom hardware using the Linux operating systems.



### SKIP MANUFACTURING AND LEVERAGE EXISTING HARDWARE

It makes sense to identify potential hardware candidates in order to avoid a costly and lengthy manufacturing process. Utilize the Microsoft Azure IoT Device Catalog to find a device that fulfills the goal of the solution, or find an experienced hardware partner to handle the task of design and manufacturing.

### PROMOTE YOUR EXISTING HARDWARE AND HARDWARE CONSULTING SERVICES IN THE AZURE IOT DEVICE CATALOG

Existing hardware designers and manufacturers may register with Microsoft, download a certification kit to test their device. Upon successful verification, the device is branded as certified and listed in the Device Catalog, along with its company details and contact information.

### DEVELOP YOUR IOT SOLUTION USING SECURE HARDWARE WITH AZURE SPHERE

Based on years of IoT experience and research, Azure Sphere has been designed to be a powerful, highly secure microcontroller (MCU) with cloud connectivity built in.

Azure Sphere promotes security with crossover MCUs, a secure OS complete with turnkey cloud security service – proven to guard every Sphere device with end-to-end security that responds to emerging threats – so you don't have to.

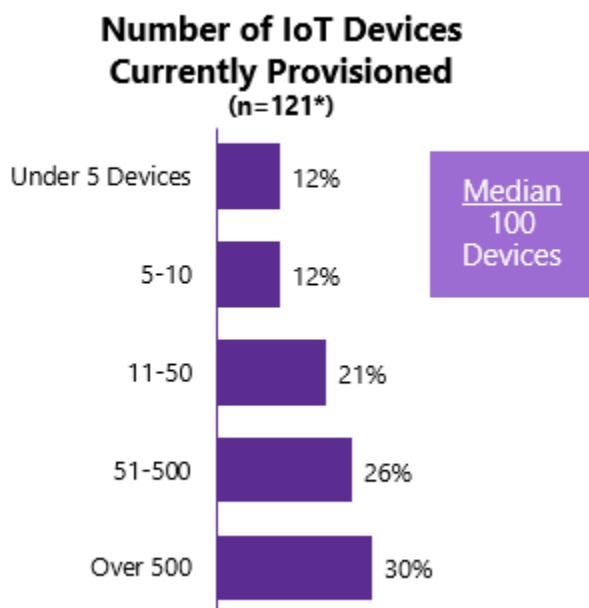
### BRING THE CLOUD INTO THE FIELD WITH AZURE IOT EDGE

IoT Edge are devices deployed to the field that are capable of running cloud analytics and custom business logic. Cloud functions such as Azure Functions, Azure Stream Analytics, and Azure Machine learning are fully supported modules on Edge devices. Depending on the workloads you wish to move into the field, the size of the device can vary wildly, from a Raspberry Pi 3 to a full-fledged multicore server. An Edge device is simply a device that has the IoT Edge runtime installed. Benefits of utilizing IoT Edge devices is reduced bandwidth costs, from moving telemetry and data analysis from the cloud, to responding to emergency situations as quickly as possible, especially in a disconnected field environment. You will learn more about IoT Edge devices and software in the upcoming section "Leverage Cloud Software On-Premise" section.

## Device Management

One of the major hurdles in any distributed system is the identification and management of nodes. To develop a home-grown service for this would incur significant cost and risk whereas the Azure IoT Hub already provides a mature, secure, and dependable solution out of the box.

The number of devices deployed in an IoT solution varies with the project. Most partners interviewed had medium to large scale device deployments.



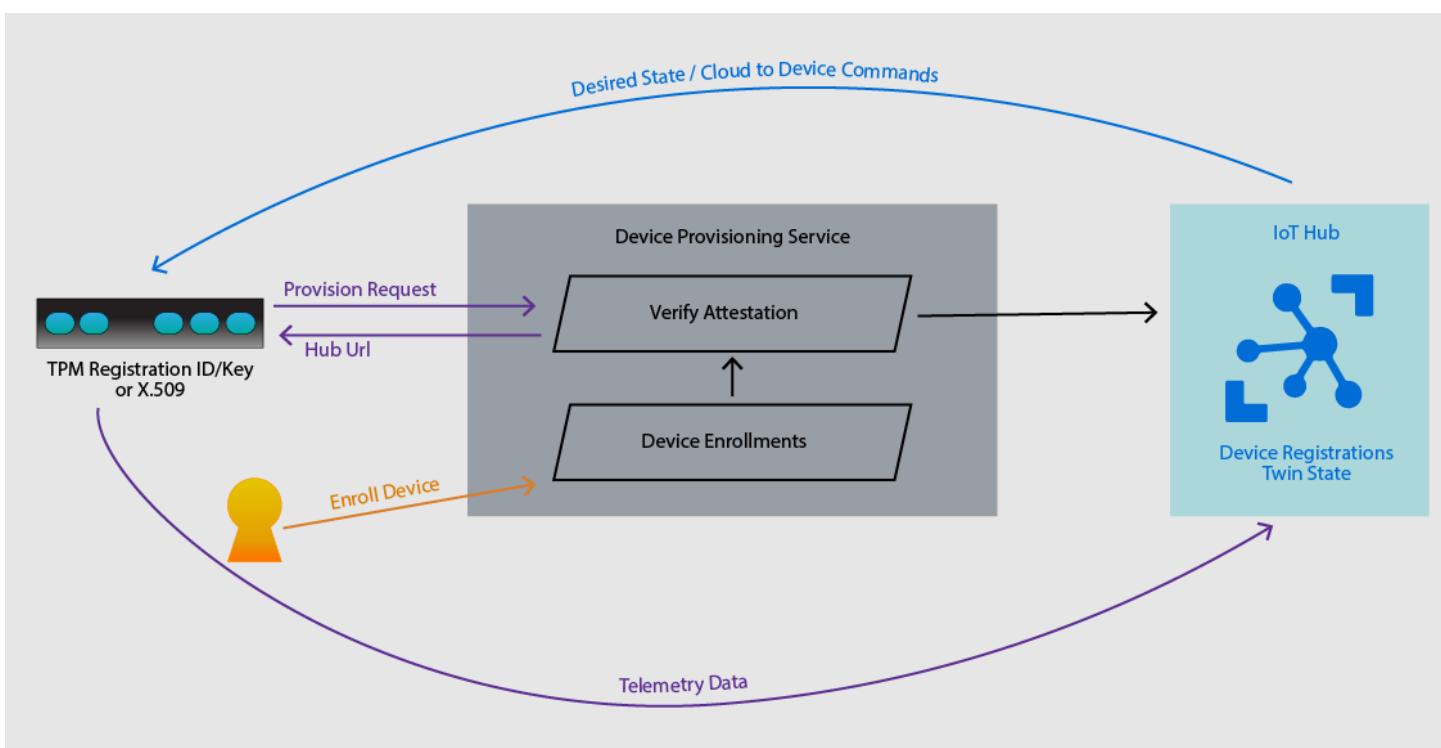
### AUTOMATICALLY PROVISIONING IOT DEVICES WITH THE DEVICE PROVISIONING SERVICE

Azure IoT Hub Device Provisioning Service provides a zero-touch provisioning solution to large and small IoT systems alike. In an effort to avoid manual tasks typically performed at a factory, this service was introduced to automate the verification of a device identity and to provide the device with an initial configuration along with the path to the IoT hub.

Auto-provisioning provides scalable just in time provisioning and initial configuration to large numbers of IoT devices and Edge devices with the IoT Hub. It allows for the physical manufacturing to be less susceptible to outdated and stale configuration and settings as only the attestation mechanism and Device Provisioning Service endpoint are shipped on the device. The configuration (state) is instead synchronized between the device and the IoT Hub instead of being embedded on the device itself.

When a device is built, it is enrolled with the Device Provisioning Service either manually through the Azure Portal or through the Device Provisioning Service API. This enrollment identifies the device as one that will be requesting provisioning at a certain point in the future. The physical device is also configured with the Device Provisioning Service endpoint that will be used when initiating the provisioning process. To identify and authenticate the device with the service, the manufacturer is given either a TPM (Trusted Platform Module) registration ID with the public endorsement key or an X.509 certificate to be used as an attestation of its identity to the service. This is all of the required pre-work that needs to be complete in order to enable auto-provisioning.

When a new device is deployed to the field it will issue a provisioning request to the Device Provisioning Service url. The service then validates the request for authenticity and if successful, the device id is registered along with its desired state in the IoT Hub. The IoT Hub maintains a twin state in the cloud that will be used to synchronize configuration values on the device. The Device Provisioning Service returns the IoT Hub url to the device which is then used to connect to the IoT hub to synchronize its desired state and to begin sending telemetry data.



## BULK MANAGEMENT OF IOT DEVICES WITH THE AZURE JOBS FRAMEWORK

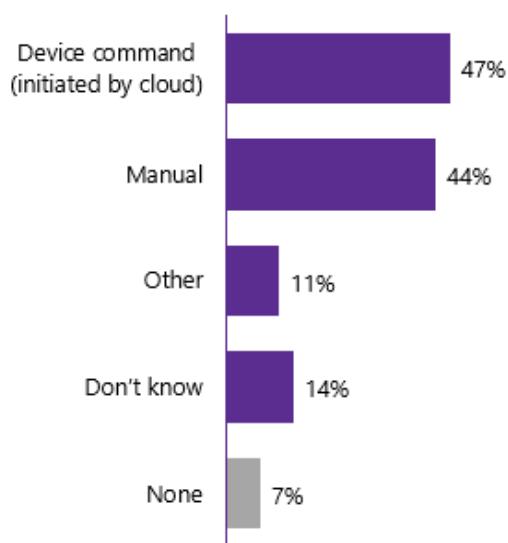
Auto-provisioning devices may not be ideal in every situation. As an alternative, Azure provides a Job framework that allows for the export, import and synchronization of data within the IoT hub identity registry. By leveraging the Job system in Azure, developers can perform bulk registrations of devices into the IoT Hub using custom code. The Registry Manager class provides methods to export and import device data by interfacing directly with the identity registry in IoT Hub. When importing device data, operations are not limited to simply creating device registrations, it also provides the ability to update and delete registrations, perform status changes (enabling or disabling devices), assign new device authentication keys, regenerate device authentication keys, as well as update twin data in bulk.

## PROVIDE OVER-THE-AIR UPDATES TO IOT DEVICES

In a distributed IoT environment, it is critical to have the ability to manage devices remotely. It is not cost-effective to require a physical visit to hundreds or even thousands of devices in a system in order to provide updates.

Configuration, software and firmware updates need to have an automated delivery, installation, and rollback mechanism. Azure IoT provides this functionality through the use of IoT Hub Configurations. From the partners interviewed, most use a cloud-to-device command to initiate updates.

**Strategy Used to Configure & Receive Updates on IoT Devices (n=121\*)**



## AUTOMATIC DEVICE UPDATES WITH IOT HUB CONFIGURATIONS

Automation of device configuration updates is made possible through the use of device twins in IoT Hub. Device twins are JSON-based configuration documents that reside in the cloud and on an IoT device and are used to synchronize settings between the two. Device twin files are structured documents made up of three sections: tags, desired, and reported properties.

Tags represent metadata that the backend system uses to identify a device or group of devices and can be used in queries to perform a lookup of devices that match a certain criteria, such as installation location.

Desired properties are set in the cloud, changes to these properties trigger notifications in the software running on the IoT device. These properties can also be read at any time in IoT device applications. Changes in desired properties are a call-to-action for the device to perform some type of update in order to synchronize itself with the device twin in the cloud.

Reported properties are set by the IoT device and is indicative of the current state of the device, this data is sent to the cloud. Reported properties are queryable in the backend and may be used to identify candidates that require updating.

To begin the process of updating devices in the field, a new Configuration will need to be created in Azure. A

configuration consists of a query that identifies the devices impacted by the update, the target condition that queries tags or reported properties to determine if the update is required on the device, the target content defines the path of the desired properties that need changed, and custom metrics that can be used to report on the status of the configuration update. Once the configuration has been established, all devices fitting the device query criteria and target condition will have its device twin desired properties set which is then pulled by the IoT device automatically where the apps on the device can then handle desired property change notifications.

## SPATIAL ENVIRONMENT MODELS WITH AZURE DIGITAL TWINS

Many IoT projects are approached from a “things”-centric approach. Leveraging Azure Digital Twins approaches solutions from an environment-centric approach. Large benefits can be found by modeling the physical environment then connecting the devices to that model. Azure Digital Twins supplement the existing twin object models with a pre-defined schema. This allows customers to establish a virtual representation of the physical environment to model the relationships among people, places, and devices. The ability to query data in the context of a space, rather than disparate sensors allows customers to realize their data in terms of the current physical environment. This type of solution truly bridges the digital sources with the physical world.

# Monitoring and Support

The overall health of devices needs to be monitored to ensure the accuracy of the telemetry reported and to detect and notify the system in the event of hardware tampering or abnormal behavior. Similarly, backend system health also requires scrutinized monitoring and troubleshooting capabilities.

Many organizations lack the resources and knowledge to support an IoT system 24/7. Establishing a practice to perform this monitoring for a client is positioning for success. By setting up diagnostics and automated alerts, a practice can provide a continuous monitoring service along with troubleshooting in a timely fashion.

Monitoring also provides an IoT Practice with experience in the behavior of an IoT system. After documenting issues and remediations over a period of time, additional custom

software can be written in order to automate actions that would fix particularly troublesome issues.

## MONITOR IOT HUB HEALTH WITH AZURE MONITOR AND AZURE RESOURCE HEALTH

Azure Monitor is a central tool that has the ability to monitor all resources available in Azure. By specifically enabling diagnostics on an IoT Hub, Azure Monitor will automatically start gathering information on multiple operations in the IoT hub including connections, device telemetry, twin queries, cloud to device commands, and more. Logs may be stored to a storage account, or to Azure Log Analytics for further processing. Automated alerts may also be added on a variety of metrics by adding a rule to the monitor. When an alert condition is met, a notification is either sent out via email, a webhook called, or by executing a logic app.

The screenshot shows the Azure portal interface for monitoring an IoT Hub. The left sidebar includes options like Create a resource, All services, Favorites, Dashboard, Resource groups, All resources, Recent, App Services, Virtual machines (classic), Virtual machines, SQL databases, Cloud services (classic), Subscriptions, Azure Active Directory, Monitor, Security Center, Cost Management + Billing, Help + support, and Advisor. The main area is titled 'Monitor - Metrics' for the IoT Hub 'iotplaybook'. It displays a list of available metrics such as Failed twin updates from back end, Failed twin updates from devices, Number of throttling errors, Request size of direct method invocations, Response size of direct method invocations, Response size of twin reads from back end, Response size of twin reads from devices, Routing: blobs delivered to storage, Routing: data delivered to storage, Routing: message latency for Event Hub, Routing: message latency for Service Bus Queue, Routing: message latency for Service Bus Topic, Routing: message latency for messages/events, Routing: message latency for storage, Routing: messages delivered to Event Hub, Routing: messages delivered to Service Bus Queue, Routing: messages delivered to Service Bus Topic, Routing: messages delivered to fallback, Routing: messages delivered to messages/events, Routing: messages delivered to storage, and Routing: telemetry messages delivered. A preview of the new metrics experience is shown. On the right, the 'Add rule' dialog is open, allowing users to set a metric alert for 'Telemetry messages sent' less than 10K. The alert name is 'Minimum Messages' and it's set to trigger on Metrics for the IoT Hub resource group 'iotplaybook'.

Azure Resource Health provides an overview of all Azure Resources from an operations standpoint. IoT Hub health is monitored at a regional level, with Azure Resource Health indicating whether or not there is an outage currently affecting the resource.

### SETUP CUSTOM ALERTS WITH AZURE STREAM ANALYTICS

Azure Stream Analytics is available both on the Azure Cloud as well on IoT Edge devices. It allows for the real-time transformation, filtering, aggregation and statistical calculation on temporal data ingested from IoT devices. Azure Stream Analytics is also fully extensible via custom code or by using a SQL-like query language to define a Job. A Job is executed on all incoming data and allows for the identification of criteria that should result in an action, such as an alert. The Job also has Output settings whereas any data confirming to the condition specified will be written to. For instance, the data could be written to blob storage that can trigger a custom alert in real-time using an Azure Function.

### MONITOR IOT SYSTEMS WITH DYNAMICS 365

Microsoft Dynamics 365 features a Connected Field Service Add-On. Utilize this add-on to detect, troubleshoot and resolve issues with customer systems remotely – before the customers even know there is a problem. The Connected Field Service Add-on provides the ability to proactively generate work orders to dispatch technicians for maintenance tasks, decreasing overall downtime. The add-on also has the ability to issue self-healing commands to impacted devices, potentially eliminating the need to dispatch technicians altogether, thus reducing cost and maximizing resource productivity. Monitor thresholds, identify anomalies and harness the power of Big Data to track performance and determine if products are meeting, exceeding, or missing expectations.

## Leverage Cloud Software On-Premise

When delivering a hosted solution to a customer, cloud resource bandwidth, throughput and compute are large components of the overall cost of an IoT Solution. As a way to mitigate this cost, it makes sense to introduce an on-premise field gateway. Rather than having each individual IoT device connect directly with cloud services, they could instead connect to this gateway which in turn would be responsible for applying logic operations, performing aggregations on the data, and more. The gateway would then furnish the cloud services with a single transformed message representative of the information provided by multiple devices rather than sending over masses of raw data. Not only does this save on bandwidth costs, it also saves on cloud compute resources as the logic and aggregation computations have already been handled prior to ingestion. Cloud resources could then be used solely to focus on the business insights rather than data transformation.

### MOVING DATA ANALYSIS ON-PREMISE WITH AZURE IOT EDGE

In Azure terminology, this gateway is referred to as an IoT Edge Device. Introducing IoT Edge devices provides great scalability to your solution as the gateway would be responsible for managing security and workloads on a subset of devices in the field. It has the ability to run custom developed business logic along with full modular implementations of cloud features such as Azure Functions, Azure Stream Analytics, and Azure Machine Learning. In moving these features out of the cloud and onto an on-premise device, it not only saves on cloud costs but also moves data processing closer to the IoT devices thus providing more timely mitigations and alerts should there be a problem identified. IoT Edge devices also solves the problem of offline or intermittent cloud connectivity as it has the ability to store data and move it to the cloud once connectivity has been established.

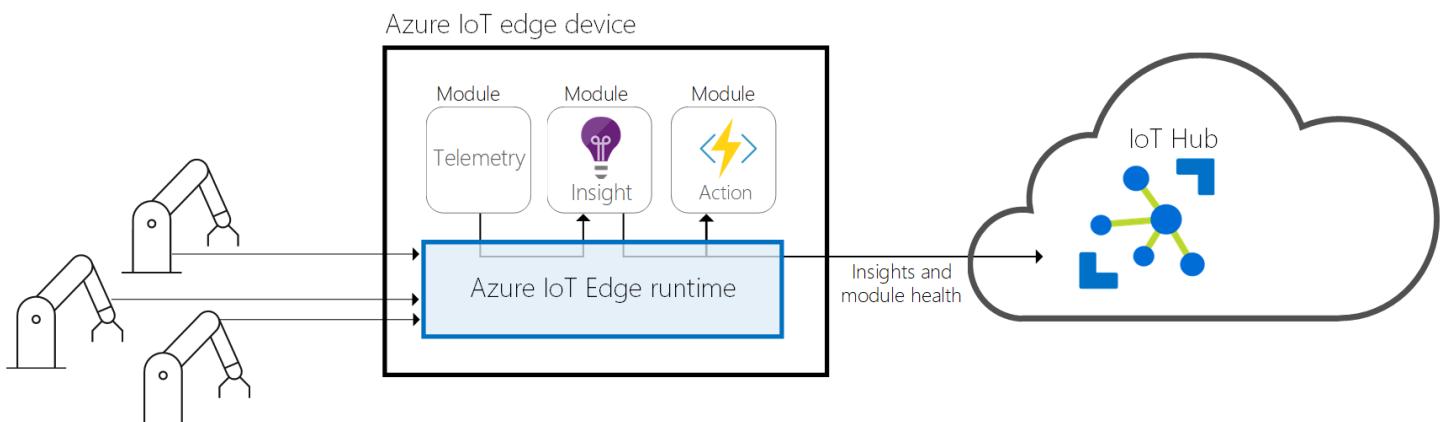


image "borrowed" from <https://docs.microsoft.com/en-us/azure/iot-edge/about-iot-edge>

IoT Edge features are called IoT Edge modules and they are implemented in the form of Docker compatible containers. These containers have the ability to run on a variety of hardware depending on processing requirements, ranging from a Raspberry Pi 3 to a full blown server installation. Developers can run custom code that would be identical to that if they were developing for the cloud directly. IoT Edge supports both Linux and Windows operating systems and Java, .NET Core 2.0, Node.js, C, and Python for programming languages.

## Communication

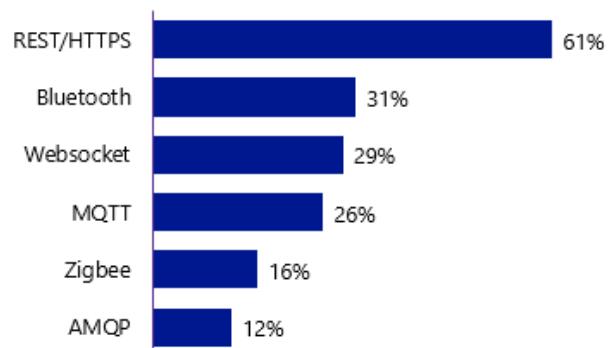
Azure IoT Hub supports the most common communication protocols found in IoT solutions, namely MQTT, AMQP, HTTPS as well as MQTT and AMQP over WebSockets. Having support for these protocols puts Azure IoT services at the forefront of potential integrations with third party services and hardware.

There are a few things to keep in mind when choosing a protocol for communication, specifically if you require a connection oriented or connectionless protocol. HTTPS is a connectionless protocol, meaning that it does not retain state and does not have an elegant way for servers to push information back down to devices, and some type of polling solution would need to be implemented at a device level. If the network firewall has a policy to reject all non-HTTPS traffic, then it would be required to utilize HTTPS or a WebSocket based solution. MQTT and AMQP on the other hand are stateful, connection-oriented protocols where bi-directional communication is made possible. MQTT and AMQP are also binary protocols which results in smaller sized payloads being sent to the cloud while MQTT and HTTPS software libraries reserve a smaller footprint on IoT devices if space is at a premium. A basic comparison of common message protocols is provided in the table below.

	<b>Transport</b>	<b>Message Paradigm</b>	<b>Server Updates</b>	<b>Scope</b>	<b>Security</b>
AMQP	TCP	Point-to-Point Message Exchange	Push	Device-to-Device Device-to-Cloud Cloud-to-Cloud	TLS
CoAP	UDP	Request/Response	Push	Device-to-Device	DTLS
DDS	UDP TCP	Publish/Subscribe Request/Response	Push Pull	Device-to-Device Device-to-Cloud Cloud-to-Cloud	TLS DTLS DDS Security
RESTful HTTP	TCP	Request/Response	Pull	Device-to-Device Device-to-Cloud Cloud-to-Cloud	TLS SSL
MQTT	TCP	Publish/Subscribe	Push	Device-to-Cloud	TLS

In the survey conducted by MDC Research, HTTPS/REST was by far the most common communication protocol in use among partners with IoT solutions already in production.

**Top Communication Protocols Used for IoT (n=121)**



## DEVICE-TO-CLOUD COMMUNICATION

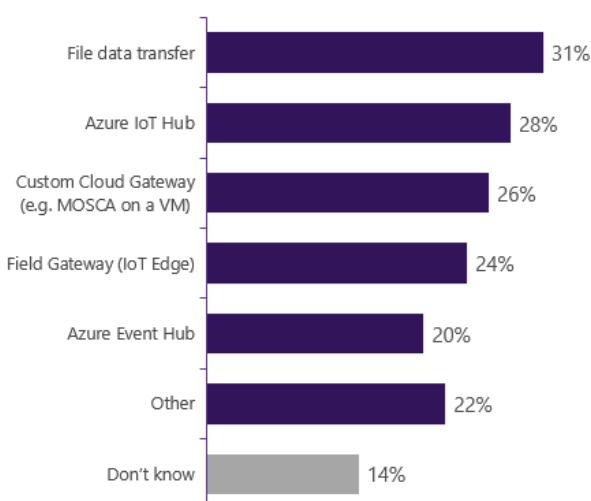
The most common application of device-to-cloud communication is the delivery of time-series telemetry to the IoT hub. These readings are sent to an endpoint on the hub where it can be read by multiple readers. Telemetry may be sent individually or in batch (up to a 256KB message size) and are stored on the IoT hub for 7 days. IoT Hub implements a streaming pattern therefore it is well equipped to handle millions of device connections and their incoming data.

Beyond telemetry readings, device-to-cloud communication can be configured with custom routing rules that can execute other backend services. As an example, an IoT device can send an alert message that a pressure sensor is too high, this message is then routed to the hub triggering a depressurization action in the backend to rectify the situation.

Device-to-cloud communication also comes into play when a device is reporting its state via device twin reported properties. This is also used to report progress in long-running processes such as software and firmware updates. Device twin reported properties messaging requires the use of the MQTT or AMQP protocols.

File uploads from a device to the cloud is also made possible using device-to-cloud messaging. There is no inherent limit on file size other than it needs to be able to be stored in Azure Blob Storage.

**How Data is Received from IoT Devices**  
(n=121)



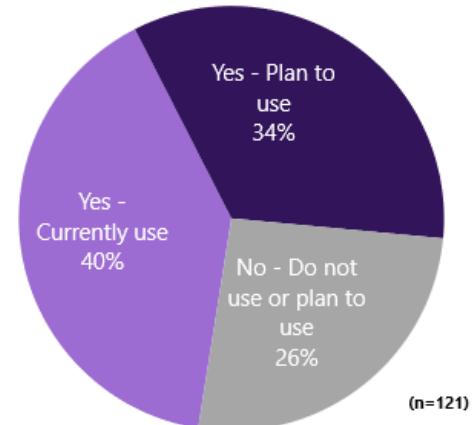
## CLOUD-TO-DEVICE COMMUNICATION

Cloud-to-Device communication provides the ability for cloud processes to initiate method calls on an IoT device and expect a response in return. Direct method calls are available on both MQTT and AMQP protocols due to their bi-directional nature. These method calls come in handy when the cloud needs to ensure an action is taken on a device, for instance - turning on a fan in order to lower the core temperature of the device. After the direct method call is received and the fan is on, the device would then send back an acknowledgement response to the backend. Direct method calls will fail if addressed to a device that is currently disconnected. The backend system initiating the call will then receive the failure notification.

Cloud-to-Device messages are similar to direct method calls, except that the communication is one-way, meaning the cloud sends the message and expects nothing in return. These messages are queued on the IoT Hub and will be retained for up to 48 hours. This means that a device could be disconnected for some time and still be able to receive the messages when they reconnect. This provides a more durable approach to a direct method call, with the caveat that there will be no direct response from the device to the callee.

When device twin desired properties are updated in the cloud, the change notification is then propagated to the IoT device through cloud-to-device communication. The applications running on the IoT device then have the ability to handle the change. This could initiate changes in configuration, firmware or software.

**Use of Device Command and Control from Cloud**

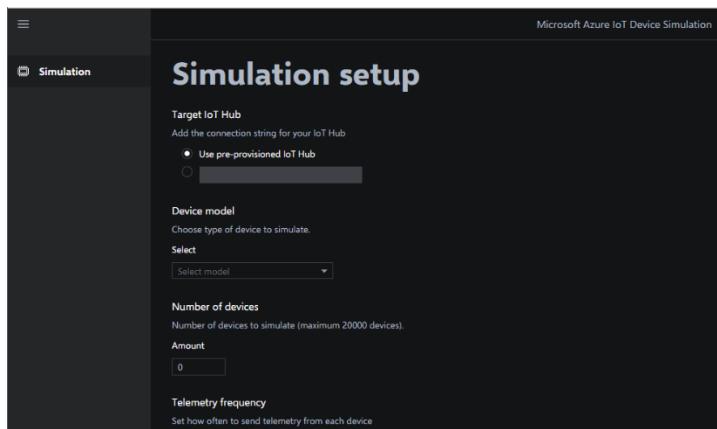


# Software

When delivering an IoT solution, it becomes difficult to develop software applications for the solution in parallel with the hardware. In the IoT market, it is imperative to build and deliver a solution quickly. Unfortunately this often leads to inadequately tested backend systems. The only way to ensure backend systems are fully tested is via realistic device simulation. There is no need to wait for hardware to be complete, nor test in production with early adopter strategies!

## AZURE IOT DEVICE SIMULATION ACCELERATOR

The [azureiot.solutions.com](https://azureiot.solutions.com) accelerators includes a solution for Device Simulation. Deployable at the click of button, a logical representation of a custom device can be defined with multiple sensors that provide random readings in a specified range. Any number of devices can be simulated for a specific length of time or the simulation can continue to be run indefinitely under the same load.



(image borrowed from: <https://docs.microsoft.com/azure/iot-accelerators/quickstart-device-simulation-deploy>)

## SINGLE DEVICE SIMULATION

Single device simulation is made possible via thorough documentation and multiple code samples available in various programming languages. As is typical with Azure samples, full source code is available in their respective GitHub repositories. Single device testing provides a controlled data stream providing valuable insight in how backend systems handle specific data. This is especially important when simulating edge cases. Leveraging single device simulation promotes well tested systems, even if actual hardware is not available and specific environment conditions are not met.

## IMPLEMENT CUSTOM IOT SOFTWARE

No two businesses are alike. Every business requires custom development in order for their IoT systems to realize their true potential. Establishing an IoT focused development practice ensures a steady flow of opportunities during this IoT boom. With experience, a portfolio of potentially reusable IP can be collected, documented and applied to future work. It may also be packaged as a stand-alone product(s) for purchase in the marketplace.

## DATA ANALYTICS AND VISUALIZATION

IoT systems tend to generate immense amounts of data over a short period of time. Business value is surfaced from this data through the use of data visualizations. They can help organizations identify and react to trends, provide rich and meaningful graphs to aid in discussions to move the company forward, as well as understand the correlation between business operations and the results gathered from the field.

As businesses grow, so does their need for data analytics and visualizations, rarely does a business stagnate and remain the same. Establishing a practice focused on surfacing and displaying important data and patterns could result in perpetual work.

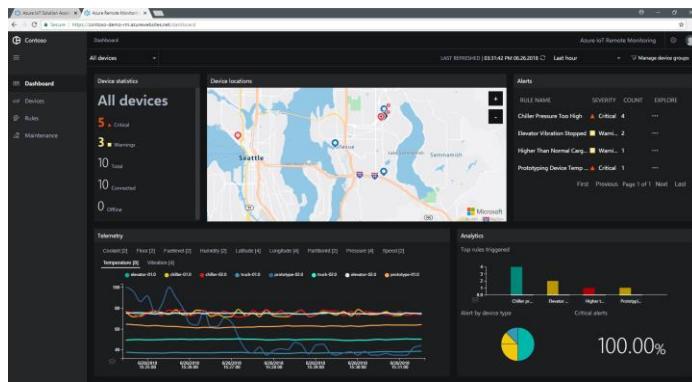
## DATA ANALYTICS WITH POWER BI

Power BI has the ability to integrate data from disparate on-premise and cloud-based systems in order to provide real-time data insights, analytics and reports unique to the business of the customer. These customized dashboards are available to be viewed in Azure with the Power BI service (SaaS), on the desktop with Power BI Desktop, in mobile applications with Power BI for mobile apps, or embedded within an existing application. Real-time data insights are made possible by feeding device telemetry

through IoT Hub into Azure Stream Analytics and then using the ASA connector as a data source.

## IMPLEMENT A CUSTOM DASHBOARD APPLICATION WITH THE REMOTE MONITORING ACCELERATOR

It is quite common to require monitoring based on telemetry data being sent in by IoT devices in the field. The Remote Monitoring Accelerator is one of many quickstart projects available at [azureiotsolutions.com](https://azureiotsolutions.com) that can serve as a starting point or reference for a custom dashboarding solution. This fully documented accelerator can be automatically deployed to an Azure environment with a press of a button, and its full source code is available in Github. The Remote Monitoring Accelerator provides common IoT dashboard functionality including setting custom thresholds on various telemetry values coming in from devices, issuing commands to devices, viewing incoming telemetry, and more. This provides insight into the overall health of the IoT device and the equipment that it is monitoring.



(image "borrowed" from: <https://docs.microsoft.com/en-us/azure/iot-accelerators/about-iot-accelerators>)

## IMPLEMENT USEFUL MOBILE APPLICATIONS

There is no denying that we live in an era that is heavily focused on mobility. The ability to provide organizations with valuable real-time data insights at a moment's notice and actionable commands in the palms of their hands is attractive not only to field workers but also to the C-level personnel who need to maintain a finger on the heartbeat of the company at all times. Development for both iOS and Android is made possible using familiar .NET

technology by utilizing tools like Xamarin and Visual Studio.

## GET UP AND RUNNING FAST WITH AZURE IOT CENTRAL

IoT Central is a fully managed, global IoT SaaS solution. Its goal is to simplify the initial setup of straightforward IoT solutions that don't require deep service customization. IoT Central was designed for the most common IoT scenarios and built based on years of experience in IoT. No coding skills are necessary, and the application can be deployed in minutes. Full documentation and quickstarts are available to customize the interface, connect and manage devices, provide data monitoring and definition of threshold rules, as well as how to initiate actions to alleviate raised conditions.

## AZURE FUNCTIONS

Azure Functions are serverless implementations of business logic that may be triggered by a number of inputs, including those emanating from Service Bus Queues, Azure Monitor, Azure Stream Analytics and more. Functions give the ability to further execute custom logic and perform transformations on incoming data as well as define an output trajectory for the resulting data. The output could be to forward the data into another subsystem, such as a data warehouse, or to Twilio in order to send a text message to the field team notifying them of physical hardware tampering of an IoT device. Inputs (triggers) and Outputs are defined in Function configuration and have no bearing on the business logic actually implemented in the function. Absolutely no monitoring, connection information, or event handling code is required. This means that a single Function may define multiple Inputs and Outputs and still run the same logic regardless of where it is sourced or destined. Azure Functions are available to be run on Edge devices as well as in the Azure cloud.

## AZURE LOGIC APPS

Azure Logic Apps may be triggered by alerts discovered in the Azure Monitor. They also have the ability to consume the streaming data coming out of an IoT Hub with the help of an intermediary. With its visual environment, Azure Logic apps provide the ability to orchestrate

workflows and integrate business processes without having to write any code.

### APPLY DATA INGRESS LOGIC USING AZURE STREAM ANALYTICS

Azure Stream Analytics provides a framework where custom defined Jobs can transform, filter and aggregate data at the earliest point from when data is ingested. These Jobs are configured with an input, such as a data stream and an output that defines where the data goes after it has been processed by the Job. The syntax of Jobs in Stream Analytics is very similar to SQL, however, Microsoft is also introducing preview support for JavaScript-based business logic in the form user defined aggregates. Depending on the conditions specified in the Job, custom workflows, functions and alerts may be automatically initiated. Azure Stream Analytics is also available as a module to be run on Edge devices to reduce cost and low (or no) connectivity scenarios.

### STREAM PROCESSING USING SPARK AND DATABRICKS

Structured Streaming is the Apache Spark API that lets you express computation on streaming data much in the same way you would express a batch computation on static data. This can be used to perform complex streaming analytics including real-time ETL, incremental

aggregations, and watermarking. A watermark is a moving threshold in event-time that trails behind the maximum event-time seen by the query in the processed data. Leveraging Spark to perform on-demand and complex real-time analytics on data is extremely high performing and can assist in detecting anomalous behavior determining the overall health of monitored equipment.

### AZURE TIME SERIES INSIGHTS

Time Series Insights is a highly intuitive, and easy to use product that stores, queries, and adds visualizations on up to 400 days of time series data. Time Series Insights is a fully managed analytics, storage and visualization service that can ingest hundreds of millions of sensor events each day. Interact with sensor data without having to write any custom code, simply write SQL-like queries that have the ability to query billions of events in seconds – on demand. Time Series Insights is applicable when you need to be able to store time series data in a scalable way, if you require near real-time data exploration, or if you require a global view of data streaming from multiple locations. It is also valuable in identifying data trends and being utilized to determine root cause analysis and anomaly detection. Alerts may also be triggered from Azure Time Series Insights. Build or enhance existing applications with Azure Time Series Insights through its REST Query APIs.

## MACHINE LEARNING

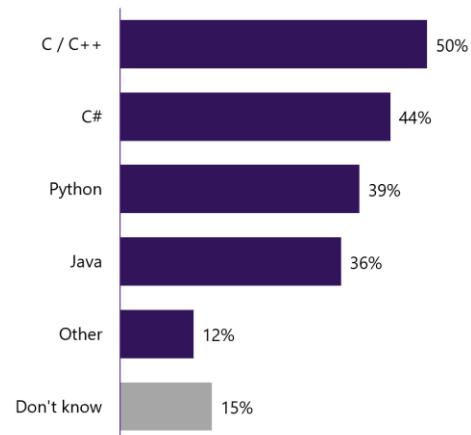
Machine learning goes hand-in-hand with data analytics. It comes down to determining the benefit of generating, collecting, and processing of large amounts of IoT data. Gathering all this information without an end goal is a mistake. What use is vast amounts of data if unable to put it to good use? Machine learning can be applied to data streams in order to identify underlying problems and determine the root cause, or it may also be applied to identify areas that need higher levels of efficiency thus focusing on process improvement. Machine Learning is a module that is also available to be run on Edge devices as well as in the Azure Cloud.

## IMPLEMENT SOFTWARE ON THE IOT DEVICE

Custom software is also required on the IoT Devices themselves. This software is used to implement the functionality of the device, whether it be just reading and translating data from sensors, or performing actions such turning on a fan when commanded to do so. Device software may be headed (meaning that it has a display) or headless, and can be developed using a multitude of

technologies depending on the underlying operating system. When using Windows IoT Core as an OS, applications can be built using .NET technology using the Universal Windows Platform. The benefit of using UWP is that libraries are portable and can be reused on any Windows Platform such as on the desktop, or on the web. Since Windows IoT Core is a subset of Windows, other technologies are available for use as well, such as NPM with Node.js.

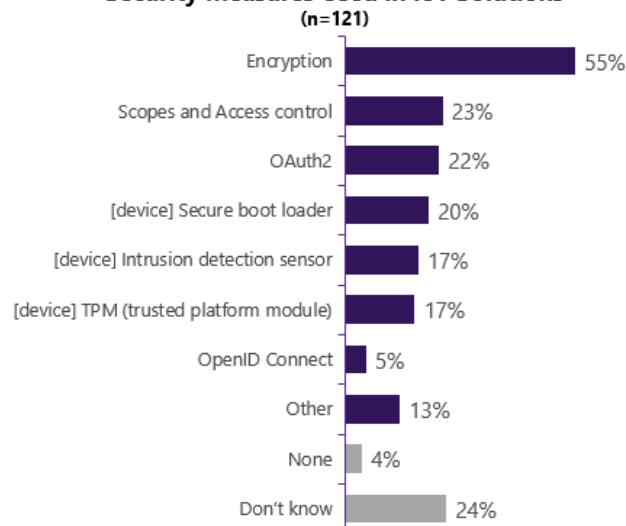
**Programming Languages Used by IoT Devices**  
(n=121\*)



# Security

Security is at the forefront of issues plaguing IoT systems today. Establishing expertise in performing security auditing for existing IoT solutions is in high demand. Microsoft has gathered leading security auditors with multiple areas of expertise to establish a Security Auditor Partner network. Partner organizations can focus on one or more area of IoT security then leverage the network to become connected with other partners to fill any holes.

## Security Measures Used in IoT Solutions



## PROTECT AGAINST PHYSICAL HARDWARE TAMPERING

Having multiple devices deployed in the field makes them more susceptible to physical hardware tampering. There are some precautions that can be put in place to lower the risk to the hardware. When deploying devices to the field, the device id and authentication key to the Device Provisioning Service must be kept secure. This will mitigate unauthorized spoof devices from gaining an identity and being provisioned by the system.

Design the hardware for the minimum requirements, adding things like USB ports for "just in case" future scenarios open up an attack vector that can likely be taken advantage of. Install tampering sensors, this way if the cover of the device is removed, it can send an alert to the cloud and trigger a self-destruct that will immediately

shut down the device. Furthermore, integrated circuits can be introduced to monitor for things like clock-based attacks and power tampering to prevent side-channel analysis.

Encryption is also very important, the use of the Trusted Platform Module (TPM) provides encrypted storage and boot functionality. Ensure secured upgrades not only on the communication channel but by performing a cryptographic post-upgrade assurance check on the device to verify that it hasn't been compromised.

## IMPLEMENT SOFTWARE SECURITY

Custom software in an IoT Solution, whether it be on-device or in the cloud should be implemented following the Microsoft Security Development Lifecycle guidance. Post development, all software should have an appropriate and secure upgrade path. This allows for future enhancements and security updates to be deployed in a structured and repeatable manner. Use caution when using Open Source Software or third-party libraries - be certain that the projects are active and supported, this will increase chances that security flaws will be found and subsequently fixed.

It is also prudent to install the latest in antivirus and antimalware software if the IoT device supports it. Ensure the operating systems have their event logging enabled and that logs are audited for security related events or physical access attempts, like through a USB port. Also be sure to keep the operating system itself up to date.

## PROTECT CLOUD ASSETS

Protect credentials for accessing and deploying cloud assets by changing passwords frequently and never using them on public machines or networks.

## PROTECTING BOUNDARIES

There are multiple boundaries or zones that are crossed in an IoT solution. At each of these boundaries, certain attacks are possible - such as Spoofing, Tampering, Repudiation, Information Disclosure, Denial of Service and Elevation of Privilege (STRIDE). Mitigate these attacks through authentication and encryption. Authenticate IoT devices with the field gateway and cloud infrastructure through the use of a symmetric key (TPM) or an X.509

certificate, then ensure all communications are encrypted and transmitted through secured protocols such as HTTPS, MQTT, or AMQP. IoT Hub also allows for establishing access control policies so that functions such as identity registry reads, identity registry writes, and direct communication (device to cloud or cloud to device) can be locked down.

When IoT devices themselves are not capable of encryption, the use of a more fully featured gateway will

help overcome this limitation. The field gateway, such as an IoT Edge device, would then be responsible for the identification, authorization, communication, collection of data, orchestration of commands and workloads for the fleet of IoT devices. It would then establish a secured communication channel with the cloud resources using secure protocols such as HTTPS, MQTT, or AMQP to feed aggregated data and device state to the cloud.

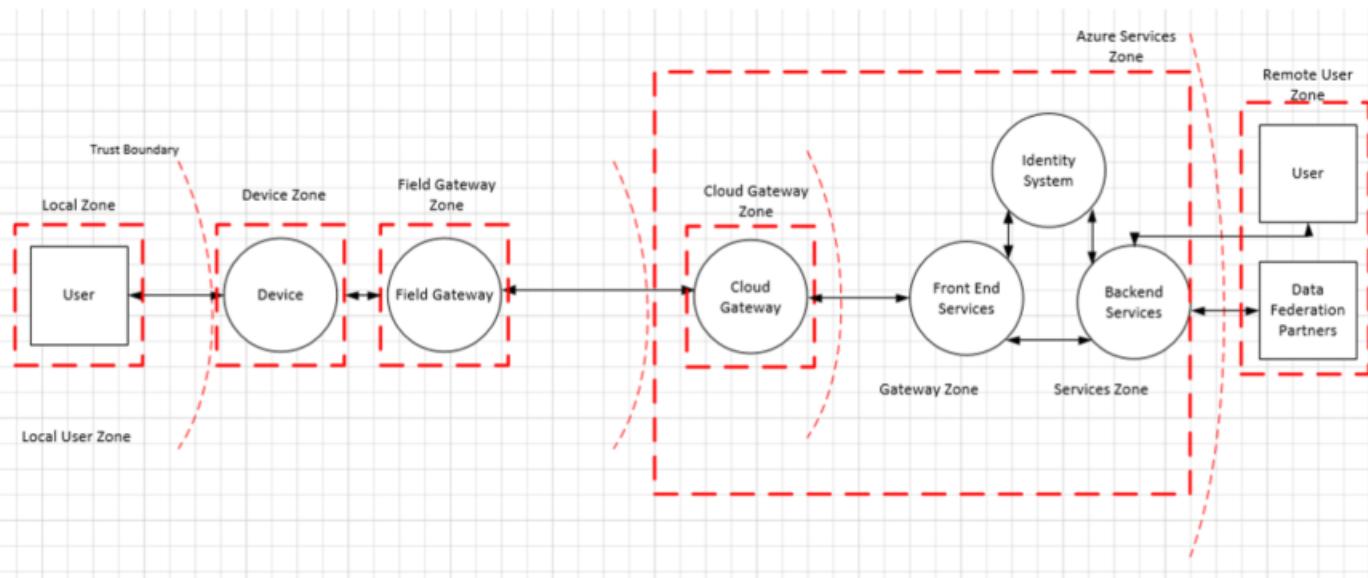


image "borrowed" from <https://docs.microsoft.com/en-us/azure/iot-fundamentals/iot-security-architecture>

# Define and Design the Solution Offer

With an understanding of the Microsoft IoT platform in place, you must next understand the business models of the IoT practice because not all revenue streams are equal.

## THERE ARE FOUR WAYS TO MAKE MONEY SELLING CLOUD:

- Resale
- Project Services
- Managed Services
- Packaged IP

A business plan is a critical asset that can help you envision and think through the details of your practice, identify gaps you will need to address, and explain the fundamentals of your practice to others. Leverage the [Cloud Practice – Develop a Business Plan guide](#) for details, profitability scenario overviews, business plan templates, and financial models.

Read on to understand what types of project services, managed services, and intellectual property you should be considering in your IoT practice.

Microsoft  
Partner  
Network

## Cloud Business Plan Template

Created for Microsoft by  
Neural Impact Inc.  
with contributions from Cloud Speed  
Updated: February 2019

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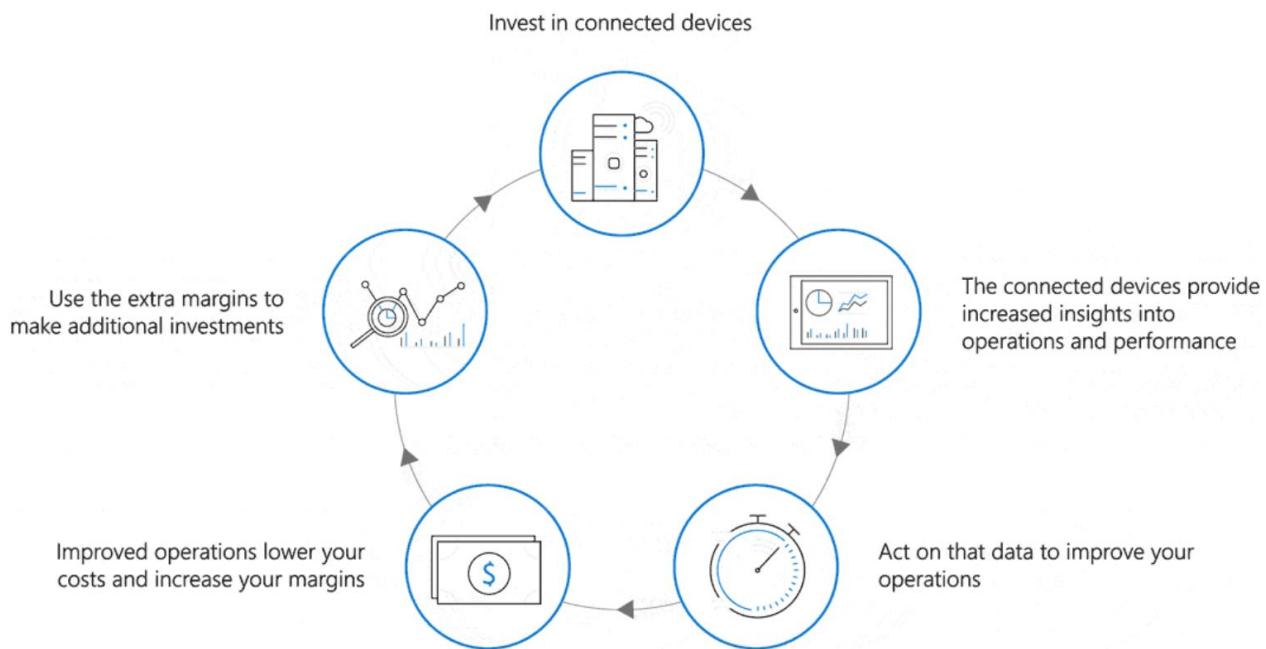
# Understanding Project Based Services

When building an IoT practice, most partners start with selling project-based services.

The adoption of IoT is still in its infancy. Many customers struggle to understand how IoT can benefit them and their bottom line. The most common entry-point for IoT with these customers is to focus on the bottom-line, rather than introducing them to a disruptive solution.

## FOCUS ON EFFICIENCY

Help companies realize the value of IoT through improved efficiency rather than changing how they collect revenue. This is a great starting point when entering the IoT space, as all the changes go on behind the scenes via operational enhancement. The external view and services of your customer do not change. This model works well for companies providing commoditized products and services as they will see improved margins without passing the costs along to customers. For example, Jabil, a world-class design and manufacturing solution provider turned to Microsoft for machine learning and predictive analytics to connect its factory floor to the cloud, reduce unplanned maintenance costs and downtime, and increase their agility to meet their customer demands.



(image from <https://content.microsoft.com/iot/business-models/section-2-1547J-2011P5.html#step1>)

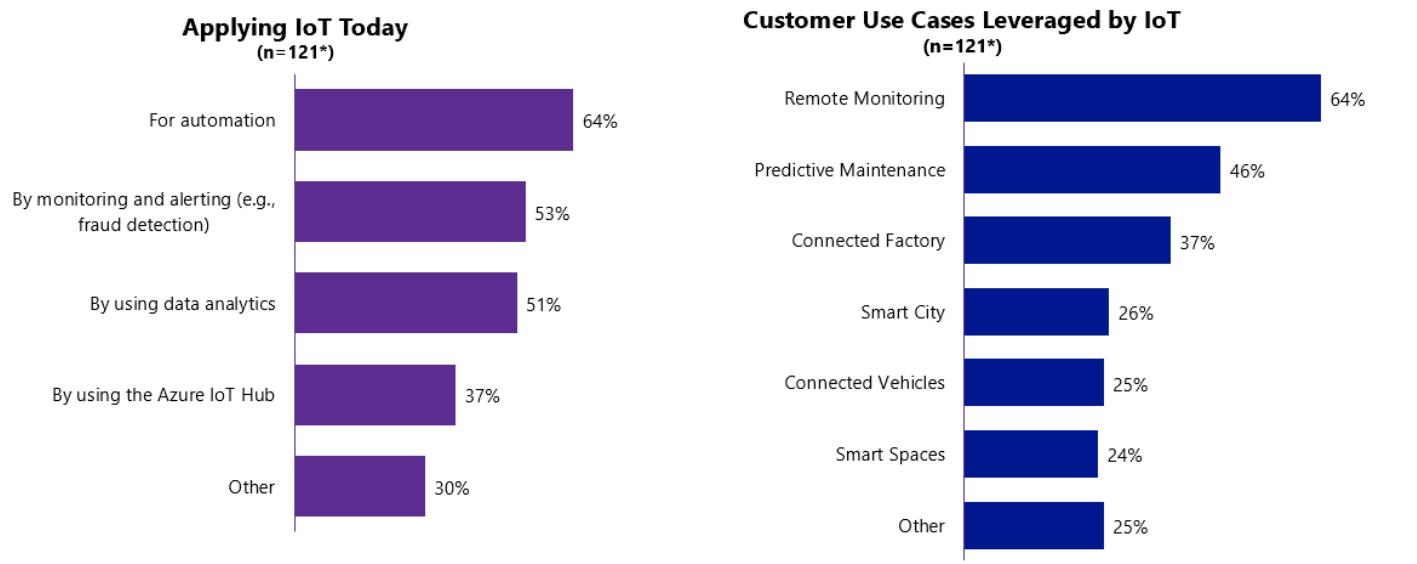
## WHAT DO THE TOP 3 PROJECT SERVICES TELL US?

The top 3 project types delivered by partners are:

- Remote monitoring
- Predictive maintenance
- Connected factory

These results indicate the current trend of profitable and repeatable IoT project solutions. Focusing in these spaces when presenting potential cost saving or revenue generating projects will yield a higher rate of success with your customers.

From a customer perspective, automation (64%), monitoring (53%), and data analysis (51%) are the predominant methods for applying IoT.



## WHAT OTHER PROJECT SERVICES SHOULD YOU CONSIDER IN YOUR IOT PRACTICE?

In our partner interviews, partners emphasized three very specific services for IoT that have a lot to do with the evolution of the sale. In chronological order they are:

- **Envisioning:** Envisioning sessions help the customer understand the opportunities for IoT in their business requirements, while relying on the partner to keep the conversation grounded in what is possible versus what is hyperbole.
- **Proof of Concept:** Some partners indicated a preference to only provide Proof of Concepts as the first engagement, to help the customer get comfortable with the capabilities of both IoT and the implementing partner and to enable the partner to understand the real situation with respect to the availability of quality data and the actual feasibility of solving the problems they are attempting to solve.
- **Pilot:** Other partners indicated a preference to sell pilot projects and effectively start all projects with the notion that the solution implemented would ultimately land in production.

We will explore each of these project services in the sections that follow.

## Deliver an Envisioning Session

An envisioning session is a common agile methodology practice that is particularly important for IoT engagements as it is up to the partner to help the customer realize the opportunities for IoT in the customer's problem statement.

The challenge is that few customers will know if their problem represents a good opportunity to apply IoT, or even if IoT is the correct approach in their situation. As a partner, you need to have a discussion with your customer about their problem and be on the lookout for opportunities to build the solution using IoT. You need to recommend the application of IoT when it is appropriate, as well as discourage its application when IoT would not be successfully applied in the near term. For example, the customer may want to build a predictive solution, but the labeled training data does not exist and would take years to collect. This type of high level requirements conversation is called an envisioning session.

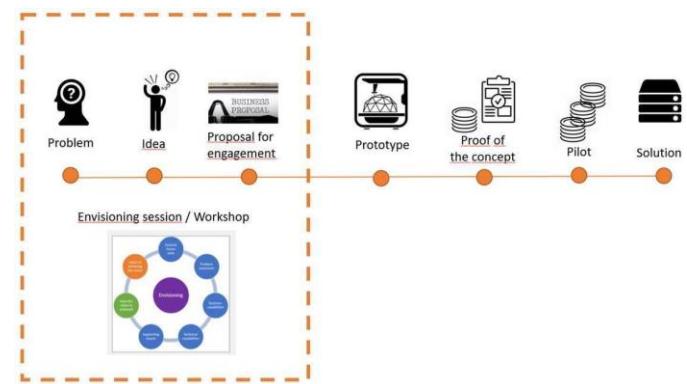
The outcome of an envisioning session is a common vision with your customer on capturing what may be achieved, the very high-level mechanism by which it will be achieved and the potential value of achieving this vision.

The envisioning session is not intended to be an in-depth, big requirements up-front requirements gathering event that takes weeks or months to complete. Instead, an envisioning session is something that can be conducted in 1-3 days depending on the complexity of the business scenario, and how much explanation the partner team needs from the customer about their scenario.

During the envisioning session you will begin by identifying the customers desired future state. Many times this includes recording and visiting multiple challenges that need to be solved. Define a vision based one or more of the challenges identified. On your way to defining how the vision is achieved and the value it would bring to the business, you will discuss the problem statement, the business and technical capabilities desired as well those that are available and the existence of supporting assets (such as data sets).

The benefits of conducting an envisioning session are:

- Identify the problem, and determine if it is worth solving. You will calculate the potential impact an IoT solution will have on the business' bottom line.
- You can answer fundamental business questions of what you will build, and a general sense of how.
- You will have improved productivity on the project having identified and thought through the critical business issues facing the project.
- You will have identified the overall business direction required by your architecture.



**AT THE END OF THE ENVISIONING SESSION:**

- The customer will have a vision of how your IoT practice can help their organization realize their goals and drive business impact. They are excited by the value unlocked in the application of IoT.
- You will have sufficient knowledge to write a proposal for an engagement.
- You will have likely identified additional opportunities to apply IoT to the customer's scenarios, and have thus already started identifying additional scope for future engagements.

**HOW TO DELIVER AN ENVISIONING SESSION**

To deliver an envisioning session correctly means to have a loosely structured conversation (ideally in front of a white board) where you brainstorm with the customer about each of the following core questions. It is entirely possible to iterate multiple times through these core questions, each time refining details. Remember this is a high-level conversation.

1. What is the customer's desired future state?
2. What is the problem the customer is trying to solve?
3. Is implementing the IoT solution financially viable?
4. What are the customer's business capabilities with respect to the problem? For example, do they have experience in the domain for which they are trying to enter?
5. What are the customer's technical capabilities with respect to the problem? For example, do they have technical resources who have worked with the data in the domain? If they had a solution in hand, could they operate it?
6. What are the supporting assets? For example, do they have the requisite historical data upon which to train predictive capabilities?
7. How will they know when the vision is achieved?
8. What is the value of achieving the vision?

**WHAT AN ENVISIONING SESSION IS NOT**

An envisioning session is not:

- An architecture design session (discussed later).
- A project planning effort.
- A technology selection effort.

If you find that your envisioning conversation with your customer is headed in either of these directions, pause. Evaluate if you have suitably addressed the core questions. If the core questions have been addressed, then you should formally conclude the envisioning session and allow time for your team to process the input and return with recommendations on next steps (which could be a proposal for a design, a PoC, or a pilot).

If not, then you should guide the conversation away from getting too much into the architecture, technology selection or other implementation details.



## Deliver a Proof of Concept IoT project

IoT projects include significant risks – for example, incurring the upfront cost of hardware procurement or manufacturing. Reduce the risk of overpromising on IoT capabilities by conducting a focused proof of concept that enables you to de-risk the riskiest elements of the larger IoT solution, build trust with the customer and deliver working IoT solutions in a shorter timeline.

### PROOF OF CONCEPT HIGH LEVEL FLOW





## Why Perform a Proof of Concept for IoT?

Proof of concepts (PoC) serve several purposes. When it comes to the IoT practice, a primary aim of the PoC is to substantiate that an IoT solution can actually deliver on the vision capture during the envisioning session. The intent is to avoid skepticism on the part of client about the capabilities that can be realized and to detect situations over-promising on the capabilities of IoT before any significant investment occurs.

The PoC also can serve as evidence that your practice can use for future engagements with the same customer or with new customers. Many times, the output of a PoC can be added to your practice's intellectual property list for demonstrations or used to accelerate future solutions. PoCs are one of the key tools when trying to displace the competition by rapidly showing value and hopefully a quick return on investment.



## PoC Execution

Identify the technical resources needed for the PoC. This will include the technical implementation team (including developers and data scientists), as well as project management for tracking the progress of the engagement.

Beyond identification of resources, ensure all members of your team and your customer's technical team (if they are participating) are clear on responsibilities. Communication is critical, so ensure that the progress of the PoC is communicated to all stakeholders on a regular basis.

During the PoC execution, keep a watchful eye towards scope creep. The PoC should be hyper focused on proving that an IoT solution can be delivered as envisioned by addressing only the core concerns originally identified during the scope definition. For example, most preliminary IoT projects will focus on improving efficiency of a single business process. Having a single concrete, defined goal is a good strategy for keeping the minimalist scope required of a PoC.



## Define Scope

A proper PoC is defined with a clear and concrete scope. Conduct an envisioning session or an architecture design session (ADS) to align business and technical requirements and set clear goals. This should include:

- Identify data that should be collected from devices, are there devices on the market that currently support this functionality?
- Identify connectivity requirements, what communication protocols do the devices support, is there a need for offline capabilities? Is there a need for a gateway?
- Determine required alerts, potential actions, and data analysis needs required to satisfy the goal.
- Determine what you want to prove and which objections need to be overcome.
- Clearly demarcate responsibilities and set up organization.
- Set up subscriptions, define payment, and perform cost estimates of the PoC.
- Agree on the next step if success criteria are met.



## Next Step

At the end of the PoC, create a report that explains the overall status of the PoC and any issues identified during the PoC. The report should elaborate on the pros and cons of the delivery and clearly explain the value prop of moving forward with a real implementation to the stakeholders along with expected production costs over time. Assuming the stakeholders agree to move forward, put a plan into place to deploy the PoC into production while ensuring that the PoC is designed for production usage.

For example, upon completing your IoT PoC you might report on the success or failure achieving the goal based on whether efficiency has been gained or lost through the overhead of a new system. Was the project successful in realizing the customer's vision.

## Examples of an IoT PoC

EXAMPLE VISION	EXAMPLE POC
We want to be alerted to the need for maintenance on our engine by monitoring its core temperature and pressure.	<p>Focus on the core aspect of the scenario (monitoring streaming telemetry data for threshold variances). The PoC scope would include defining temperature and pressure thresholds as well as analyzing incoming telemetry for values that exceed the thresholds.</p> <p>There is no need to utilize actual engines or sensors – take advantage of the Device Simulation accelerator to simulate the streaming of data into the IoT solution. Alternatively, if a real device is requested, consider utilizing an Azure Sphere device to enable quick and secured connectivity to the cloud.</p> <p>Utilize the Remote Monitoring solution accelerator to demonstrate the use of an actionable dashboard and explain how it can also be used to send self-healing commands, or automate the dispatch of service crews. By demonstrating how to remotely monitor the engines, you will have met the goal of the project, and potentially up-sell a full blown IoT solution that includes implementing and issuing self-healing commands, or automating the dispatch of service crews.</p> <p>Alternatively, this vision is also well served by utilizing IoT Central. Deploy an application in minutes, do some customization, and have a PoC available within hours, no coding skills necessary.</p>
We want to create and provision a consumer device that can receive commands from the cloud, like turn on or off, or display a message.	The Device Simulation accelerator is able to simulate the receiving of commands, but you also have the option to invest in a low-cost device, such as Azure Sphere, or Raspberry Pi. The Remote Monitoring accelerator also provides the ability to provision and update devices, as well as initiate cloud to device commands through messaging.
We want to monitor our manufacturing equipment in multiple factories, reporting on valuable KPI's such as efficiency, quality and uptime.	The Connected Factory accelerator provides a global dashboard solution that can be modified to fit your customer's needs. It includes an overall equipment efficiency panel that can be drilled down from an enterprise level, down to the factory, and further down to the actual station. The solution is backed by actual Open Platform Communications Unified Architecture (OPC UA) servers that are running simulated tasks. The Connected Factory simulator is also equipped to report on and respond to alarm situations as well as analyze incoming telemetry. Customize this solution for your customer or present it as-is as a realistic example of a connected factory.

## DEFINE SCOPE WITH AN ADS

An architecture design session (ADS) is a working session between your experts and the customer to define scope. It should follow the envisioning session and build on the customer's vision already established.

This intensive, two-day session delivers in-depth technical information on integrating data from across your customer's entire organization and delivering it in an analysis-ready form. Presentations, demonstrations, and whiteboard discussions are customized to address your customer's needs. In many cases, the design session is used to identify candidate proofs of concept. The primary audience includes architects, developers & data scientists, test and quality assurance (QA) engineers, and technical staff, and here are some potential topics to cover:

- **Document solution architecture:** Document how all the services and components fit together to deliver the complete IoT solution, end to end.
- **Identify IoT Solution:** Identify any marketplace products or services that you can leverage, including IoT solution accelerators. Determine what aspects require custom devices, coding, or modifications. Ensure that all aspects of the IoT architecture are covered.
- **Discuss risk:** Consider the cost of the project and its projected benefits. If the client is skeptical about achieving the vision, consider making these parts as candidates for the PoC or pilot.
- **PoC or Pilot:** Consider if the solution should be delivered as one or more PoCs, or if it is more appropriate to prepare for production directly by delivering a pilot.
- **Post-production monitoring:** Work with the customer to define how success will be measured after production delivery. How do you continue to ensure on-going performance?

## Phases of a successful ADS

### BEFORE THE ARCHITECTURE DESIGN SESSION

Prior to performing the ADS, it is important to conduct a simple session with the customer to establish the scenario. This session is oftentimes referred to as ideation or opportunity definition. The goal is to establish the five Ws (who, what, when, where, and why) of their needs, which can be used as a guide for the ADS, streamlining the brainstorming process, and informing the agenda and milestone goals you will bring to the session.

- **Perform an envisioning session:** Prior to the ADS, perform an envisioning session to identify preliminary opportunities that would benefit from IoT.
- **Schedule a time for the design session:** This is normally 1–2 days.
- **Schedule a location:** Ensure you have whiteboards and a projector.
- **Schedule resources:** This could include experts from your team and a cross-cutting panel of technical and business stakeholders from the customer.
- **Build an agenda:** Establish milestone goals in advance so that the ADS doesn't get consumed discussing a single topic.
- **Prepare preliminary documentation and architectural diagrams:** Even if you only have the basic building blocks, it's good to come prepared with something you can modify during or after the session.

### DURING THE ARCHITECTURE DESIGN SESSION

Begin by reviewing requirements with your customer. As you conduct the design session, whiteboard the requirements and proposed solutions, and arrive at a consensus for each major topic. During this time, be sure to capture photos of the whiteboard so as not to lose your notes.

There are typically the following phases during an architecture design session: discovery, envisioning, and planning.

#### DISCOVERY

- Customer background and business technology strategy
- Project background and its drivers/aims
- Functional and non-functional requirements

- Usage scenarios
- Technology landscape
- Hardware and Data assets
- External connections and integration points
- Security considerations
- Abilities considerations
- Map requirements and scenarios to components

## PLANNING

- Establish proof points
- Exclusions, risks, and issues
- Pre-requisites
- Deliverables
- Resources
- Escalation, communication, and long-term plans

## AFTER THE ARCHITECTURE DESIGN SESSION

During the ADS, you and your customer planned a high-level architecture framework and conceptual design for a solution that addresses their organization's business goals and technical requirements. In addition to a summary of the engagement, you'll deliver information about:

## ENVISIONING

- Key functions and capabilities
- Components of the solution
- Special areas of concern to your customer's organization, such as security, compliance, and compatibility.
- Deployment scenarios that map to established deployment and practices and that cite specific examples where applicable.
- Familiarity with the Microsoft technologies proposed for the solution, in addition to any trade-offs among the differing technology options.
- The capabilities of your solution to deliver business performance on premises or in the cloud.

The outcome should be polished architecture diagrams that can be reviewed and signed off on by the customer. If one or more proof of concepts are desired or a pilot is determined to be the path forward, provide a plan and a timeline to deliver.



## Deliver a Pilot for an IoT project

A PoC might secure the project, but a pilot is what you will deliberately take to production.

Consider offering your services as a pilot project to your prospects. With a pilot project, the customer receives two important values. First, they get to better understand how the project goals will be successful, and second, they have a production-grade starting point for their larger efforts.

The IoT partners interviewed for this playbook highlight another value of the pilot for the IoT practice – it serves as a way for your implementation team (developers and data scientists) to stretch into new areas (learning the customer's domain, learning to apply different predictive algorithms, working with unfamiliar data), while minimizing risk if something doesn't work out quite right on the first attempt. This is because while the intent of a pilot is to ultimately take the solution into production, the initial pilot delivery is never rolled out directly into production, at best it usually affects a subset of the production environment which helps to minimize the impact of unexpected issues.

Irrespective of the decision to move forward with a PoC or Pilot, it is important to obtain stakeholder commitment

prior to start of the project. While the project will remain small in stature and be of limited risk, you to ensure that it does provide value to the business, and is engaging to stakeholders and sponsors to increase the chances of success.

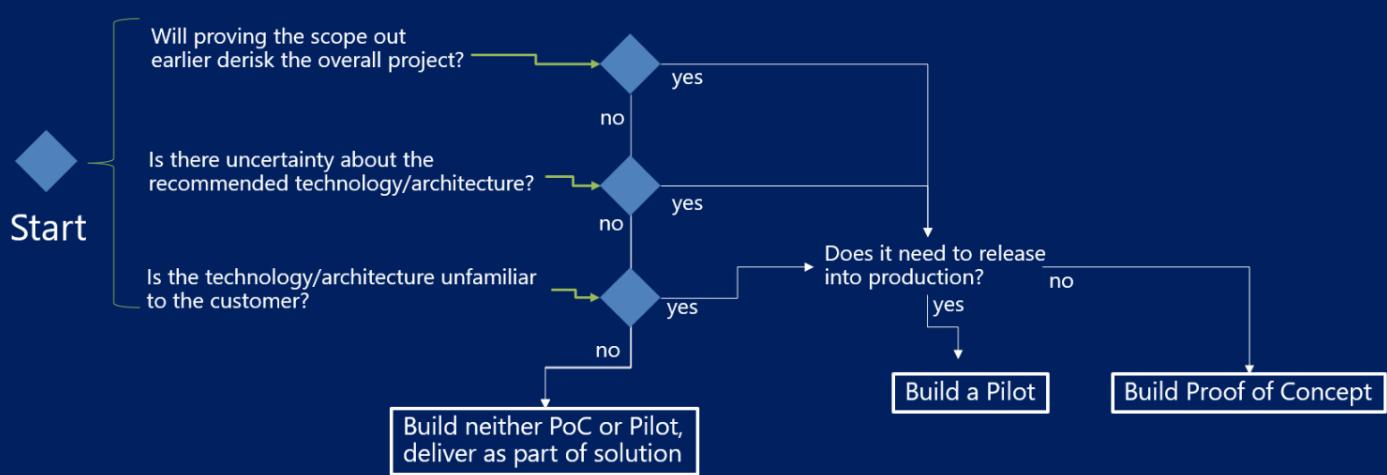
### CHOOSING BETWEEN A PILOT OR POC

It is important to keep the distinction between Proof of Concept and Pilot clear – a PoC should never be considered for direct deployment into production, whereas a pilot should be constructed with a production release in mind.

For example, in an IoT PoC, you would typically only be working with simulated devices and data. A PoC demonstrates the cloud capabilities without incurring a large expense. In a pilot, however, you would want to start with a customer's existing hardware, or realistic simulated datasets – if the hardware is not yet available. The goal is to end up with an end-to-end IoT solution that if proven successful, will form the basis of production solution.

A pilot solution is a production-ready product whose influence is limited in scope (targeted rollout), customer base, or capacity. A well-executed pilot will give the customer a better understanding of how the project goals will be successful, while providing them with a production-grade starting point. Since a successful pilot will be scaled up to the final production solution, it is important to create the pilot following best practices.

In choosing between implementing a proof of concept or a pilot for a given scope, consider the following questions to help you make your decision.





Start the pilot design process with a clear plan on its initial scale, and develop a strategy to increase its scale as milestones are met.

For instance, if the intent of the pilot is to onboard a small portion of the customer base at first, identify the participants early and add your communication strategy to the project plan. Consider targeting users who are representative of the whole of your customer base. This should provide you with an accurate test of geographic, technological, and demographic factors.

## A TYPICAL PILOT UNDERGOES THE FOLLOWING PHASES:

- Define scope – typically occurs during an architecture design session (ADS)
- Execute implementation – create, test, refine, repeat
- Conclude – post-mortem, validation, path to production plan

## DURING THE PILOT CHECKLIST

The following checklist provides the core tasks you should complete when conducting a pilot.

- Go over established business and technical requirements from the detailed requirements gathering session (e.g., architecture design session)
- Determine which features will be included in the pilot that provide a minimum viable product
- Conduct a full-fledged design, mapping requirements to workloads and features of the pilot
- Establish team responsibilities and organization
- Perform cost estimates (e.g., for Azure services used like Cognitive Services, Machine Learning, etc.)
- Outline next steps after the success criteria is met

## AFTER THE PILOT CHECKLIST

Throughout the pilot, you have collected valuable data from metrics and telemetry, and have compiled user feedback and taken this information to refine the pilot and prioritize features for general release. The next step is to propose the move to production and provide a cost estimate and delivery schedule to the customer. You should perform the following in concluding a pilot:

- Learn to identify the end of the pilot; when the proposed features are functional and validated, and when the business transformation begins
- Conduct a post-mortem of the pilot, talking to users, business managers, developers, and development managers. Evaluate lessons learned and refine feature list to include any features excluded from the pilot
- Upon agreeing to move to production phase, establish cost and delivery schedule based on established plan to transform to v1 product

# Understanding Managed Services

With managed services, you can help your customers on a regular basis by offering white-glove services wrapped around your IoT solution. Your offerings can span from planning, to enablement, and to day-to-day operations and support.

Managed services is not a new business model. For more than 20 years, large enterprises have relied on service providers to manage their IT assets on their behalf. Whether you call them an outsourcer or a managed IT provider, service providers have been managing their customers' workloads — either in their own data centers or those operated by their customers. Managed services create opportunities for partners building new lines of business to provide a white glove experience for the entire IoT solution running on-premises, in the cloud or as a hybrid solution.

Managed services give you an alternative option to selling the time of your IoT practice team for money (as you might in project services). Becoming a managed services provider (MSP) enables you to take the IP that is almost always created in the process of delivering an IoT solution (such as insights into a domain, the data providing the greatest predictive capability, device hardware, software for reporting and dashboards, etc.) and package the IP with services that the customer will pay for on a subscriptions basis. You can then sell that same set of IP plus services to other customers needing a similar solution without repeating all of the IP creation effort, at a profit.



## PLANNING

- Help the customer envision scenarios where IoT could improve process efficiency, or predict failure of a certain type of equipment.
- Identify the “low-hanging fruit” opportunities that can be used to build confidence in your services and in the solution.
- Build a roadmap that shows the path to the larger opportunities, building on the success of the smaller or more near-term opportunities.



## ENABLEMENT

- Design and implement the IoT solution with the customer.
- Engage the domain expertise of the customer throughout the process to capture their insights and to validate the IoT solution.



## SUPPORT OPERATIONS

- Offer further support while delivering on SLAs and uptime guarantees.
- Operate and monitor the solution.
- Monitor the performance and stability of the solution.
- Apply patches and updates to end devices and edge devices.
- Perform routine security audits and provide recommendations and implementations for new or existing threats.
- Identify useful trends in telemetry data that can identify and propose future IoT opportunities by leveraging deep learning, AI and ML technologies.

So what managed services can your IoT practice offer? We'll examine that in the next section.

# Managed Services for an IoT Practice

The IoT partners interviewed for this playbook suggested that when ideating about what to offer of your practice as managed services, that you might first consider the project services you are offering. With some creativity, the project services discussed earlier are all potential offerings for managed services.

According to the partners interviewed for this playbook, there is a **significant and unique opportunity for partners looking to offer IoT as a managed service**. Moving from project services to managed services will help your IoT practice create annuity income streams with higher professional services margins, increased customer loyalty and the increased revenue that naturally follows.

Why move from project services to managed services for IoT services?

## SUPPORT SERVICES

The low hanging fruit for most practices to offer managed services is to provide support for the solution delivered via project services. If you have an IoT practice, you might think you do not want to be in the business of technical support. However, consider what happens when your customer takes your incredible IoT solution into production. Perhaps for an initial period, everything is working as intended and you do not hear from the customer at all. Then one day you get a frantic call from the customer because the communication to field devices is “not working” and neither the developers nor the IT professionals at the customer site know where to begin in troubleshooting the issue. This is the opportunity to provide IoT support as a managed service.

Why? Given the shortage of IoT capabilities, it is likely that IoT solutions will be delivered to customers who do not themselves have internal IoT capabilities. This means that for the customer’s long-term success, your practice is likely to be involved in perpetuity in supporting the solution in production. Would you rather scramble to assemble the team to support the customer’s panicked call once the team capable of resolving it has moved on to other projects, or would you prefer a controlled and organized response where you have already transitioned the solution knowledge to a managed services support

team who is on standby and is ready to support the customer?

This model works well for companies that are able to leverage customer data from device sensors to more efficiently service their products. For example, Tetra Pak, a cutting-edge food processor and packager offers service contracts to more than 5,000 of its customers. All data is fed to Azure in real-time that is subsequently managed by Tetra Pak for monitoring and analysis. Tetra Pak uses this data to streamline machine diagnostics and repairs for its customers, thus reducing repair time, preventing failures and increasing uptime on its equipment.

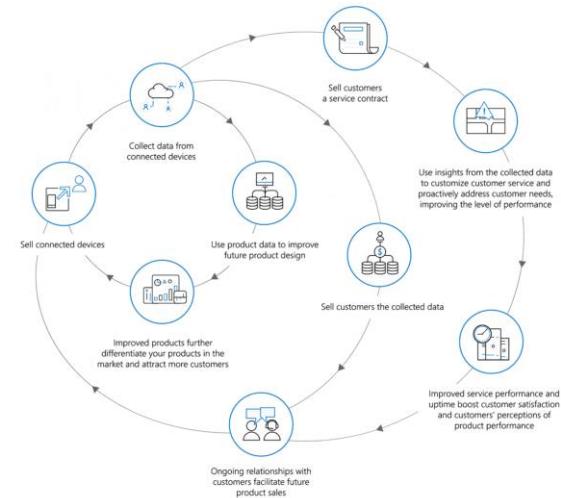


Image from: <https://content.microsoft.com/iot/business-models/section-2-1547J-2011P5.html#step6>

## HOW TO BUILD AN IOT MANAGED SERVICE

For even the most sophisticated software house, effectively measuring performance, handling patching, and staying ahead of the rapidly evolving IoT landscape can be too difficult to manage without help. Partners can offer their services on a subscription basis to ensure the production IoT solution continues to deliver the value and performance that got the customer excited at using IoT in the first place.

## KEY CUSTOMER CHALLENGES

1. They lack the tools and expertise to effectively monitor the performance of an IoT solution.
2. They are unable to identify, assess, and troubleshoot issues in production deployments.
3. They don't possess development staff to develop solutions to visualize data through dashboards and reports.

# IoT Practice Management Service

Unlike the support you might expect to provide for a SaaS-based web application or web service in production, the support provided for an IoT solution in production is different, as is the reason customers will want IoT practices to include support as a managed service along with the delivered solution. At its core, the difference lies in the skillset required to support the IoT solution, coupled with the reality that IoT expertise is in short supply. This means that it is highly likely that your customers will be looking to you for help when something goes wrong with their solution in production, because they are not likely to have the resources to support the solution in house.

This is not to say that the support for an IoT practice would support only the IoT components, since no matter how well a cloud or hybrid solution is planned, provisioned, operated or monitored, problems will arise, and those problems will need to be remediated. It's your job as an MSP to offer support to your customers to deal with outages, breaches, inefficiencies, and disaster scenarios. IoT simply adds additional items your customer will need support with, such as monitoring and maintaining devices, identifying when trends in the current data diverge from those in historical data and necessitate diagnosing why an IoT solution is seemingly displaying an undesirable bias.

MSPs need to consider the level of support that makes sense for their practice — in terms of resources and revenue — as well as what makes sense to the customers they serve.

## KEY CUSTOMER CHALLENGES

- They are overwhelmed by the complexity of managing a large number of devices.
- They lack expertise in the maintenance and upgrading of device hardware and the software that runs upon it.
- They lack data science talent that can assist them in analyzing their data to make correlations that can improve their business.

- They lack the expertise and resources to troubleshoot problems.
- They are unable to determine the root cause of performance issues and glitches.
- They have no knowledge of how to remediate problems when they correctly identify them.
- They do not want to spend time and resources fixing problems.

## KEY SERVICES FOR THIS OFFERING

- **Device Network Support:** Provide support around monitoring and maintaining the device network in terms of the accuracy, currency or reasonableness of its data. Assist the customer specifically in diagnosing what has changed with respect to the data environment, the model or other factors and providing support in resolving the issue.
- **User Support:** Provide support for frequently asked questions, setup and usage, best practices, questions around billing and invoicing, break-fix support for developers, architecture design, and solution design support for architects.
- **System Support:** Provide customers with information on any service interruption, and relay expectations on when the system will be back online.
- **Product Support:** Provide support when the Microsoft product is not working as expected or the service stops working. Escalate to Microsoft when the issue cannot be resolved with existing documentation and/or training.
- **Extended Support Hours:** Many customers need the ability for 24/7 support, but cannot justify the overhead internally.
- **Account Management:** Offering an account manager that is responsible for reporting on service consumption and ultimately minimizing time to resolution is a service that can be offered at a premium.
- **Dedicated Support:** The value add of a dedicated support team cannot be overstated. Engineering resources that already know your customers' environment, including the business and technical reasons for how a solution was implemented can add a tremendous value over the lifetime of an agreement.

## Monitoring IoT Services

In the IoT world, the tools and requirements have evolved, but the problem statement has not fundamentally changed. How do I monitor the health and performance of my infrastructure? There is no easy answer to this and customers expect their service providers to solve it for them. Most mid-market and enterprise organizations simply do not have the time, resources, or dedicated staff required to monitor every aspect of the solution, and this is where MSPs add the most value. While Azure offers many monitoring capabilities built within the platform to monitor the application related services, there is still a place for partners who (a) provide additional, deeper monitoring tooling that takes into account the health and performance of the IoT Solution, (b) triages the false positives from the real alerts, and (c) proactively acts upon the alerts before any measurable loss in performance.

### KEY CUSTOMER CHALLENGES

Common challenges heard from customers tend to center around the need for IoT operational dashboards, diagnostics, monitoring and support.

- I don't have the time or resources to monitor all the components in my IoT solution. (IoT Management and Monitoring)
- I need a single pane of glass view that tells me how all my IoT Solution is performing, at any point in time. (IoT Dashboards)
- I find it challenging to diagnose the root cause of breakdowns, outages, or unexpected bias. (IoT Diagnostics)
- How do I respond to so many alerts? How do I differentiate the false positives from the concerning ones? (IoT Management and support)

### KEY SERVICES FOR THIS OFFERING

The following table illustrates how a partner might construct a comprehensive IoT solution monitoring offering, which includes IoT performance monitoring.

SYSTEM HEALTH MONITORING	LOG ANALYTICS AND ALERTING	DATABASE MONITORING	SOLUTION PERFORMANCE MONITORING	SYSTEM MONITORING
<p>Complete monitoring of devices, edge devices, VMs, CPU utilization, memory usage, storage IOPs, and OS performance.</p> <p>Includes monitoring of application performance and operation health, and dashboards and reports on system health.</p>	<p>Every client, device, and user accessing a network produces data that is logged.</p> <p>Analyzing those logs can offer deep insight into performance, security, resource consumption, and other meaningful metrics.</p>	<p>A view into your customer's database that helps MSPs ensure high availability of database servers.</p> <p>The process involves keeping logs of size, connection time and users of databases, analyzing use trends, and leveraging data to proactively remediate issues.</p>	<p>End-to-end tracking of all aspects of an IoT Solution).</p> <p>Monitoring involves watching every part – from device connectivity, communication issues, machine learning algorithms, to the performance of dashboards and reports important for the customer, this can be web apps or mobile applications in an effort to provide the best user experience possible.</p>	<p>Perpetual monitoring and evaluation of data in terms like accuracy and reasonableness.</p> <p>Monitor to identify unexpected IoT behaviors or situations where the solution was unable to provide a solution or is consistently responding with low confidence.</p>

# Understanding Intellectual Property

Intellectual property (IP) includes the proprietary elements you develop in-house, own, maintain and sell directly or as value add to project and managed services.

The idea of developing “productized” intellectual property (IP) may sound daunting. But many partners find that they already had IP, it just wasn’t packaged that way. If you did something custom that was successful for one client, there may be more customers that would benefit from solving the same problem.

Review your most successful projects to see if there are repeatable elements that you can productize. Repeatable elements can be about your own industry or process best practices, or even focus on common customer pain points. Start small. Your IP can be a simple template or just a few lines of code that automates a function in a way your market typically needs. Productizing IP and creating repeatable processes has been a very successful strategy for many partners.

Some partners are achieving gross margins in excess of 70% by productizing IP and selling it to their customers on a recurring revenue basis.

Productizing IP helps you create stickiness with customers and opens up opportunities to sell your solutions through the partner channel. If you don’t want to create your own IP, you can also look to the partner ecosystem for incremental solutions that can be bundled with Microsoft’s offerings to round out your total solution. There are multiple opportunities for building intellectual property that can be used to expedite engagements, or even as an entire engagement. With the ability to create fully automated solutions, partners can challenge their creative side to offer up solutions that can save their customers money, as well as add a striking differentiator amongst peers.

## IMPLEMENTING IP IN YOUR IOT OFFERINGS

Tips to get you started with productizing your IP and going to market:

1. **Define your solution.** Through our research process, when we asked partners how they determined what IP they were going to build, we often got the same answer, which is that they realized most of their customers were asking for the same thing or something very similar, and rather than continuing to do high-cost custom work for every customer, they decided to productize what their customers were asking for. Bring your sales, marketing, technical and delivery teams together to brainstorm and define what your solution will look like.
2. **Determine what will differentiate your solution** from others in the market. It is vital that you think about your differentiation strategy. What is going to make your solution better than other solutions like it in the industry?
3. **Maintain rights to the IP.** It is critical that you maintain the IP rights to the solutions and get customers to agree to the terms through your customer agreements
4. **Establish a recurring revenue model.** The beauty of deploying IP in the cloud space is that you can light up the recurring revenue model, which will have a positive impact on the valuation of your business and will help even out your cash flows in the future.
5. **Consider your channel strategy.** One of the advantages of productizing your IP is that it opens a lot of doors to sell your solution through channel partners.
6. **Consider sourcing strategy.** In order to develop IP, it is not necessary to build your own development organization. There are thousands of companies in the world that do software development as a service. But remember to secure rights to your IP in this case.

For an even deeper dive into cloud profitability, see these additional resources: [IP Development](#) and [Create Stickiness with IP](#).

## CREATING INTELLECTUAL PROPERTY IN YOUR IOT PRACTICE

Making money in IoT usually partially requires you to retain IP to drive annuity. Annuity is a key strategic component to a cloud practice, and it is not different for practices focused on IoT.

Broadly speaking, there are three forms of IP that partners create that can yield annuities:

- Sell specialized hardware and related services.
- Provide the data and the platform to access, query and interact with the data.
- Provide analytics apps and APIs atop a data platform.

If, in the course of operating your IoT practice, you have collected data assets, and potentially created hardware - consider treating these as an important part of your intellectual property portfolio and think about how enabling controlled third-party access to your data sets and devices might yield new annuities. If you do not own the data, consider the opportunity to build analytic applications and APIs that sit atop the data platform of another- be it the customer's own data platform or that provided by a third party. This approach can be described as the app-ification of data with IoT and the most common approach is to provide SaaS APIs integrated by others in delivering their solution.

## PACKAGE YOUR PROCESS

Another way partners are creating IP in IoT practices is by packaging their assessments, documents, and processes into proprietary, reusable components that only they own and can deliver. For example, package a service around delivering envisioning sessions with customers that enable you to quickly get to the best possibilities quickly. Offer this service on an annualized basis as your customer's and their data evolve, and never leave them without thinking about new opportunities to innovate with your help.

## ENGAGE LEGAL COUNSEL

Key to partner success with IP is taking care with licenses, contracts and terms of use. To this end, partners should make sure to protect their IP by involving legal counsel early before any customer uses the new IP.





## Protect your IoT IP with the Microsoft Azure IP Advantage

Microsoft's [Azure IP Advantage program](#) represents the industry's most comprehensive protection against intellectual property (IP) risks, particularly revolving around IP infringement. The Microsoft Azure IP Advantage program includes the following benefits:

- Best-in-industry intellectual property protection with uncapped indemnification coverage will now also cover any open source technology that powers Microsoft Azure services, such as Apache Spark used for machine learning in Azure HD Insight.
- Patent Pick: Makes 10,000 Microsoft patents available to customers that use Azure services for the sole purpose of enabling them to better defend themselves against patent lawsuits against their services that run on top of Azure. These patents are broadly representative of Microsoft's overall patent portfolio and are the result of years of cutting-edge innovation by our best engineers around the world.
- Springing License: Microsoft is pledging to Azure customers that if Microsoft transfers patents in the future to non-practicing entities, they can never be asserted against them.

With these changes, Microsoft now offers our customers industry-leading protection against intellectual property risk in the cloud.

### CONSIDERATIONS FOR YOUR IOT IP

Fundamentally, in order to benefit from the Microsoft Azure IP Advantage program, some parts of your solution need to run in Azure, such that you meet minimal spend requirements. For example, if building your IoT solution in a hybrid fashion you might perform some data wrangling and model building on-premises, but deploy the trained models to Azure using Azure Machine Learning services. As long as you meet the following requirements, you would be eligible for Microsoft Azure IP:

- For patent pick eligibility: you must (i) have an Azure usage of \$1,000 USD per month over the past three months; (ii) have not filed a patent infringement lawsuit against another Azure customer for their Azure workloads in the last 2 years; and (iii) show evidence of a current patent litigation that occurred after February 8, 2017. Legal transactional costs apply.
- For springing license eligibility: you must have an Azure usage of \$1,000 USD per month over the past three months.

# Define Industry Specific Offerings

It is recommended that you specialize by industry, functional process, or technology.

In the earlier section on Industry Opportunities, we provided a range of examples of how partners have delivered successful IoT solutions by industry (across healthcare, financial services, manufacturing, retail, government, and education). Why do partners choose to verticalize their solution like this?

Irrespective of if you are building IoT solutions or line-of-business applications, the reason that you verticalize boils down to maximizing your domain expertise. For non-IoT solutions, partners can learn just enough of the domain to incorporate the required knowledge into the solution they deliver, and in reality they may not always need the domain expertise to deliver a viable solution. IoT is different. The reason, as we will explore in more detail in the section on Hire and Train, has everything to do with the increased importance of domain expertise that is employed by your IoT implementation team when creating IoT solutions. The following diagram summarizes the situation well:

IoT solutions are built by teams having overlapping capabilities in computer science, math, AND domain expertise. Without the domain expertise, the IoT solution might be extremely efficient from a computation standpoint, but the outcome itself could be meaningless or useless from the real-world standpoint of the domain.

## EXAMPLES OF SPECIALIZATION:

- Industry specialization: manufacturing, banking, retail
- Functional process specialization: accounting, human resources, marketing campaign management
- Technology specialization: systems management, analytics, enterprise resource planning

Think about it this way; if there is lack of differentiation in the market owing to approaches like verticalization, then price becomes the primary differentiator between you and your competition. This can erode your margins and trap you in a business they can't afford to invest in as prices race to the bottom in order to win customers.

Establish your company as an expert in your selected areas. You can also focus on a specific technology or become known as an early adopter and technology leader. But the real value comes from IP or expertise in an industry, vertical, or business process. The combination of adding IP to an industry or business process expertise makes that advantage even more powerful.

Our research with partners suggests mastering one specialization before adding additional ones. We understand that it is easy to be distracted, by saying "yes" to every request, and by diversifying into too many offerings. But in the long run, it is better to say "no" to those projects that are outside of your focus. Partners have shown benefit from having a strict focus on one key solution and growing by expanding one industry at a time.

# Define Your Pricing Strategy

Pricing your IoT offering is no longer determined simply by cost plus margin.

Pricing has evolved in the Cloud era, so to assist in helping you determine how to best price your IoT solutions, we offer a four-step approach.

## STEP 1 : EVALUATE THE CUSTOMER VALUE OF YOUR OFFER

The costs associated with IoT solutions can involve developing software and hardware, management and installation of those devices, in addition to services. However, pricing your offer is no longer determined simply by cost plus margin.

Pricing a product or offering is different in today's marketplace. Increasingly it is about return on value (ROV) — the added benefits (e.g., better per-unit price, improved service characteristics) your customer gets by being a better customer of yours (e.g., buying contracts with longer durations, making upfront payments, etc.). Customers will only pay as much as the value they estimate they will get from the offering.

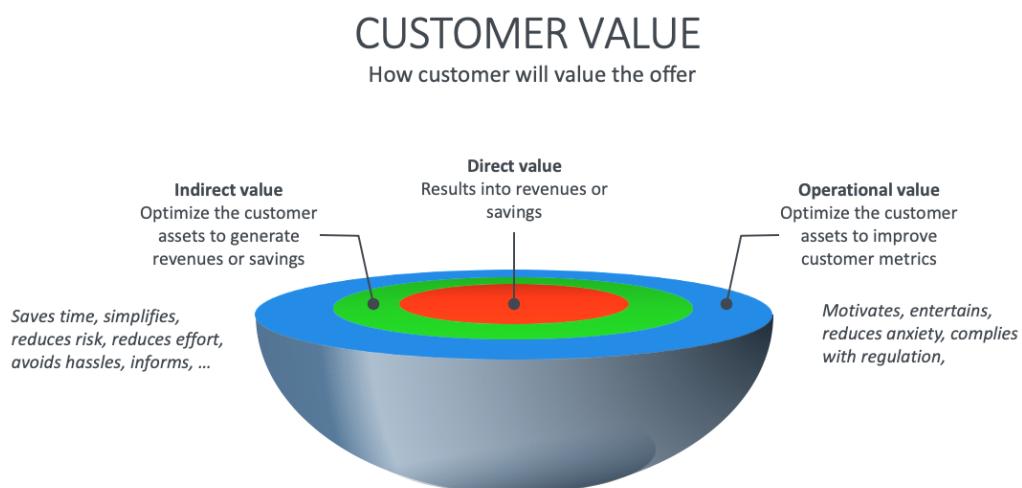
Three value categories may be considered.

A **DIRECT VALUE** is one that you can measure in the customer accounting books, and it can be either incremental revenues or cost reductions. For example, selling an E-Commerce solution to a retailer may lead him to reach new customers and generate more revenues. Or, selling a Device as a Service, may lead the customer to end his contract with maintenance company and result into immediate and tangible savings.

An **INDIRECT VALUE** is one that is real and tangible but can hardly be seen in the customer company books. For example, by subscribing to Microsoft Dynamics CRM, a customer' sales team may increase its productivity by 20% although it may not result in immediate incremental revenues.

An **OPERATING VALUE** suggests better results on key performance indicators defined by the customers such as reputation, employee retention rate, or product quality.

Estimating the value of your offer for the customer will enable you to set a price range that should ideally be appreciated as a great return for his business.



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## STEP 2 : SELECT A RELEVANT PRICE UNIT

As usage becomes the currency of the Cloud era, a **PRICE PER USER** is increasingly popular and applied for many solutions. Yet, it may not be applicable for all solutions where user is not the main variable. We may select a **PRICE PER APPLICATION** instead, or a **PRICE PER GROUP OF INDICATOR** for a BI solution or even a **PRICE PER RESULT**. Whatever unit is chosen it should suggest a sense of freedom for the customer likewise subscribers of mobile phone plans do not feel constrained by the number of calls they can make anymore.



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## STEP 3 : DEFINE YOUR PRICE AND THE VARIATION MODEL

### STANDARD PRICING

Pricing is the consequence of the product and aligns to the accepted industry/application standard. Think of this as reference pricing; as in customers have seen similar products sold for this amount, so you price your offer so that it is similar. What's the standard price for a mobile phone app? \$0.99. If you charge more, you are breaking from the industry accepted, standard pricing. This is an old way to look at pricing. Buyers today will accept this model, but they do not prefer it and it provides minimal help in getting your offer purchased, so let's look at the other options that you should consider for your IoT practice.

### VIRTUOUS PRICING

Virtuous pricing is about using the price as a sales weapon. The goal of virtuous pricing is to create a virtuous sales cycle within your customers, where each sale encourages the next sale within the customer organization. It fosters product adoption and proliferation. Let's begin with a counter example of what is not virtuous pricing — a fixed price per user, or for an IoT example, a fixed price per IoT device. Here, you have a simple pricing structure (which is important), but there is nothing to encourage more aggressive purchasing by the customer.

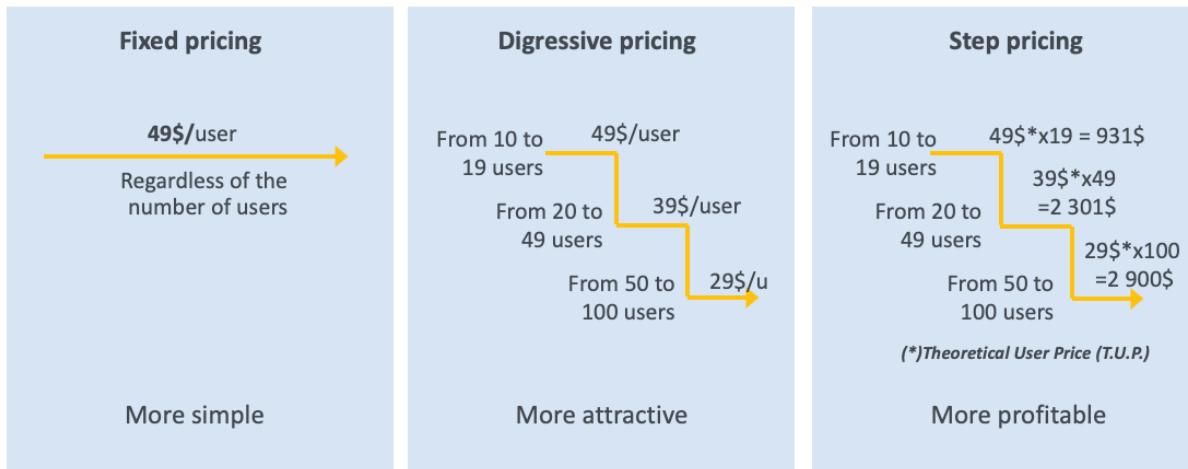
Enter digressive pricing, which drops the per-unit price with the purchase of more units. Your customers get a discount per unit price the more they buy. This can help create a virtuous sales cycle within the customer because now the customer is looking for way to bring their cost per unit (e.g., user) down.

For example, assume one line of business has already purchased 19 IoT devices from you at \$49 per device. Now, there are discussions within another line of business within the same customer organization to purchase a similar product from a competitor or to purchase yours. Your existing customer is incentivized to lobby on your behalf because if the other line of business purchases your product, their cost will drop to \$39 per device. And the cycle can continue as each new group evaluates your solution offering.

There is a way to adjust digressive pricing slightly to make it significantly more profitable — step pricing. This method sets the price for each step as the top number of units in the range. Building on the example from digressive pricing, let's say that the customer purchased 15 devices. They would pay for the equivalent of 19 devices since that is the price for this range of

units. Why is this more profitable? Because your customer is effectively paying you for the 4 devices they are not using (yet) — which goes straight into your profits. What's more is you have amplified the virtuous sales cycle because the customer wants to get as close to the maximum number of devices for the step as possible in order to get the lowest possible cost per unit within the step.

## VIRTUOUS PRICING



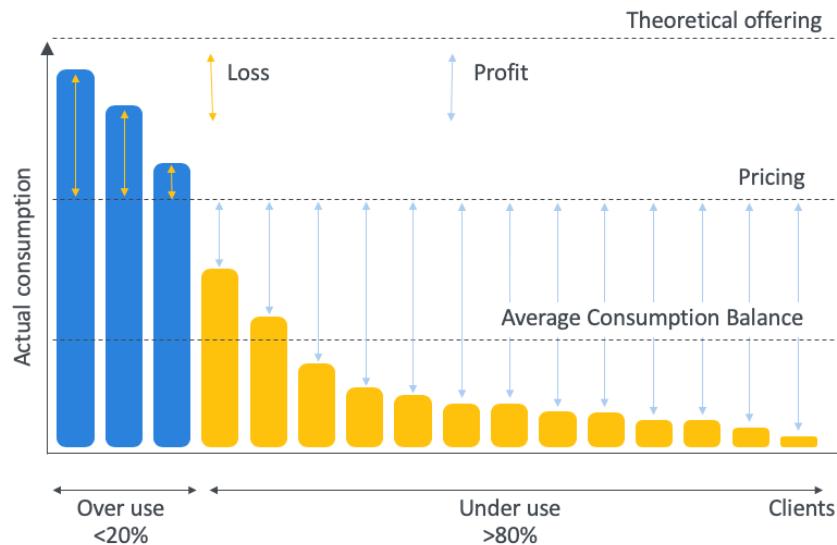
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## STEP 4 : EVALUATE CREATIVE PRICING MODELS

**FLAT RATING** is one of the most powerful business pricing strategies.

You have probably already experienced it, although you may not have realized. Flat rating pricings is leveraged by banks, insurance, etc., every time you pay premiums. While it can have varying levels of sophistication (banks and insurance firms use sophisticated versions of this based on significant work by their actuaries), the model can be described and implemented in a simple fashion. The basic idea is that you provide a certain quantity of value for a set cost that all customers pay. Some customers may come close to (or even exceed) using the full value of what they pay for, while the rest are nowhere close. A well-crafted model identifies the average consumption across all of your customers, and creates a situation where over 80% of the customers are using less than what they are paying for (and ideally less than the average consumption) and fewer than 20% are using more. You set your price to be above the average consumption. By doing so, clients in the 80% who use less than what they pay for generate your profit. The further they are below the average consumption, the more profit they generate. For the 20% who use more than they pay for, you might take a loss on them individually. However, in the aggregate, the long tail represented by the 80% of customers who do not fully use what they pay for more than covers the cost of your heavy consumers, and these heavy consumers are likely to be your biggest champions. So, there are tangential benefits to supporting their cost. Pricing models built around flat rate pricing have shown between 1.5 and 3 times as much profit as traditional models.

## FLAT RATING



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### UPFRONT FEES

Another consideration of your pricing strategy is whether to charge your customers an upfront fee.

Reasons for doing so, including providing some working capital to get resources going in the early days of your practice, mitigate the risk that a customer abandons a project without any payment and ensure the customer is as invested in a project as you are. It can also serve to minimize financial impact to your practice when the customer has requested longer payment terms.

### PAYMENT TERMS

The final consideration for your pricing strategy is the payment terms. This is defined as the duration of time between when you invoice the customer for service rendered and when you receive payment from the customer.

Payment terms are measured in days; for example 10 days, 15 days, 30 days or 90 days. These are usually expressed as NET 10, NET 15, NET 30 or NET 90 payment terms. In addition, you might consider offering the customer a discount for prompt payment on your shortest payment. For example NET 2/10/30 is used to describe terms where a 2% discount is provided for payment received within 10 days of invoicing, otherwise the full invoice amount is due in 30 days.

### PRICING COMMUNICATION

Price is rarely mentioned on service provider websites. The sales copy speaks of partnerships and the price is often revealed only after speaking to a sales representative. In an offer-based strategy, this will not work. In the business of cloud, price is always disclosed up front. Because price is part of your value proposition and solution offer, your pricing is something you can be proud of and share. Remember you are in a race against yourself and the competition. Be proud and show your price early, removing any customer concerns.

## How are IoT Partners Pricing?

Pricing is very dependent upon the types of IoT solutions being offered by your practice, and standard pricing practices are still evolving. In general, consumption- or subscription-based pricing models are the most predominant in IoT practices.

### SUBSCRIPTION SERVICES

Another approach to obtaining an income stream is by providing a subscription fee service to access the benefits of an IoT solution. The subscription can be charged on a per-user, per-device, per-request or some type of flat subscription fee. The services provided could be relative to interest in the data collected from your customers, these consumers could be the customers themselves, or a 3<sup>rd</sup> party that is interested in only in the data. When delivering hardware with this type of solution, it is important to keep the cost low in order to facilitate customer adoption. For example, selling a smart thermostat that collects historical data sells a subscription service to the consumer of the thermostat to control the device remotely and view historical charts, either through a web dashboard or a mobile application. The telemetry data gathered by the thermostats may also be of interest to utility providers that can pay by the amount of data requested. The benefit of this model is that you will see a continuous revenue stream from your customers – as long as they see value in your service. One downside to this is that customers are not tied to the service, and they can easily switch out to a competitor service. It is imperative to ensure customer satisfaction, quality software, and quality data. This model works well for companies that can accept not having upfront revenue and can accept a variable income. This is often the case when companies are switching from predominantly selling products to selling an equivalent service. Enhancement and supporting labor is a variable cost driven by demand for the service. Rolls-Royce provides dashboard software along with the deployment and management of sensors on more than 13,000 commercial aircraft engines. Customers using their engines pay a recurring subscription fee based on engine fly hours, dubbed “power by the hour”. By moving from a fixed-cost model to a variable cost model, Rolls-Royce is earning more revenue, and continues to improve its maintenance processes by leveraging the data collected from its service customers in order to ensure maximum aircraft availability. By improving their efficiency, they are also improving their bottom line.

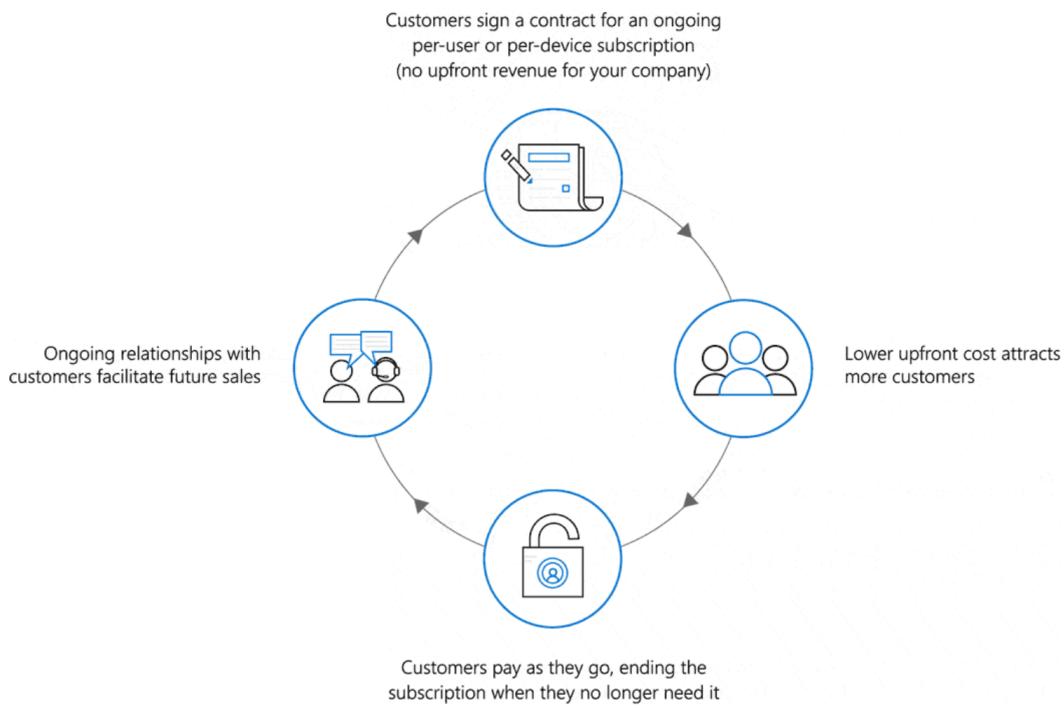


Image from (<https://content.microsoft.com/iot/business-models/section-2-1547J-2011P5.html#step5>)

## HIGH-END SKU

If you have developed a niche product or service, you can charge a premium for a higher-end offering. Pricing this type of offering is highly dependent on how much a customer is willing to pay. A benefit to this approach is that you can yield high margins to be able to further develop your solutions. On the other hand, you risk alienating customers if you set the price-point too high. Luxury connected car brands have found success with this business model. They utilize IoT to create a high-end driving experience that customers are willing to pay for, such as self-driving sensors and touch screen control of many of the car systems.

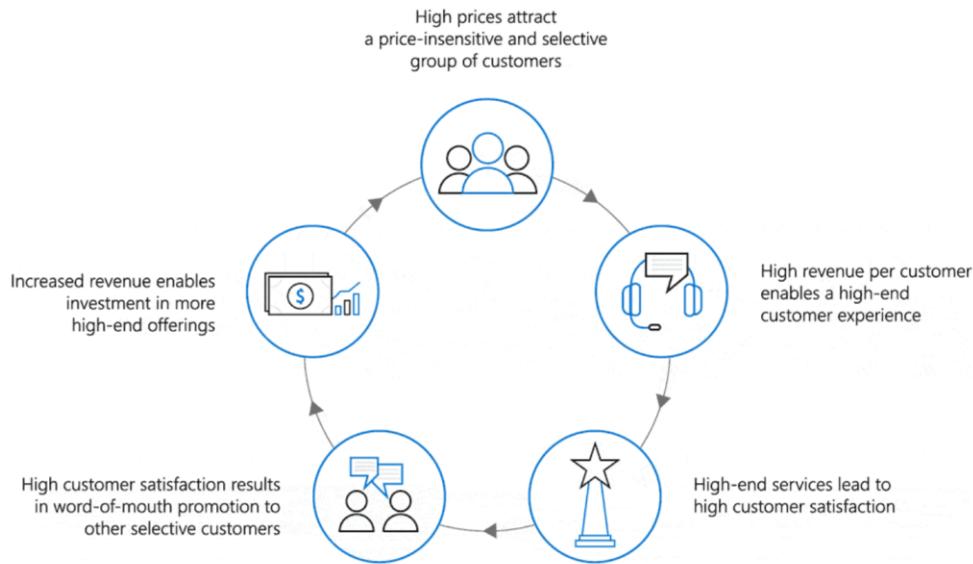


Image from (<https://content.microsoft.com/iot/business-models/section-2-1547J-2011P5.html#step2>)

## FREEMIUM

Using a freemium model may sound counter-intuitive, but it can result in wide adoption of the IoT product or service. Essentially, the base product or service is granted free of charge to the customer. This yields a large adoption of the product, leading to improved brand awareness, increased advertising power, and brand loyalty. The consumers try the product and if they like it, they will continue using it, and sharing their experiences with their peers. The customers are then offered tantalizing paid add-on services and upgrades. Due to their experience with the product, many will see value in the upgrades and pay for the additional services. It is important to note that there will be some customers who will never pay for the product, but rest assured, you are still collecting data from them, and they still will be spreading brand awareness. It is important to ensure a quality, compelling product and paid add-ons to customers, otherwise they may switch products entirely, or will never be compelled to pay, which is unsustainable. This model typically requires upfront losses in revenue, as the product and/or service is offered free. SkyAlert utilizes this model in distributing its early-warning system for earthquakes via a mobile app, standalone devices, and an IoT solution that runs in Microsoft Azure. Two months after release, they already accrued 5.8 million mobile app users, and more than 40 organizations using their standalone devices.

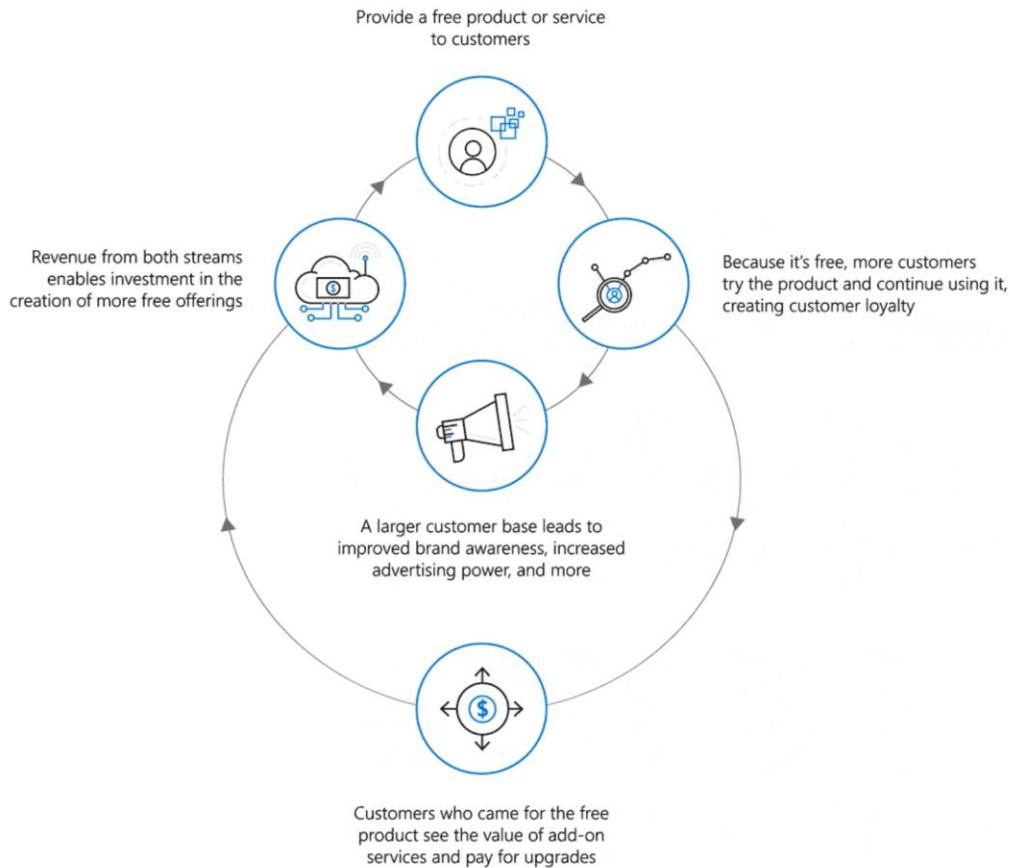


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## DEVELOP AN IOT ECOSYSTEM

Also known as the “lock-in” model the product you offer is simply a stepping stone into a larger ecosystem, thereby guaranteeing future revenue via brand loyalty and a large customer base. Similar to the freemium model, this approach typically results in an initial loss, by selling the product for a low or no upfront cost. For example, you provide low-cost hardware to the customer to increase product adoption. You also offer additional paid hardware that is only compatible with the hardware you manufacture that offers compelling features for your customers. The higher revenue from the sales of additional hardware will offset the upfront loss. This type of ecosystem should be unique in nature, to ensure that customers don’t look for a more “open” solution. Some of the biggest affordable smart home systems employ this model. They sell a central control hub that is only compatible with their own thermostats, light bulbs, smart plugs, etc. This hub is typically controlled the customer via a mobile phone app, or a web portal.

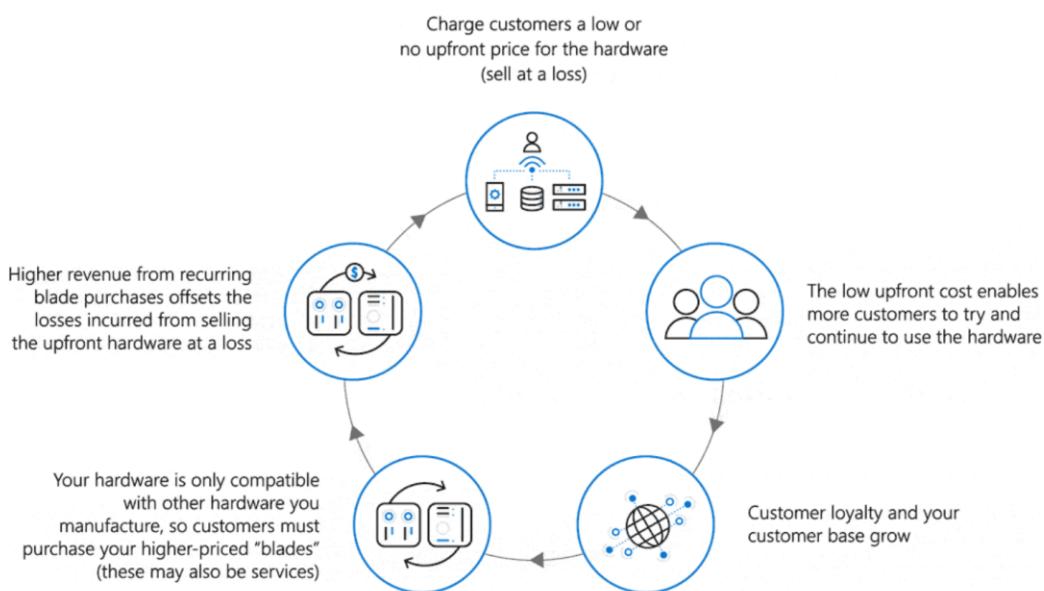


Image from <https://content.microsoft.com/iot/business-models/section-2-1547J-2011P5.html#step4>

## CREATE SAAS APIs FOR YOUR DATA

For the predictive scenarios for which it applies, consider exposing your predictive services via REST APIs in the SaaS approach. In this approach, customers typically have access to a free tier to experiment with your predictive service, but then have to pay for use as their consumption crosses thresholds you specify. Consider placing your predictive web services built with Azure Machine Learning and hosted in Azure Container Service behind [Azure API Management](#) to monitor and meter third-party access to your intellectual property.

# Calculate Your Azure Practice Costs

## Azure Practice Costs

Your practice relies on Azure services to deliver customer success, so understanding the Azure-related expenses incurred in delivering a customer solution is critical. How do you calculate these Azure costs?

Using the [Azure Pricing Calculator](#) to estimate Azure costs, you can build an estimate online and the export it to Excel for further refinement and analysis. This tool will give you the retail rates (also known as the Pay-As-You-Go option) for the Azure services, so treat it like the "high end" of your consumption estimate.

Become familiar with the discounted pricing and Azure credits:

- **Graduated Pricing:** Services like Azure Blob storage have tiered pricing based upon the volume used.
- **Enterprise Agreement:** By making a three-year monetary commitment, Azure services are available at a discount off retail rates. To learn more, see [Enterprise Agreements](#).
- **Azure Credits:** Microsoft Partners can receive Azure credits as a part of their benefit. For example, partners with the Silver Cloud Platform Competency receive \$350 USD per month in Azure credits; those with Gold Cloud Platform Competency receive \$600 USD per month in Azure credits.

It can be helpful to identify items which are used elastically versus items that have a fixed monthly cost. Significant savings can be achieved via elastic use of resource because you can turn them off (or pause them) when they are not in use.

For example:

- **Elastic:** SQL Data Warehouse used only during month end calculations. It can be paused the rest of the month. Another example of elastic use is to leverage auto-scale capabilities of the resource, such as auto-scaling the number of Azure App Service instances down in the evenings and back up during the workday.
- **Fixed:** Azure Kubernetes Service (AKS) running your machine learning model web service. This AKS instance needs to run 24x7 because your visitors will send data for analysis at all hours.

Finally, if you don't understand how much of a given resource you will use, consider building a scaled down proof-of-concept to get a first estimate.



# Identify Partnership Opportunities

## Partner to Partner

With an IoT practice, not all partners will or even should do everything themselves. It is critical that partners learn to seek out other IoT partners to fill gaps in their practice – from missing talent to expertise in building custom PCBs.

It is tempting to want to do everything related to your business, but the fact remains you will never have enough time. This is a primary reason to seek out compatible partners that can help you to:

- Complete your solution
- Build credibility
- Partners for infrastructure
- Leverage joint marketing
- Add-on to sales
- Broaden your customer base

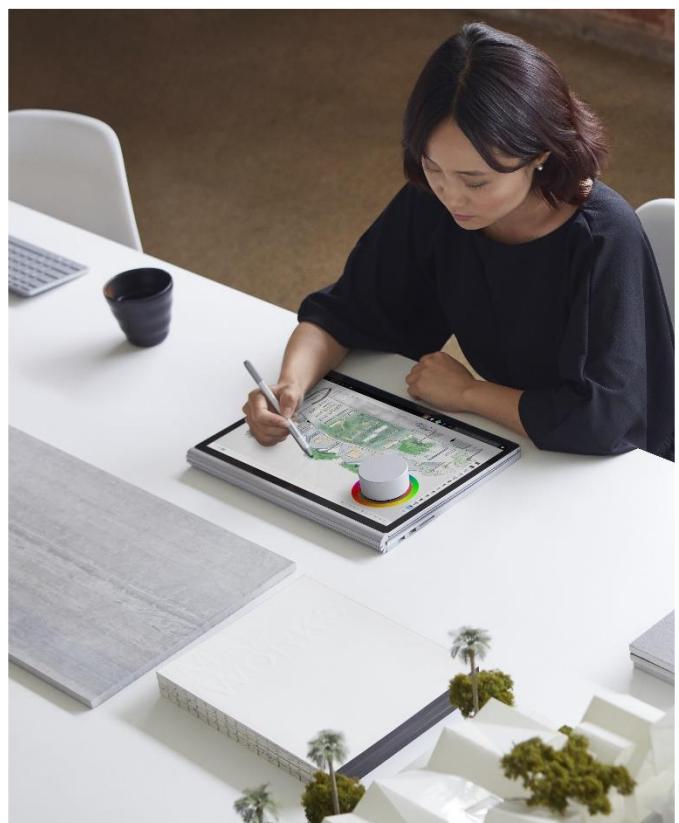
Finding the right type of partnerships is key to finding success in today's competitive market. Some partner combinations meld together well to create success. To help you find the right mix, here's an example of a partner recipe we know works:

ISV + channel-based MSP partners = international success

[Find out what's in it for the Partners and customer and the secret of success.](#)

## Partner Across Domains

With an IoT practice in particular, having partners with expertise in other domains can be lucrative. A compelling example of this is in security. A security partner is already established, experienced, and considered experts in the security domain. If you partnered with a security partner, you would gain domain expertise from a very complex and rapidly evolving domain. The security partner would also benefit by gaining experience from your IoT capabilities – such as cloud management, network and/or software expertise. Partnering together will often lead to an IoT solution that could go beyond mainstream



approaches. Establishing this a successful partnering relationship also increases your chances of obtaining future projects as an experienced IoT partner on projects originally sourced by the security partner that you've already established a relationship with.

It is also quite common in the IoT space to leverage partners for the hardware aspects of the solution. Many of the partners interviewed for this document leverage partnerships to design, develop, and manufacture their hardware.

## Make connections with Dynasource.com

It's hard to beat the value of partner-to-partner conversations and networking. Luckily, there are communities to help you expand your network and make an even bigger impact on your business.

[Dunasource](#) is a global, two-sided marketplace that allows partners to connect with other firms that have complementary expertise and capabilities. If you have excess capacity, increase your billability and profitability by finding partners that can drive utilization of your staff. If you lack the capacity, Dynasource can help you connect with partners that have the expertise to enable and expand your solutions. If your customers are looking for a solution that is outside your particular expertise, you can use Dynasource to find an expert that can provide that solution. By connecting through Dynasource and working together, you can meet customer demand for needs across the Microsoft portfolio and grow your business.

### TRANSFORM THROUGH COLLABORATION

After you've created a profile on Dynasource, you can search the Dynasource Microsoft Partner Community for qualified resources that can collaborate with your team on an opportunity. This allows you to transform your cloud business and expand your offerings at a pace that works for you.

### INCREASE DEMAND FOR YOUR RESOURCES

Business is not always predictable but retaining quality staff is essential to your success. With Dynasource, you can make your resources and capabilities available to partners who can utilize them today, making your workforce agile and billable.



### GET STARTED NOW

In order to join Dynasource, all you'll need is general information about your business. Once you create a profile, you can search for other resources and jobs, as well as create and post your own. You can control the availability of your resources and what level of information you would like to share about your capabilities. With the Dynasource premium membership, you can request connections with other members and resources.

### Resources

- [Smart Partner-to-Partner Relationships](#)
- [A Recipe for Global Success](#)
- [Selling thru Partners](#)
- [The right ingredients for partner-to-partner success](#)

# Define Engagement Process



## Pre-Sales, Post-Sales, and Support

For your practice, you should define the technical effort required before the sale (pre-sales), after the sale (post-sales), and in support of the sale. You will need to decide on the technical pre-sales and post-sales requirements for your solution offer.

### **PRE-SALES**

The technical effort required to make the sale involves:

- Discuss the customer requirements and address their objections.
- Develop technical pitch decks. Leverage the [Cloud Adoption Framework](#).
- Technical demo: This demo may be generic or may need customization to better meet the requirements of the customer. The goal of the technical demo is to inspire confidence in your ability to deliver the desired solution by demonstrating you have “already done something like it before.”

### **POST SALES**

The technical effort required after the sale includes:

- Addressing follow-on customer concerns about the technology or implementation.
- Providing training to increase awareness of the solution that will be implemented.
- Providing a technical demo more customized for the customer to better understand their needs before moving on to the next phase of the project.
- Following up with the customer to ensure implementation is on track and meeting expectations.

For guidance with sales efforts, consider the learning paths available in the Microsoft Partner Network [Learning Portal](#).

### **SUPPORT**

Define your customer support program and processes. This includes:

- Defining your support model
- Provisioning your support infrastructure
- Defining and implementing your escalation process
- Selecting and enabling your support options for Azure

Microsoft also provides support for technical presales and deployment services. See the section [Supporting your Customers](#) for more information on available resources and using Partner Advisory Hours.

# Identify Potential Customers

## Build your prospect hit list.

Your goal is to build the list of prospects that could potentially turn into customers. To accomplish this, create an awareness campaign to draw attention to your practice, highlight your service offerings, and use your success to earn additional business with your customers and the industry at large.



Use these awareness activities to help generate new customers:

### WEBINARS AND PODCASTS

A great way to transfer knowledge, establish yourself as an expert, and pique the interest of potential customers.

### REFERRALS

Ask for referrals in email and phone calls when talking with existing customers, partners, and vendors who might know someone who is ready for your services.

### WHITE PAPERS

These are a great way to build credibility with decision makers. Technical staff often expect a white paper to help them understand underlying architecture and technology of your solutions.

### NEWS ARTICLES

Leverage public relation efforts to drive publicity around your technology, things your company is doing in the market, and other topics of current interest.

### SOCIAL MEDIA

Social media such as Twitter, LinkedIn, etc., is a place to build awareness, reputation, and customer satisfaction — and gain new customers.

### REVISIT EXISTING CUSTOMERS

If IoT represents a new practice within a going business concern, the easiest way to acquire new customers for your IoT practice is to introduce the IoT practice to your existing customers.

# Join the Microsoft Partner Network

## Partnering with Microsoft

The Microsoft Partner Network is the start of your journey. One of the first steps to partnering with Microsoft for your Azure practice is to join the Microsoft Partner Network if you are not already a member. As a partner, you will gain access to resources like training, whitepapers, and marketing material described in this playbook. It's also where you will set up your users to gain Microsoft Partner competencies and access to your partner benefits.

### TO BECOME A MICROSOFT PARTNER

The Microsoft Partner Network provides [three types of memberships](#). Each type provides a set of benefits to help you grow your business. As you achieve your goals, participate in the program at the level that suits your unique needs, so you can access more benefits and develop your relationship with Microsoft and other Microsoft Partners.

- **[Network Member](#)**: Receive a set of no-cost introductory benefits to help you save time and money. Use our resources to help build your business as a new partner and discover your next step.
- **[Microsoft Action Pack \(MAP\)](#)**: This affordable yearly subscription is for businesses looking to begin, build, and grow their Microsoft practice in the cloud-first, mobile-first world through a wide range of software and benefits.
- **[Competency](#)**: Get rewarded for your success with increased support, software, and training.

### TAKE THE NEXT STEP WITH A COMPETENCY

As a competency partner, you can earn both gold and silver competencies in one or more areas. Earn a silver competency to help your business demonstrate its expertise or a gold competency to showcase your best-in-class capabilities within a Microsoft solution area. Later in this playbook we'll review the competencies relevant for launching a successful Microsoft Azure practice.

### CLOUD ENABLEMENT DESK

The goal of the [Cloud Enablement Desk](#) is to assist partners in obtaining their first Silver Cloud Competency. Partners will be assigned a Cloud Program Specialist (CPS) for up to six months on their way to obtaining their first Silver Cloud Competency.

The Cloud Enablement Desk program requirements include:

- Partner must have a MPN ID.
- Partner must agree to and sign Conditions of Satisfaction that state partner is actively trying to achieve Silver Cloud Competency status and include the name of the primary contact person.
- Partner cannot have an existing Microsoft account management relationship.

# Partner Programs for IoT Partners

The following programs all build upon your membership in the Microsoft Partner Network and provide you with additional benefits and incentives as you prove your practice by earning competencies, passing assessments and winning customers in your practice focus area.

## HARDWARE PARTNER

As a Hardware Partner, you have the ability to add your device to the device catalog. This device catalog allows for customers and other partners to contact you directly regarding procurement and usage of your device, or otherwise recruit your services to develop a new hardware device. Benefits include access to a hardware certification kit that allows you to utilize the certified logo on all IoT web properties, social media exposure, discoverability through the device catalog which generates new business leads and showcase your hardware by specific business and technical needs.

## SECURITY PARTNER PROGRAM

The goal of the Security Partner Program for Azure IoT is to provide customers the ability to be connected with the best security auditors to evaluate their solutions end-to-end. This includes device manufacturing, hardware integration, solution development, solution deployment, cloud operations, data security and privacy management.

Some auditors may have expertise only in certain areas, which is also acceptable in this program.

## BUSINESS INTELLIGENCE PARTNER PROGRAM

The Business Intelligence Partner program enables you to build your expertise and showcase your solutions to customers. It enables you to get listed on PowerBI.com and supports you in becoming a Solution Partner where you can be showcased on PowerBI.com, AppSource.com or get listed as a Solution Template partner on PowerBI.com. This program also provides funding programs you can tap into for delivering workshops or proof of concepts to your customers.

## ADVANCED ANALYTICS PARTNER PROGRAM

The Advanced Analytics Partner program enables you to get listed as a partner who can deliver Advanced Analytic services as well as to get your solution showcased on the Cortana Intelligence Suite Solution Showcase.

## SI/ISV - CLOUD SOLUTION PROVIDER (CSP)

As a partner, you are able to offer your deep knowledge of IoT to deliver the right IoT solutions to your customers. You are able to create and sell customized or ready-to-use IoT software and services in your area or industry of expertise. This partner program benefits you with a community network and access to valuable resources including training, developer tools, software, and support. List your software and consulting services in the Azure Marketplace to increase discoverability and obtain business leads.

The [Cloud Solution Provider \(CSP\) program](#) rewards partners for driving cloud revenue through the CSP model, which enables you to drive deeper customer engagement with greater profitability as you get to combine high-margin service offerings with Microsoft cloud products and retain the ability to provide customer support and manage billing for your customer. You get to become your customers' single solution provider and trusted advisor by servicing all their cloud service needs.

The CSP Direct model is great for partners who have the infrastructure in place to do it all. If your business meets these requirements :

- You have a services business model
- You have customer support infrastructure
- You have customer billing and invoicing capabilities

- You have the ability to scale

Key services for this offering are:

- You are the first point of contact for your customers' needs
- You own and control the billing cycle
- You sell integrated offers and services – one sales motion to drive services, attach, and upsell
- You receive in-product tools to directly provision, manage, and support your customers

If you meet these requirements and are ready to take advantage of CSP Direct services, [enroll today](#).

Another option is CSP Indirect. This program allows you to spend more time with your customers and provide specialized service offerings. If you're not interested in building an infrastructure to provide customer support and billing, [get connected with an Indirect Provider](#).

For additional details on the CSP program, refer to the [Azure Managed Services Playbook for CSP Partners](#).

## P-SELLER PROGRAM

P-Sellers are Microsoft's "go to" partner resources across the customer lifecycle, and act as an extension of Microsoft in working with customers. As a Business Intelligence Solution Partner, you will receive sponsorship for your admission to the P-Seller program.

# Stay Informed on IoT Matters

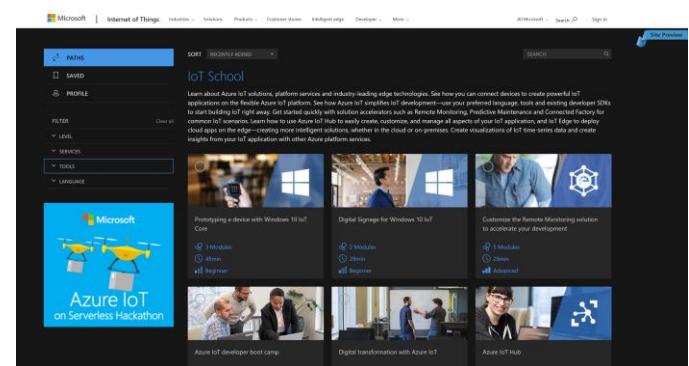
There are three resources you should be very familiar with when defining your IoT practice strategy. These are IoT School, Azure IoT and IoT Central portals.

## IoT School Portal

The [IoT School](#) portal provides resources for you to use for training. Content in this portal encompass many IoT aspects from prototyping devices with Windows 10 IoT Core, to device management, security, edge, creating visualizations of IoT time-series data, and more.

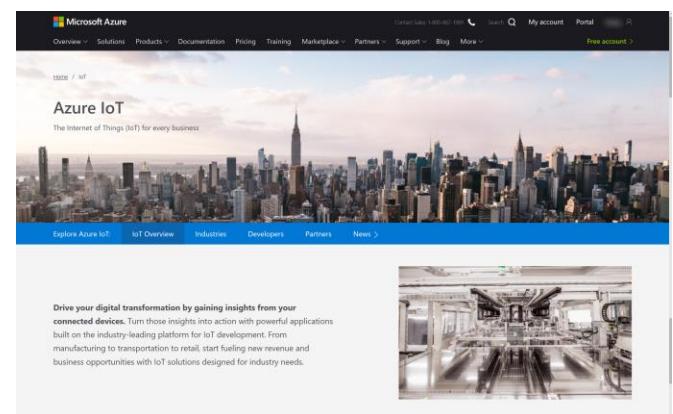
### THE IOT SCHOOL SITE PROVIDES

- Training resources, including self-paced and upcoming live and in-person events.
- Business-focused content on digital signage, and digital transformation.
- Training on solution accelerators to help you with implementation of proof of concept and pilot projects.



## Azure IoT Portal

The [Azure IoT site portal](#) provides insight into how IoT is transforming business, including multiple case studies including an industry breakdown, details of partner programs, and developer resources.



### Why Azure for Internet of Things (IoT)?

Accelerate your business transformation with IoT. Reduce complexity, lower costs, and speed up your time to market. Explore fully managed IoT services and solution accelerators designed for industry and scenarios like smart cities, monitoring, predictive maintenance, smart spaces, and connected products.



# IoT Central Portal

The [IoT Central](#) Portal provides a jump start into the IoT space – it automatically provides the infrastructure necessary to setup a full enterprise grade, scalable, and secure IoT solution in a matter of hours – without the need for developers or cloud expertise. You are able to customize the generated application by defining your devices, configuring rules, and customizing the operator views. You are be able to add real devices and begin monitoring them through this encompassing solution.

The screenshot shows the Azure IoT Central homepage. At the top, there's a navigation bar with links for Overview, Solutions, Products, Documentation, Pricing, Training, Marketplace, Partners, Support, Blog, and More. A 'Free account' button is also present. The main header is 'Azure IoT Central' with a sub-header 'Experience the simplicity of SaaS for IoT (Internet of Things), with no cloud expertise required.' Below this, there's a 'Get started' button and a visual diagram showing a central cloud icon connected to various IoT devices like a car, a building, and a person. The page is divided into several sections: 'Fast and easy' (with icons for gear and cloud), 'Scalable and secure' (with icons for gear and shield), 'Enterprise grade' (with icons for gear and checkmark), 'Simplify setting up your IoT solution' (with a small icon and a note about building applications in hours), 'Connect and manage your things with ease' (with icons for cloud and server), 'Rest easy with world-class security and privacy' (with a lock icon), 'Related products and services' (listing Azure IoT Central, IoT solution accelerators, IoT Hub, and IoT Edge), 'Learn more' (with links to documentation, partners, and videos), and 'Technical resources' (with links to latest updates, Stack Overflow, and feedback). At the bottom, there are buttons for 'Get more information', 'Contact us', 'Find a partner to help', 'Find a partner', and a large 'Start free' button.

# Identify Marketplaces

**Results in All apps for IoT (148)**

App Name	Publisher	Description	Action
Trakopolis IoT Platform	By Trakopolis	Trakopolis serializes the location and performance of vehicles, equipment and people in real time.	Contact me
IoT Service Hub	By Hitachi Solutions	Create a Data-Driven Service Business to Improve Operational Efficiencies.	Contact me
IoT Hub	By Microsoft	Connect, monitor and manage IoT devices	Get it now
Axonize IoT Orchestration Platform	By Axonize	Axonize IoT Orchestration Platform	Free trial
Asavie IoT Connect	By ASAVIE TECHNOLOGIES LIMITED	Secure connectivity for cellular IoT	Contact me
IoT Central Application	By Microsoft	Experience the simplicity of SaaS for IoT (Internet of Things), with no cloud expertise required.	Get it now
SpringBoard for Industrial IoT Genset Management	By BrightWorl	A customisable Azure IoT solution for industrial genset monitoring and control	Contact me
Smart IoT oneM2M network	By PilotThings	Plug and Play IoT network	Free software trial
SpringBoard Industrial IoT System for Azure	By BrightWorl	A customisable solution for industrial IoT and connected product systems	Contact me
AVEVA IoT Edge HMI	By AVEVA	AVEVA IoT Edge HMI	Get it now
Real-time Security for IoT Solutions	By SecurThings	Fully Managed Service for Securing IoT Solutions.	Contact me
Reekoh IoT Integration Platform-as-a-Service	By Reekoh	Reekoh provides agile enterprise integration from IoT device to business process and application.	Contact me
IoT Hub Device Provisioning Service	By Microsoft	Seamless, zero-touch registration of devices to IoT Hub with security that begins at the device and ends w...	Get it now
Vizix™ IoT Blockchain for Retail Supply Chain	By Mojix Inc.	Vizix™ 5 - Connect, Collect, Compose - IoT at your fingertips	Bring your own license
worXsmart IoT Process Enforcement Service	By Metri Systems	worXsmart brings the autonomy of IoT to any workplace compliance and process enforcement application	Contact me
Azure Stream Analytics on IoT Edge	By Microsoft	Deploy near-real-time analytical intelligence to IoT Edge devices	Get it now
Windows 10 IoT Core Services	By Microsoft	Commercialize your project with enterprise-grade security and support	Get it now
Trend Micro IoT Security (TMIS)	By Trend Micro	TMIS is a security SDK providing protection against hacking for a wide range of products.	Free software trial
Azure Blob Storage on IoT Edge	By Microsoft	Azure consistent blob storage on IoT Edge.	Get it now
ShookIOT Essentials for IIoT	By ShookIOT	You need a simple and easy way to organize and share your data?	Contact me



## Azure Marketplace

Azure Marketplace is an online store that enables you to offer your solutions to enterprises and Azure customers around the world. Within a single, unified platform, customers can easily search, purchase, and deploy your solutions on Azure with just a few clicks.

[Azure Marketplace](#) is the source for thousands of software applications and services certified by Microsoft to run on Azure. Azure Marketplace supports offers that include virtual machines, developer services, and solution templates.

Azure Marketplace gives your solutions exposure through the marketplace page and the listings integrated with the Azure Portal. For example, customers can deploy Azure Stream Analytics on IoT Edge by clicking a button that engages automated steps that deploy the supporting infrastructure in Azure. These capabilities are also made available via the Marketplace blade of the Azure Portal.

The process of getting your solution listed in the Azure Marketplace is referred to as getting Microsoft Azure Certified. This comes with benefits, many of which include select benefits from the MPN Silver Cloud Competency.

### CERTIFY APPLICATIONS AND SERVICES

Solutions sold in the Azure Marketplace must be [Microsoft Azure Certified](#). This provides assurance to your customers that your offers have been tested for usability, readiness, and compatibility with Azure.

- Access broad-reaching Microsoft marketing channels and receive co-marketing assistance and promotion outside of your Azure Marketplace listing.
- Leverage technical and business planning support to help you maximize your ROI.
- Utilize a self-service portal that contains ready-to-use marketing resources to enhance your communications and messaging.
- Take advantage of resources, such as the Sales Accelerator Toolkit and credits for display, and search advertising to help drive customer adoption.

Once you identify and select the marketplace to target for promoting or selling your services, and increase your visibility. View the [Integrate into a Marketplace guide](#) for details.

## Azure Device Catalog

The [Azure Device Catalog](#) allows you to list your certified hardware or hardware kits. Customers leverage this catalog to ensure peace of mind that the hardware has been tested and vetted in order to become certified.

The Azure Device Catalog provides potential customers with detailed filter criteria, such as the type of hardware, industry certifications, communication protocols, operating systems, built-in sensors, supported programming languages, the security capabilities of the device, and many more.

The screenshot shows the Azure Device Catalog interface. At the top, there's a search bar and a 'Browse Devices' section titled 'Certified devices and starter kits'. Below this, a sidebar lists various filter categories: Azure IoT Edge, Microsoft Azure IoT Starter Kit, Industry, Device Type, Tested Built-in Sensors, Operating System, Connectivity, Secure Hardware, Device Security Services, I/O Hardware Interfaces, Chip Manufacturers, Programming Languages, Industrial Protocols, Industry Certification, Cloud Protocol, and Geo Availability. The main area displays a grid of hardware kits, each with a thumbnail, name, and manufacturer logo. The kits include: Azure IoT Starter Kit CEC102DevBoard, Industrial IoT Starter Kit, Grove Starter Kit for Azure IoT Edge, MiKroinos IoT Button, ARK-1123H, Azure IoT Starter Kit Medium, MXChip IoT DevKit, Azure IoT Starter Kit STMicroelectronics STM32 NUCLEOFR310RBT, Amplified ENGINEERING, Azure IoT Starter Kit WiFi module based on STSAFE-NUCLEOF740RBT, Raspberry Pi 3, Intel NUC, WGE-5231, PMC-5231, SparkFun ThingDev, Azure IoT Starter Kit Adafruit Feather Huzzah, Adafruit Feather M0 WiFi, Azure IoT Starter Kit BeagleBoard, ProTech-SE-d124, KUB-E-5500, and mraa. A navigation bar at the bottom shows page numbers from 1 to 10.

Microsoft  
Partner  
Network

# Hire & Train

## Internet of Things

[aka.ms/practiceplaybooks](http://aka.ms/practiceplaybooks)



# Executive Summary



In the previous section, you evaluated the various services your business can pursue as you set up or build your IoT practice. Now that you've identified some avenues of success, you may be wondering how to build and train your team.

First, we'll help you define the members of your team and the skills they should bring to the table. If you need to hire to fill gaps, we provide you with detailed job descriptions you can use, as well as ideas on where to look for resources, the factors you should look for in a candidate's skillset, and what you should expect to pay by role and region.

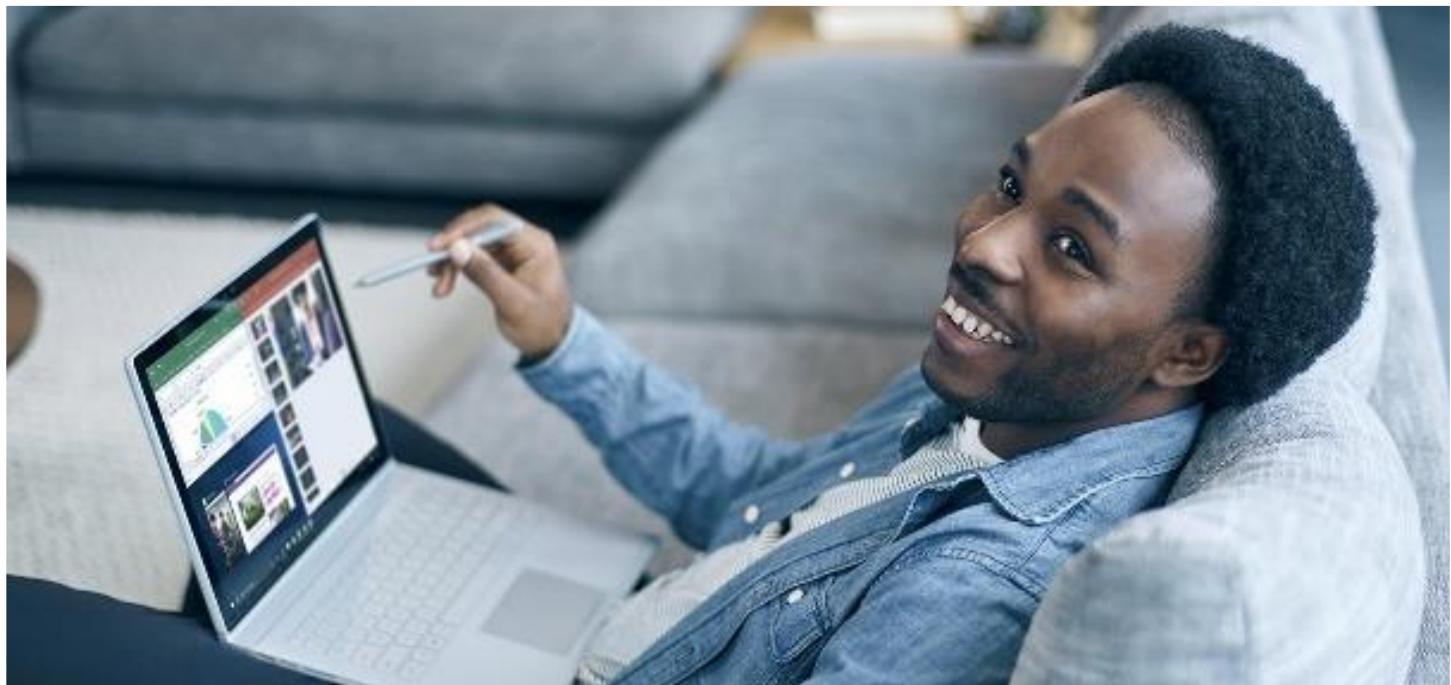
A big focus of this section is the critical piece of ensuring all of your practice resources are trained and continue to receive ongoing training. We cover not just the technical training, but also sales and marketing training.

Additionally, we'll give you details on the specific Microsoft certifications your technical resources should be working towards, both for their own professional development and to earn your organization Microsoft Partner Network competencies.

## Top 5 things to do

You're crafting your gameplan to build your team, make sure you nail down these 5 tasks before you move to the next section.

- Define the members and roles required
- Identify capability and skills gaps
- Decide which skills to hire and train
- Hire to fill gaps in your team
- Train and certify your team



## Create a Hiring Plan

Human resources are a critical asset to any services-based practice. Starting a new practice requires you to start with an evaluation of your existing team members (if any) and then make the decision of whether to hire new employees or bring your existing team up to speed.

The following sections describe the recommended resources across sales, technical and support functions that you will likely need. In many practices that are just getting started you may not be able to fill all roles with individual professionals. In this situation one person will likely be required to fulfill the duties of multiple roles.

### Partner Skillsets

Referrals and LinkedIn are top sources for identifying skilled labor. Once a candidate is identified, work history, cultural fit, and years of experience become the important considerations.

Roles associated with IoT practices typically have at least 1-2 years of experience. Furthermore, most companies engage in at least annual ongoing staff learning efforts like conferences/events and online training. A median of 8.5% of technical resource time is spent on training.





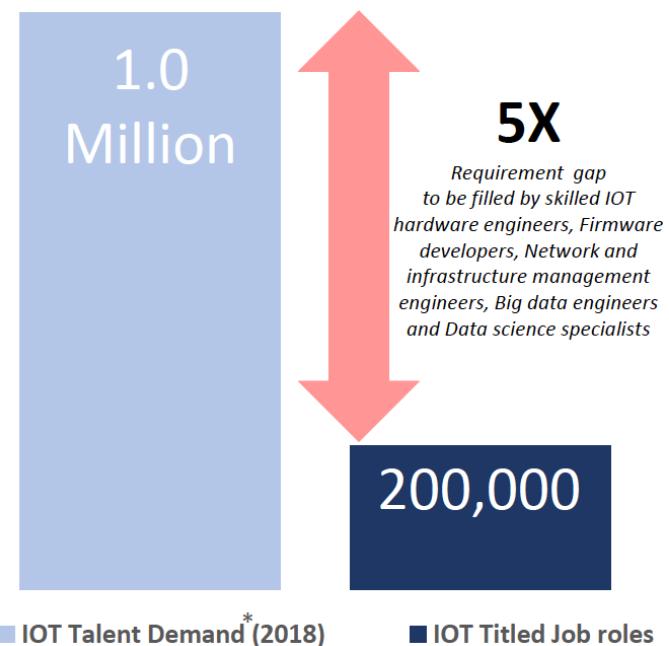
## Building Your Team

All practices need a team to support technical and business functions. Given the interdisciplinary nature of IoT, practices delivering IoT solutions need to be carefully structured to balance breadth of disciplines with depth of resources of a particular discipline.

### THE HIRING ENVIRONMENT

As you begin the journey of building or expanding your IoT team, it is important to understand the current environment and demand surrounding IoT talent. IoT adoption is widespread across industries, leading very high demand for IoT talent. According to Zinnov, the global demand of IoT talent in 2018 was over a million professionals, and talent shortage is one of the key reasons for IoT project delays and slow-downs. Their research indicated that it takes, on average, three months to close an IoT role.

With this in mind, organizations should consider upgrading core IoT skills among existing team members, using internal training initiatives and external learning sources as part of their team building strategy. This approach allows organizations to focus hiring efforts on key positions and skills that don't exist within their current team.



## KEY TECHNICAL ROLES IN AN IOT PRACTICE

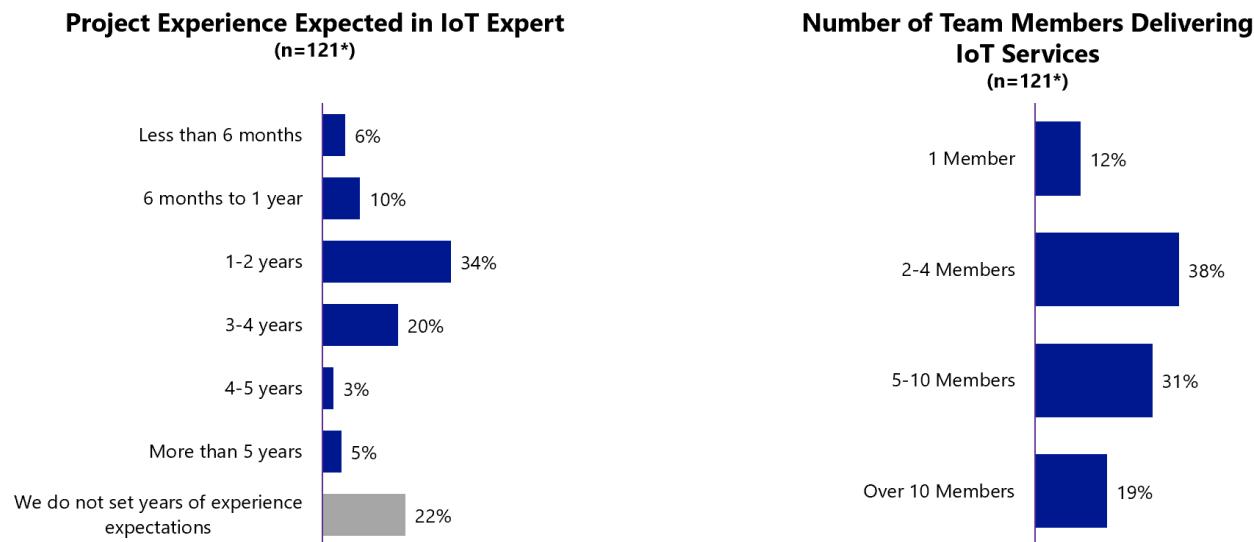
The following table identifies the technical IoT roles most in demand, as indicated by the partners surveyed by MDC Research. In the sections that follow, those key roles are described in greater depth. Having strong expertise in the domain of the problem being addressed is absolutely critical to producing IoT solutions that satisfy the goal, are performant and well optimized. The domain experts may be permanent team members or customer stakeholders immersed with the rest of your solution team. According to our recent survey of IoT partners, data- and hardware-related positions are most in demand, with Analytics and Computer Science being the most sought after skillsets.

IOT TEAM ROLES (n=121)	
Data Architect	42 %
Hardware/Electronic Engineer	38 %
Product Designer	36 %
Data Developer	33 %
Data Engineer	33 %
Azure Developer	32 %
Domain Expert	28 %
Manufacturing Liaison	16 %
Statistician	12 %
Other	19 %
Don't know	12 %

DESIRED TECHNICAL SKILLSETS (n=121)	
Analytics	58 %
Computer Science	58%
Hardware Devices	48 %
Domain Expertise	43 %
Big Data	42 %
Artificial Intelligence	41 %
Data Mining	35 %
Messaging	35 %
Statistics	29 %
Other	5 %
Don't know	7 %

## IOT TEAM SIZE AND EXPERIENCE

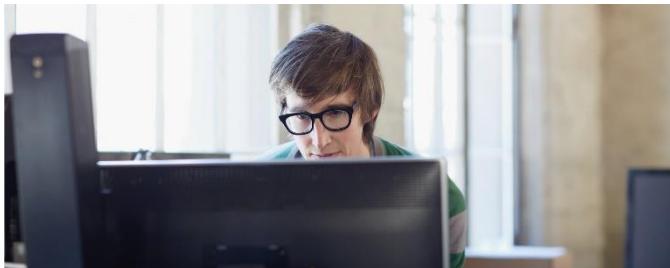
Given the relatively recent emergence of IoT demand, the MDC Research study found that most teams are made up of 2-10 members, with experience ranging, primarily, from 1-4 years.



## Technical Roles (Architecture, Infrastructure, and Development)

These roles form the heart of your IoT solution. Hiring the right people can turn your vision into reality.

The **Data Architect** drives customer initiatives leveraging data and analytics services to solve the biggest and most complex data challenges faced by enterprise customers. The DA is a technical, customer facing role, accountable for the end-to-end customer deployment and usage experience for Azure data services. DAs own the Azure technical customer engagement including: architectural design sessions, implementation projects and/or proofs of concept and pilots. The Data Architect is proficient in distributed computing principles and familiar with key architectures including Lambda and Kappa architectures, and has a broad experience designing solutions using a broad set of data stores (e.g., HDFS, Azure Data Lake Store, Azure Blob Storage, Azure SQL Data Warehouse, Apache HBase, Azure DocumentDB), messaging systems (e.g., Apache Kafka, Azure Event Hubs, Azure IoT Hub) and data processing engines (e.g., Apache Hadoop, Apache Spark, Azure Data Lake Analytics, Apache Storm, Azure HDInsight). The ideal candidate will have experience in customer facing roles and success leading deep technical architecture and design discussions with senior executives. Five plus years of experience with deep understanding of databases and analytics, including relational databases, data warehousing, big data, business intelligence and analytics. Five plus years of success in consultative/complex technical sales and deployment projects. Technical BS degree in Computer Science or Math background desirable.



The **Data Engineer** is responsible for helping to select, deploy and manage the systems and infrastructure required of a data processing pipeline in support of the customer requirements. Primary responsibilities revolve

around DevOps and include implementing ETL (extract, transform and load) pipelines, monitoring/maintaining data pipeline performance. The Data Engineer is proficient in distributed computing principles and familiar with key architectures including Lambda and Kappa architectures, and has a broad experience across a set of data stores (e.g., HDFS, Azure Data Lake Store, Azure Blob Storage, Azure SQL Data Warehouse, Apache HBase, Azure DocumentDB), messaging systems (e.g., Apache Kafka, Azure Event Hubs, Azure IoT Hub) and data processing engines (e.g., Apache Hadoop, Apache Spark, Azure Data Lake Analytics, Apache Storm, Azure HDInsight). The ideal candidate has three or more years of experience working on solutions that collect, process, store and analyze huge volume of data, fast moving data or data that has significant schema variability.

A **Data Scientist** is responsible for identifying the insight opportunities present in the customer's data, and helping shape the data pipeline that deliver the insights by applying advanced analytics (e.g., machine learning) in collaboration with the customer. The Data Scientist is a technical, customer facing role, who along with the Big Data Engineer is accountable for the end-to-end data pipeline envisioning and development that starts with addressing issues of data acquisition and data sampling, data exploration and data quality assessment, data wrangling to massage the data so it is better suited to applying advanced analytics, and visualizing or reporting on such data to make the insights available to the customer's business. The ideal candidate will have experience in customer facing roles and has a cross-disciplinary background consisting of statistics and software development. A technical BS degree in Computer Science or Math background is highly desirable. Three or more years customer facing experience desired.

The **Cloud Architect (CA)** drives customer initiatives in collaboration with customers. The CA is a technical, customer-facing role that is accountable for the end-to-end customer cloud deployment experience. CAs own the

technical customer engagement, including architectural design sessions, specific implementation projects and/or proofs of concepts. The ideal candidate will have experience in customer-facing roles and success leading deep technical architecture and application design discussions with senior customer executives to drive cloud deployment. A computer science or related engineering degree is required.

The **Senior Developer** has a history of designing, owning and shipping software, as well as excellent communication and collaboration skills. With a focus on cloud-based application development, the candidate must have demonstrable experience architecting and deploying applications to cloud platforms, the ability to effectively integrate disparate services as needed, and decide when to implement IaaS, SaaS, and PaaS components. As a mentor to junior developers, the senior software developer should have a solid understanding of the software development cycle, from architecture to testing. They should have a passion for quality and be a creative thinker. A senior developer will write secure, reliable, scalable, and maintainable code, and then effectively debug it, test it and support it live. This person should also be comfortable owning a feature and making decisions independently. Another aspect of a senior software developer, is that they can effectively gather customer requirements, and ask clarifying questions when needed. This person must be able to translate these requirements to actionable tasks they will perform, or delegate to members of the team.

The **Developer** enjoys the challenge of building applications that solve today's business needs. This person must be willing to keep up to date with the fast-moving cloud services landscape to remain an effective member of the development team. A software developer should work equally well on a team or independently, given a set of project requirements or tasks. This requires the developer to possess excellent communication and collaboration skills. The developer should understand the aspects of the software development cycle, from architecture to testing. This person will design, build, and maintain efficient, reusable, and reliable code.

Given the natural evolution of skills as developers gradually take on more IoT development responsibilities, their IoT experience lies on spectrum.

The **Automation Engineer** is primarily responsible for managing all aspects of DevOps, and is proficient in tools for source control, continuous integration and continuous deployment, and team management. This is a technical, customer-facing role, who must be comfortable collaborating with architects, developers, and other IT staff members to manage code releases. This person should be capable of assisting with all stages of testing, developing interface stubs and simulators and performing script maintenance and updates. Automation engineers build automated deployments through the use of configuration management technology, and deploy new modules, upgrades and complete fixes within the production environment. Routine application maintenance tasks are an ongoing. They cross and merge the barriers that exist between software development, testing and operations teams and keep existing networks in mind as they design, plan and test. This person should have five or more years of experience with modern DevOps tools, such as Jenkins and Azure DevOps. The ideal candidate has five or more years of experience in working with and automating the builds and deployments for enterprise cloud solutions.

The **Electronics Hardware Engineer** is a key individual in the development of IoT hardware, including the design of circuit boards for sensors and devices. This position is an integral part of the IoT product development team, working with existing and new products at various stages of their product lifecycles including design, architecture and implementation. This individual will be self-motivated and creative with a demonstrated ability to design, develop and verify electronic hardware systems for compact, low-power, embedded microcontroller electronic products.

The **Information Security Analyst** assesses and provides security advice on your cloud infrastructure, including network, service, and application components. This role conducts risk assessments, architectural reviews, provides cyber security subject matter expertise, and assists in the building and design of secure solutions. Additional duties may include network and application penetration testing, and support for cyber security investigations as well as on-call response for cyber security incidents. A computer science or related engineering degree is required, or the equivalent combination of education, professional training, or work experience.

## Leadership Roles

Consider the following management positions if your development effort will involve eight or more technical staff. In smaller teams, senior-level employees (e.g., lead data scientist, lead developer) sometimes take on management duties along with their other responsibilities, removing the need for dedicated managers.

The **Chief Data Officer** (CDO) drives the definition of balancing data governance, protection with data discovery and analytics. This role establishes the organization's data analytics platform strategy, selection of appropriate technologies and focuses on strategic and timely talent acquisition. An important responsibility of the CDO is in creating a learning culture within the organization by providing for and fostering an environment for learning.

The **System Architect** is responsible for designing the IoT solution. System architecture determines the scope of the project and the problem space, and all of the solution requirements. They work closely with the electronics hardware engineers, data architects, data engineers, and developers to incorporate required IoT devices and tools, and to create an implementation strategy for IoT technology.

The **Data Protection Officer** assesses and advises across the company group for data protection and privacy matters related to security. This role is a subject matter expert in the handling of personal data and ensures there are policy and compliance processes to comply with local data protection legislation. Expert knowledge of global and national data protection law and practices, as well as the General Data Protection Regulation (GDPR) is a requirement, as well as the ability to fulfill the tasks referred to in Article 39 of the GDPR. Experience in conducting data privacy compliance, reviews, and audits is beneficial.

The **Product Manager** (or Product Management team) establishes and sustains the business case for the project and plays a key role in identifying and setting priorities across the target audience. This includes ensuring that business expectations are clearly articulated and understood by the project team, and that the functional specifications respond to business priorities.

Product Management owns the vision statement for the project. The vision statement is an informal document that communicates the expectations and assumptions on which the project is based.

Product Management is also responsible for high-level project communications such as business projections, project costing, and contract negotiation. Product Management communicates the high-level milestones to the target audience and other team members.

The **Program Manager** or Program Management team "owns" the specification for an application's features and functionality and coordinates the day-to-day communication required to develop and deliver the application effectively and consistently within organizational standards.

Program Management has a key communication and coordination role. With input from other team leads, Program Management assists Product Management in articulating the vision for the project. Using this vision, Program Management drafts the initial version of the functional specification and is considered the keeper of the functional specification. Program Management is responsible for all activities associated with analysis, specification, and architecture. Program Management is also responsible for defining how the project will interoperate with external standards, maintaining external technical coordination and communication, and managing the master schedule.

## Support Roles

A lot of effort goes on behind the scenes, or in positions that involve post-sales customer engagement. To ensure long-term success of your projects, consider hiring some of these support roles.

In an IoT practice the support roles are generally similar to those for any other software solution, with one exception: monitoring. In this case, your team will need to be involved to assist in crafting the dashboards that your customer support team monitors, and may need to be available to assist in escalations when anomalies have been detected.

The **Customer Success Manager** is passionate about engaging your customers and helping them expand their use cases. They have excellent relational skills and can create win/win environments for all parties they work with. In their day-to-day responsibilities, they own the overall relationship with assigned clients by increasing adoption and ensuring retention and satisfaction. They make a large impact on your enterprise security business by establishing a trusted and strategic advisor relationship with each assigned client, driving continued value of your products and services. The Customer Success Manager will help drive sales by working to identify or develop upsell opportunities. Additionally, they will advocate customer needs and issues cross-departmentally and program manage account escalations. Qualifications include prior experience in customer success or equivalent history of increasing customer satisfaction, adoption, and retention.

The **Quality Assurance (QA) / Test Technician** is thorough and detail-oriented and should work well with established processes. The primary goal of this role is to help avoid defects in your final product or solution. This person will be involved throughout the development process and use their intuition to problem solve and identify technical, procedural, and usability concerns. They must take meticulous notes, be organized about recording process steps, and work well with others since they will be coordinating with technical and management teams to ensure that the correct measures are put into place to align the final product with the initial goal.

The **User Support Specialist** assists customers who are having technical issues with your product, or who need help realizing the full benefit of your solution to help them deliver their cloud-based workloads. They will likely be in a position to help customers navigate the operational challenges of cloud computing, so thoroughly training them on both your product — and the infrastructure on which it is built — is paramount to their success, and ultimately, your customers' satisfaction. Qualifications include technical support experience and great communication and interpersonal skills (soft skills). Experience with cloud technologies is a major plus.



# Job Descriptions for your Technical Team

The following tables provides detailed job descriptions you can utilize to hire the key technical resources. All technical skills, non-technical skills, certifications, and technologies listed are potential items a candidate should have, but no candidate will have all the items listed.

## Data Architect

A Data Architect (DA) drives customer initiatives leveraging Azure data and analytics services (e.g., ranging from SQL Server to SQL Database and SQL Data Warehouse to Cortana Intelligence Suite) to solve the biggest and most complex data challenges faced by enterprise customers. The DA is a technical, customer facing role, accountable for the end-to-end customer deployment and usage experience for Azure data services. DAs own the Azure technical customer engagement including: architectural design sessions, implementation projects and/or proofs of concept and pilots. The Data Architect is proficient in distributed computing principles and familiar with key architectures including Lambda and Kappa architectures, and has a broad experience designing solutions using a broad set of data stores (e.g., HDFS, Azure Data Lake Store, Azure Blob Storage, Azure SQL Data Warehouse, Apache HBase, Azure Cosmos DB), messaging systems (e.g., Apache Kafka, Azure Event Hubs, Azure IoT Hub) and data processing engines (e.g., Apache Hadoop, Apache Spark, Azure Data Lake Analytics, Apache Storm, Azure HDInsight). The ideal candidate has experience in customer facing roles and success leading deep technical architecture and design discussions with senior executives. Five plus years of experience with deep understanding of databases and analytics, including relational databases, data warehousing, big data, business intelligence and analytics. Five plus years of success in consultative/complex technical sales and deployment projects. Technical BS degree in Computer Science or Math background desirable.

- **Top Qualities:** Problem Solving (72%), Creativity (34%), Highly Organized (33%)
- **Previous Roles:** Database engineer (43%), Database administrator (43%), no previous role (28%)
- **Certifications:** MCSE Data Management and Analytics (34%), MCSE Cloud Platform and Infrastructure (21%), MCSA Cloud Platform Solutions Associate (19%)

### Technical Skills

- Deep understanding of using data and analytics services to solve enterprise data challenges.
- Extensive architecture and design experience with complex applications across various data sources and platforms.
- Highly proficient in distributed computing principals and familiar with key architectures, including Lambda and Kappa architectures, and has extensive experience designing solutions leverage a diverse assortment of data sources.
- Deep understanding of common database technologies, such as SQL Database/Server, SQL Data Warehouse, Oracle, MySQL, and other data sources, such as Azure Data Lake Storage and Azure Blob Storage.
- Solid understanding of data governance and creating data dictionaries.
- Understanding of how to accelerate a customer's digital transformation using advanced analytics, artificial intelligence (AI), and Big Data.
- Strong understanding of scripting languages, including R, Python, Scala, and SQL.

### Non-Technical Skills

- Proven track record of driving decisions collaboratively, resolving conflicts & ensuring follow through.
- Presentation skills with a high degree of comfort with both large and small audiences.
- Prior work experience in a consulting/architecture position within a software & services company.
- Problem-solving mentality leveraging internal and/or external resources.
- Exceptional verbal and written communication.

<b>Technologies</b>	<ul style="list-style-type: none"><li>Access, AWS, Amazon Athena, AWS Glue, Amazon QuickSight, Amazon RDS, Amazon Redshift, Amazon S3, AWS VM, Azure, Azure Active Directory, Azure Cognitive Services, Azure Data Catalog, Azure Data Factory, Azure Data Lake, Azure Cosmos DB, Azure Event Hubs, Azure HDInsight, Azure Import/Export, Azure IoT Hub, Azure Machine Learning, Azure Search, Azure SQL Data Warehouse, Azure SQL Database, Azure Storage, Azure Stream Analytics, Azure WebJobs, BizTalk, business objects, Cassandra, Cloudera, Cognos, Cortana Intelligence, CouchDB, Db2, Docker, Amazon EC2, erwin Data Modeler, Excel, Google App Engine, Greenplum, Hadoop, Apache HBase, HDInsight, Apache Hive, Hortonworks, IBM Bluemix, Informix, Kafka, MapR, MapReduce, MariaDB, MongoDB, MySQL, Netezza, Node.js, NoSQL, Oracle, Oracle Exadata, PaaS, Pig, PostgreSQL, Power BI, SAP HANA, SAS, SharePoint, Apache Spark, SQL Server, SQL Server IaaS, SSAS, SSIS, SSRS, Storm, Sybase, Tableau, Teradata, Visio, VMware, webMethods, WebSphere, YARN</li><li><b>Programming/Scripting Languages:</b> C#, DMX, DAX, MDX, SQL, T-SQL, Java, Scala, SQL, Python, PowerShell, R, Ruby.</li><li><b>Platforms:</b> Linux (Red Hat, Ubuntu, Debian, etc.), Windows.</li></ul>
<b>Certifications</b>	<ul style="list-style-type: none"><li>Microsoft Certified Azure Administrator Associate, Microsoft Certified Azure Developer Associate, MCSE Business Intelligence, MCSA Cloud Platform Solutions Associate, MCSA Linux on Azure Solutions Associate, MCSE Cloud Platform and Infrastructure, MCSE Data Management and Analytics, AWS Certified Solution Architect, AWS Certified Developer, AWS Certified Developer, Big Data, Certified Analytics Professional, Certificate in Engineering Excellence Big Data Analytics and Optimization (CPEE), Cloudera Certified Developer, Cloudera Certified Specialist, Data Warehousing, IBM Certified Data Architect/Engineer, Mining Massive Datasets, Graduate Certificate (Stanford), Oracle, Salesforce.com, SAP, SAS Certified Big Data Professional</li><li>Exam priorities: <a href="#">Designing and Implementing Big Data Analytics Solutions 70-475</a>; <a href="#">Designing Business Intelligence Solutions with Microsoft SQL Server 70-476</a>.</li></ul>
<b>Project Experience Types/Qualities</b>	<ul style="list-style-type: none"><li>5+ years of experience building advanced analytics (including machine learning) solutions</li><li>5+ years of experience with one or more scripting languages, such as R, Python, Scala, or SQL.</li><li>5-8 years of experience building data pipelines to operationalize end-to-end solutions.</li><li>5+ years of experience in data analytics and data mining with proven quantitative orientation.</li><li>5+ years of working on complex reporting requirements, large, complex data sets, and various reporting tools, such as Power BI.</li><li>8+ years of demonstrated ability to deliver high-quality reporting metrics to customers and executives.</li><li>8+ years of proven ability to judge data results as valid and accurate.</li><li>5+ years of experience delivering proven database modernization solutions.</li><li>5+ years of experience in ingesting and performing advance analytics on data from multiple sources, including batch analytics, interactive analytics, real-time/streaming analytics.</li></ul>



## Data Engineer

A Big Data Engineer is responsible for helping to select and implement the tools and processes required of a data processing pipeline in support of the customer requirements. The Data Engineer may be a customer facing role, but the primary responsibilities include implementing ETL (extract, transform and load) pipelines, monitoring/maintaining data pipeline performance. The Data Engineer is proficient in distributed computing principles and familiar with key architectures including Lambda and Kappa architectures, and has a broad experience across a set of data stores (e.g., HDFS, Azure Data Lake Store, Azure Blob Storage, Azure SQL Data Warehouse, Apache HBase, Azure Cosmos DB), messaging systems (e.g., Apache Kafka, Azure Event Hubs, Azure IoT Hub) and data processing engines (e.g., Apache Hadoop, Apache Spark, Azure Data Lake Analytics, Apache Storm, Azure HDInsight). The ideal candidate has three or more years' experience working on solutions that collect, process, store and analyze huge volume of data, fast moving data or data that has significant schema variability.

- **Top Qualities:** Problem Solving (79%), Highly Organized (44%), Creativity (31%)
- **Previous Roles:** Database administrator (54%), IT Administrator (29%), Network Engineer (21%)
- **Certifications:** MCSE Data Management and Analytics (33%), MCSE Business Intelligence (21%), MCSE Cloud Platform and Infrastructure (21%)

<b>Technical Skills</b>	<ul style="list-style-type: none"><li>• Deep understanding of using data and analytics services to solve enterprise data challenges.</li><li>• Extensive architecture and design experience with complex applications across various data sources and platforms.</li><li>• Highly proficient in distributed computing principals and familiar with key architectures, including Lambda and Kappa architectures, and has extensive experience designing solutions leverage a diverse assortment of data sources.</li><li>• Deep understanding of common database technologies, such as SQL Database/Server, SQL Data Warehouse, Oracle, MySQL, and other data sources, such as Azure Data Lake Storage and Azure Blob Storage.</li><li>• Solid understanding of data governance and creating data dictionaries.</li><li>• Understanding of how to accelerate a customer's digital transformation using advanced analytics, artificial intelligence (AI), and Big Data.</li><li>• Strong understanding of scripting languages, including R, Python, Scala, and SQL.</li></ul>
<b>Non-Technical Skills</b>	<ul style="list-style-type: none"><li>• Proven ability to develop work in environments following Agile methodologies.</li><li>• Proven track record of driving decisions collaboratively, resolving conflicts &amp; ensuring follow through.</li><li>• Presentation skills with a high degree of comfort with both large and small audiences.</li><li>• Prior work experience in a consulting/architecture position within a software &amp; services company.</li><li>• Problem-solving mentality leveraging internal and/or external resources.</li><li>• Exceptional verbal and written communication.</li></ul>
<b>Technologies</b>	<ul style="list-style-type: none"><li>• Azure Machine Learning, Analytics, APS, AWS, Amazon Athena, AWS Glue, Amazon QuickSight, AMAZON RDS, AWS VM, Amazon Redshift, AMAZON S3, Azure Active Directory, Azure Data Catalog, Azure Data Factory, Azure Data Lake, Azure Storage, Azure Cosmos DB, Azure SQL Data Warehouse, Azure Import/Export, Azure HDInsight, Azure SQL Database, Azure Search, Azure Stream Analytics, Azure Event Hubs, Azure IoT Hub, Azure Web Jobs, Azure Cognitive Services, Birst, Business Objects, Cassandra, Cloudera, Cognos, Cortana Intelligence, CouchDB, Data warehouse, Database, DB2, Docker, Excel, Flume, IBM Bluemix, Google App Engine, Greenplum, Hadoop, HANA, HBase, Hive, Hortonworks, IBM, Informix, IoT Solutions, Java, Kafka, Machine Learning, MapR, MapReduce, ML, MongoDB, MariaDB, MySQL, Netezza, Networking, NoSQL, Oracle, Oracle Exadata, Oracle SOA, PBI, Pig, Power BI, PostgreSQL, Python, Qlik Tech, REST, Revolution R, Samza, SAP HANA, SAS, Security, Spark, SQL Server, SQL Server IaaS, SSIS, Storm, Streaming, Sybase, Tableau, Teradata, T-SQL, Virtualization, webMethods, WebSphere, YARN.</li><li>• <b>Programming/Scripting Languages:</b> C#, DMX, DAX, MDX, SQL, T-SQL, Java, Scala, Python, PowerShell, R, Ruby.</li><li>• <b>Platforms:</b> Linux (Red Hat, Ubuntu, Debian, etc.), Windows.</li></ul>

<b>Certifications</b>	<ul style="list-style-type: none"><li>Microsoft Certified Azure Administrator Associate, Microsoft Certified Azure Developer Associate, MCSE Data Management and Analytics, MCSE Cloud Platform and Infrastructure, and other Big Data related certifications, such as SAS Certified Big Data Professional, MapR Hadoop Developer (MCHD), Certified Business Intelligence Professional (CBIP).</li><li>Exam priorities: <a href="#">Designing and Implementing Big Data Analytics Solutions 70-475</a>.</li></ul>
<b>Project Experience Types/Qualities</b>	<ul style="list-style-type: none"><li>5+ years of experience building advanced analytics (including machine learning) solutions.</li><li>5+ years of experience with one or more scripting languages, such as R, Python, Scala, or SQL.</li><li>5-10 years of experience building data pipelines to operationalize end-to-end solutions.</li><li>5+ years of experience building advanced analytics (including machine learning) solutions</li><li>5+ years of experience in data analytics and data mining with proven quantitative orientation.</li><li>5+ years of working on complex reporting requirements, large, complex data sets, and various reporting tools, such as Power BI.</li><li>8+ years of demonstrated ability to deliver high-quality reporting metrics to customers and executives.</li><li>8+ years of proven ability to judge data results as valid and accurate.</li><li>5+ years of experience delivering proven database modernization solutions.</li><li>5+ years of experience in ingesting and performing advance analytics on data from multiple sources, including batch analytics, interactive analytics, real-time/streaming analytics.</li></ul>



## Data Scientist

A Data Scientist is responsible for identifying the insight opportunities present in the customer's data and helping shape the data pipeline that deliver the insights by applying advanced analytics (e.g., machine learning) in collaboration with the customer. The Data Scientist is a technical, customer facing role, who along with the Big Data Engineer is accountable for the end-to-end data pipeline envisioning and development that starts with addressing issues of data acquisition and data sampling, data exploration and data quality assessment, data wrangling to massage the data so it is better suited to applying advanced analytics, and visualizing or reporting on such data to make the insights available to the customer's business. The ideal candidate has experience in customer facing roles and has a cross-disciplinary background consisting of statistics and software development. A technical BS degree in Computer Science or Math background is highly desirable. Three or more years of customer facing experience desired.

- **Top Qualities:** Problem Solving (78%), Creativity (39%), Attitude (33%)
- **Previous Roles:** Developer (55%), Statistician/Mathematician (37%), No previous role (37%)
- **Certifications:** MCSA In Machine Learning (24%), MCSE Data Management and Analytics (24%)

<b>Technical Skills</b>	<ul style="list-style-type: none"><li>• Deep understanding of how to identify data sources, integrate multiple sources or types of data, and apply expertise within a data source to develop methods to compensate for limitations and extend the applicability of the data.</li><li>• Strong ability to apply (and develop if necessary) tools and pipelines to efficiently collect, clean, and prepare massive volumes of data for analysis.</li><li>• Able to transform formulated problems into implementation plans for experiments by applying (and creating when necessary) the appropriate data science methods, algorithms, and tools, and then statistically validating the results against biases and errors.</li><li>• Deep understanding of how to interpret results and develop insights into formulated problems within the business/customer context, while providing guidance on risks and limitations</li><li>• Acquires and uses broad knowledge of innovative methods, algorithms, and tools from within the larger scientific community, and applies his or her own analysis of scalability and applicability to the formulated problem.</li><li>• Understanding of how to validate, monitor, and drive continuous improvement to methods, and propose enhancements to data sources that improve usability and results.</li><li>• Deep understanding of big data systems, including Spark, Hadoop, Azure Data Lake, Azure SQL, etc.</li><li>• Strong understanding of scripting languages, including R, Python, Scala, and SQL.</li></ul>
<b>Non-Technical Skills</b>	<ul style="list-style-type: none"><li>• Work with management and stakeholders, identify opportunities for data science to make an impact, and formulate these opportunities to data science projects.</li><li>• Consultative requirements gathering with stakeholders at all levels of the business.</li><li>• Proven track record of driving decisions collaboratively, resolving conflicts, and ensuring follow through.</li><li>• Presentation skills with a high degree of comfort with both large and small audiences.</li><li>• Problem-solving mentality leveraging internal and/or external resources.</li><li>• Exceptional verbal and written communication.</li></ul>
<b>Technologies</b>	<ul style="list-style-type: none"><li>• AWS, Amazon Lex, AWS machine learning, Amazon QuickSight, Amazon RDS, Amazon Redshift, Amazon Rekognition, Amazon S3, Azure, Azure Cognitive Services, Azure Data Catalog, Azure Data Factory, Azure Data Lake, Azure Cosmos DB, Azure HDInsight, Azure Import/Export, Azure Machine Learning, Azure Search, Azure SQL Data Warehouse, Azure SQL Database, Azure Storage, Cassandra, Cloudera, Cognos, Cortana Intelligence, Db2, Amazon EC2, Excel, Hadoop, Apache HBase, Apache Hive, Hortonworks, IBM Bluemix, Kafka, MapR, MapReduce, MariaDB, Microsoft R, MongoDB, MySQL, NoSQL, Oracle, Oracle Exadata, Pig, PostgreSQL, Power BI, SAP HANA, SAS, Scala, Apache Spark, SQL Server, SQL Server IaaS, SSAS, SSIS, SSRS, Sybase, Tableau, Teradata</li><li>• <b>Programming/Scripting Languages:</b> R, Scala, Python, DMX, DAX, MDX, SQL, T-SQL, Java</li><li>• <b>Platforms:</b> Linux (Red Hat, Ubuntu, Debian, etc.), Windows.</li></ul>

<b>Certifications</b>	<ul style="list-style-type: none"><li>Microsoft Certified Azure Administrator Associate, Microsoft Certified Azure Developer Associate, MCSA in Machine Learning, other certifications include: Master or PhD in Data Science, Statistics or Probability from accredited universities, Certified Analytics Professional (CAP), Certification of Professional Achievement in Data Sciences, Cloudera Certified Professional: Data Scientist (CCP:DS), edX Verified Certificate in Data Science Curriculum, EMC Data Science Associate, MCSE Business Intelligence, MCSE Data Management and Analytics, Revolution R Enterprise Professional, SAS Certified Data Scientist.</li><li>Exam priorities: <a href="#">Analyzing Big Data with Microsoft R 70-773</a> (retired); <a href="#">Perform Cloud Data Science with Azure Machine Learning 70-774</a> (retired); <a href="#">Azure Data Scientist Associate DP-100</a>.</li></ul>
<b>Project Experience Types/Qualities</b>	<ul style="list-style-type: none"><li>5-8+ years of experience developing and working with machine learning algorithms, including classification, regression, clustering, time series forecasting, recommendation systems, and text analytics, and a good understanding of deep learning.</li><li>5 years of working experience in applying machine learning to solve complex business problems.</li><li>5+ years of experience with one or more scripting languages, such as R, Python, Scala, or SQL.</li><li>5+ years of experience working with machine learning platforms, such as R, Python, and Azure ML.</li><li>5-8 years of experience building data pipelines to operationalize end-to-end solutions.</li><li>3+ years applying statistical modeling and machine learning algorithms to real-world problems.</li></ul>

## Cloud Architect

A Cloud Architect (CA) drives Azure-based customer initiatives in collaboration with customers and participates in both pre and post-sales (e.g., deployment) efforts. The CA is a technical, customer facing role that is accountable for the end-to-end customer cloud deployment experience. CAs own the Azure technical customer engagement including architectural design sessions, specific implementation projects and/or proofs of concept, and deployment. The ideal candidate has experience in customer facing roles and success leading deep technical architecture and application design discussions with senior customer executives to drive cloud deployment. Five or more years of architecture, design implementation and/or support of distributed applications designed to run in the cloud or across hybrid cloud and on-premises environments. Experience in consultative sales, design and deployment of projects strongly preferred. A computer science or related engineering degree is required.

- **Top Qualities:** Problem Solving (41%), Creativity (21%), Attitude (20%)
- **Previous Roles:** Developer (42%), Support Engineer (25%), Network Engineer (22%), No previous role (22%)
- **Certifications:** MCSA Cloud Platform Solutions Associate (24%), MCSE Cloud Platform and Infrastructure (21%), MCSA Linux on Azure Solutions Associate (8%)

<b>Technical Skills</b>	<ul style="list-style-type: none"><li>• Deep understanding of cloud computing technologies, business drivers, and emerging computing trends.</li><li>• Solid understanding of cloud virtualization, storage and networking.</li><li>• Understanding of cloud governance technologies for cost management and control.</li><li>• Understanding of common database technologies such as SQL Database/Server, Oracle, MySQL.</li><li>• Deep technical experience in enterprise mobile, identity and access control, &amp; security solutions.</li><li>• Working knowledge with AGILE development, SCRUM and Application Lifecycle Management (ALM) with one or more of the following programming languages: PowerShell, Bash, .NET, C++, Java, JSON, PHP, Perl, Python, Ruby on Rails, HTML, CSS, JavaScript, Responsive Web Design.</li><li>• Solid understanding of modern DevOps practices, including automation, continuous delivery, continuous deployment, and continuous integration methodologies.</li><li>• Deep understanding of cloud-based Business Continuity and Disaster Recovery practices.</li></ul>
<b>Non-Technical Skills</b>	<ul style="list-style-type: none"><li>• Building customer/partner relationships.</li><li>• Proven track record of building deep technical relationships with senior executives and growing cloud consumption share in large or highly strategic accounts.</li><li>• Proven track record of driving decisions collaboratively, resolving conflicts &amp; ensuring follow through.</li><li>• Presentation skills with a high degree of comfort with both large and small audiences.</li><li>• Prior work experience in a consulting/architecture position within a software &amp; services company.</li><li>• Problem-solving mentality leveraging internal and/or external resources.</li><li>• Exceptional verbal and written communication.</li></ul>
<b>Technologies</b>	<ul style="list-style-type: none"><li>• Azure Machine Learning, Analytics, APS, AWS, Amazon RDS, Amazon EC2, Amazon Redshift, Amazon S3, Azure Active Directory, Azure Data Factory, Azure Data Lake, Azure Storage, Azure App Services, Azure API Management, Azure Cosmos DB, Azure SQL Data Warehouse, Azure Import/Export, Azure HDInsight, Azure Logic Apps, Azure Mobile Apps, Azure SQL Database, Azure Search, Azure Stream Analytics, Azure Event Hubs, Azure IoT Hub, Azure Virtual Machines, Azure Web Apps, Azure Web Jobs, Azure Cognitive Services, BizTalk, Business Objects, Cassandra, Cloudera, Cognos, Cortana Intelligence, CouchDB, DB2, Docker, Excel, IBM Bluemix, Google App Engine, Greenplum, Hadoop, HANA, HBase, Hive, Hortonworks, Teradata, IoT Solutions, Java, Kafka, Machine Learning, MapR, MapReduce, ML, MongoDB, MariaDB, MySQL, Netezza, Networking, NoSQL, Oracle, Oracle Exadata, Oracle SOA, PBI, Pig, Power BI, PostgreSQL, Python, Qlik Tech, REST, Samza, SAP HANA, SAS, Security, Spark, SQL Server, SQL Server IaaS, SSIS, Storage, Storm, Streaming, Sybase, Tableau, Teradata, T-SQL, Virtualization, WebSphere</li><li>• <b>Programming/Scripting Languages:</b> C#, C++, Apache Hive, Perl, PHP, PowerShell, Pig, Ruby, Ruby on Rails, Scala, SQL, T-SQL</li></ul>

<b>Certifications</b>	<ul style="list-style-type: none"> <li>Microsoft Certified Azure Administrator Associate, Microsoft Certified Azure Developer Associate, MCSE Cloud Platform and Infrastructure, MCSE Data Management and Analytics, MCSA Cloud Platform, MCSA Linux on Azure, AWS Certified Solutions Architect – Associate and/or Professional, AWS Certified Developer – Professional.</li> <li>Exam priorities: <a href="#">Implementing Infrastructure Solutions 70-533</a> (retired), <a href="#">Microsoft Certified Azure Administrator Associate AZ-103</a>, or <a href="#">AZ-102</a> (retired), or <a href="#">AZ-100</a> (retired) and <a href="#">AZ-101</a> (retired); <a href="#">Developing Azure Solutions 70-532</a> (retired), <a href="#">Microsoft Certified Azure Developer Associate (AZ-203)</a>.</li> </ul>
<b>Project Experience Types/Qualities</b>	<ul style="list-style-type: none"> <li>5-8 years of experience designing and delivering cloud solutions on an enterprise scale.</li> <li>5+ years of experience with creating pilots, prototypes, and proof-of-concepts to provide validation of specific scenarios.</li> <li>4-6 years of experience providing cloud solutions, including hybrid solutions on-premises or in the cloud, lift-and-shift initiatives, migrations and upgrades.</li> </ul>

## Software Developer (Senior, Junior, Mobile, Full-Stack, etc.)

A Software Developer enjoys the challenge of designing and building applications that solve today's business needs. This person must be willing to keep up to date with the fast-moving cloud services landscape including IaaS, SaaS, and PaaS designs to remain an effective member of the development team. A software developer should work equally well on a team or independently, given a set of project requirements or tasks. This requires the developer to possess Excellent communication and collaboration skills. The developer should understand the aspects of the software development cycle, from architecture to testing. This person designs, builds, and maintains efficient, reusable, and reliable code. This person should have experience with participating in projects using agile methodologies, such as the Scrum approach to agile software development. They should also be able to effectively gather customer requirements and ask clarifying questions when needed and translate these requirements to actionable tasks they perform, or delegate to members of the team. Five plus years of experience with deep understanding of web technologies, API consumption/development, full lifecycle application development, database development (relational and/or NoSQL), and enterprise/cloud architecture. Technical BS degree in Computer Science desirable.

- **Top Qualities:** Problem Solving (88%), Attitude (41%), Creativity (39%)
- **Previous Roles:** Support Engineer (7%), Network Engineer (5%), No previous role (88%)
- **Certifications:** MCSE Cloud Platform and Infrastructure (9%), MCSA Linux on Azure Solutions Associate (7%), MCSA Cloud Platform Solutions Associate (7%)

<b>Technical Skills</b>	<ul style="list-style-type: none"> <li>Deep understanding of application development practices and design patterns, application lifecycle management, and common software architectures.</li> <li>Solid understanding of modern DevOps practices, including automation, continuous delivery, continuous deployment, and continuous integration methodologies.</li> <li>Solid understanding of common database technologies, such as SQL Database/Server, Oracle, MySQL, PostgreSQL, MongoDB.</li> <li>Strong understanding of Agile development best practices.</li> <li>Understanding of software testing and optimization methodologies, including writing unit tests and executing performance and regression testing.</li> </ul>
<b>Non-Technical Skills</b>	<ul style="list-style-type: none"> <li>Proven ability to develop software using Agile methodologies.</li> <li>Proven track record of creating rich documentation for software solutions.</li> <li>Presentation skills with a high degree of comfort with both large and small audiences.</li> <li>Proven track record of driving decisions collaboratively, resolving conflicts and ensuring follow through.</li> <li>Problem-solving mentality leveraging internal and/or external resources.</li> <li>Exceptional verbal and written communication.</li> </ul>

<b>Technologies</b>	<ul style="list-style-type: none"><li>AMQP, Ansible, ASP.NET, AWS, Amazon API Gateway, Amazon EC2, Amazon RDS, Amazon Redshift, Amazon S3, Amazon SWF, AWS VM, Azure, Azure Active Directory, Azure App Service Environment, Azure Cognitive Services, Azure Data Catalog, Azure Data Factory, Azure Data Lake, Azure Cosmos DB, Azure Event Hubs, Azure Functions, Azure Import/Export, Azure Search, Azure SQL Data Warehouse, Azure SQL Database, Azure Storage, Azure WebJobs, Bluetooth, BizTalk, business objects, Cassandra, CentOS, Chef, Cortana Intelligence, CouchDB, Db2, Docker, Excel, GitHub, Google App Engine, Hadoop, IaaS, IBM Bluemix, IntelliJ, Jira, Microsoft Azure, Microsoft Dynamics CRM, MongoDB, MQTT, MySQL, Node.js, NoSQL, Oracle, Oracle Exadata, PaaS, PostgreSQL, PostgreSQL, Puppet, REST/HTTPS, Apache Spark, SQL Server, SQL Server IaaS, SSIS, Sybase, Teradata , Apache Tomcat, UserVoice, Visual Studio, Websockets, Xcode</li><li><b>Programming/Scripting Languages:</b> C, C#, C++, F#, Go, Java, JavaScript, Objective C, Perl, PHP, PowerShell, Python, Ruby, Ruby on Rails, Scala, SQL, T-SQL</li><li><b>Platforms:</b> Linux (Red Hat, Ubuntu, Debian, etc.), Windows, iOS</li></ul>
<b>Certifications</b>	<ul style="list-style-type: none"><li>Microsoft Certified Azure Developer Associate, MCSD App Builder, MCSE Enterprise Devices and Apps, MCSE Business Intelligence, MCSA Cloud Platform Solutions Associate, MCSA Linux on Azure Solutions Associate, MCSE Cloud Platform and Infrastructure, AWS Certified Solution Architect, AWS Certified Developer</li><li>Exam priorities: <a href="#">Developing Azure Solutions 70-532</a> (retired), <a href="#">Microsoft Certified Azure Developer Associate (AZ-203)</a>.</li></ul>
<b>Project Experience Types/Qualities</b>	<ul style="list-style-type: none"><li>3-10+ years of experience developing applications, consuming and developing APIs, and following technical best practices and design patterns.</li><li>3-5 years of experience with creating pilots, prototypes, and proof-of-concepts to provide validation of specific scenarios.</li><li>4-6 years of experience developing hybrid solutions on-premises or in the cloud.</li><li>3+ years of experience working in an Agile environment practicing CI/CD.</li><li>3+ years of experience working with source code repository management systems, such as TFS, GitHub, and Azure DevOps.</li></ul>



## Automation Engineer

An Automation Engineer is responsible for the automation of your development and deployment activities. They must be familiar with DevOps tools such as Jenkins, Puppet, Ansible, Redgate, Azure ARM Templates, Azure DevOps and many more. They should have the skills to implement and support your development activities via Continuous Integration (CI), Continuous Deployment and Delivery (CD) methods. They are very skilled at setting up rigorous testing mechanisms to ensure high quality automated releases are delivered to your customers.

- **Top Qualities:** Problem Solving (78%), Highly Organized (46%), Creativity (35%)
- **Previous Roles:** Developer (56%), IT Administrator (52%), Support Engineer (33%), Network Engineer (30%)
- **Certifications:** ISA Certified Automation Professional (CAP) (13%), Six Sigma (11%), ISTQB Advanced Level Test Automation Engine (9%)

<b>Technical Skills</b>	<ul style="list-style-type: none"><li>• Solid understanding of modern DevOps and deployment automation practices.</li><li>• Deep understanding of automation, continuous delivery, continuous deployment, and continuous integration methodologies.</li><li>• Deep technical experience in scripting and software development.</li><li>• Understanding of common database technologies, such as SQL Database/Server, Oracle, MySQL, PostgreSQL, MongoDB</li><li>• Working knowledge with AGILE development, SCRUM and Application Lifecycle Management (ALM) with one or more of the following programming languages: PowerShell, Bash, .NET, C#, Java, JSON, PHP, Perl, Python, Ruby on Rails, HTML, CSS, JavaScript, Responsive Web Design.</li><li>• Understanding of software testing and optimization methodologies, including executing performance and regression testing and building test plans and cases.</li></ul>
<b>Non-Technical Skills</b>	<ul style="list-style-type: none"><li>• Proven track record for continuously deploying software following Agile development practices.</li><li>• Process oriented, with a proven track record of driving decisions collaboratively, resolving conflicts &amp; ensuring follow through.</li><li>• Proven track record for driving decisions collaboratively, resolving conflicts and ensuring follow through.</li><li>• Problem solving mentality leveraging internal and/or external resources.</li><li>• Exceptional verbal and written communication.</li></ul>
<b>Technologies</b>	<ul style="list-style-type: none"><li>• Ansible, Apache Maven, ASP.NET, AWS, Azure DevOps, Chef, Confluence, Consul.io, Docker, GitHub, Jenkins, Jira, Kafka, MongoDB, MySQL, Node.js, Oracle, PostgreSQL, Microsoft Project, Puppet, Visual Studio</li><li>• <b>Programming/Scripting Languages:</b> C, C#, C++, Java, JavaScript, Perl, PHP, PowerShell, Python, Ruby, SQL, VBScript</li><li>• <b>Platforms:</b> Linux, Windows</li></ul>
<b>Certifications</b>	<ul style="list-style-type: none"><li>• Microsoft Certified Azure Administrator Associate, Microsoft Certified Azure Developer Associate, MCSE Cloud Platform and Infrastructure, or other relevant certifications in Quality Management or Quality Assurance and DevOps, such as AWS Certified DevOps Administrator.</li><li>• Exam priorities: <a href="#">Implementing Infrastructure Solutions 70-533</a> (retired), <a href="#">Microsoft Certified Azure Administrator Associate AZ-103</a>, or <a href="#">AZ-102</a> (retired), or <a href="#">AZ-100</a> (retired) and <a href="#">AZ-101</a> (retired); <a href="#">Developing Azure Solutions 70-532</a> (retired), <a href="#">Microsoft Certified Azure Developer Associate (AZ-203)</a>.</li></ul>
<b>Project Experience Types/Qualities</b>	<ul style="list-style-type: none"><li>• 3+ years of implementing large automation projects, documenting workflow and processes, reliable monitoring implementations, optimizing script performance, and delivering high quality, consistent results.</li><li>• 5+ years performing testing, test automation, bug tracking and quality management.</li><li>• 5+ years of successful usage of open source testing tools, large test data sets, agile and sprint-based projects, with an emphasis on quality.</li></ul>

## Electronics Hardware Engineer

The Electronics Hardware Engineer is a key individual in developing IoT hardware, including the design of circuit boards for sensors and devices. This position is an integral part of the IoT product development team, working with existing and new products at various stages of their product lifecycles including design, architecture and implementation. The electronics hardware engineer is responsible for researching and developing electronics hardware designs incorporating embedded microcontrollers, physical sensors, wireless data communication, and other required components for a variety of smart, robust and reliable commercial and industrial products. This individual will be self-motivated and creative with a demonstrated ability to design, develop and verify electronic hardware systems for compact, low-power, embedded microcontroller electronic products.

<b>Technical Skills</b>	<ul style="list-style-type: none"><li>• Deep understanding of low power electronics design, architecture and validation.</li><li>• Solid foundation in core electrical engineering principles including fundamental circuit designs, RF Electronics design, simulation, test &amp; measurement and analytical analysis.</li><li>• Strong ability to contribute to IoT hardware design, implementation, testing and debugging.</li><li>• Solid understanding of manufacturing processes and testing procedures for devices that have long-term operational lifetimes.</li><li>• Ability to develop embedded software from design and architecture to code generation, ultimately resulting in firmware that is robust, secure and production-ready.</li><li>• Deep understanding of embedded C/C++ programming development.</li><li>• Experience with test equipment and test methods for analog, digital and RF electronics.</li><li>• Strong scripting language abilities using Python and shell.</li><li>• Evaluate design solutions as well as perform IoT electronics functional test and system integration.</li><li>• Proven ability to create and construct working prototypes for testing and validation.</li><li>• Ability to work with other Electrical, Mechanical, and Validation Engineers in analysis, investigation and resolution of engineering problems.</li><li>• Experience designing products for deployment in commercial environments and meeting regulatory certification (UL, FCC, CE, IC).</li></ul>
<b>Non-Technical Skills</b>	<ul style="list-style-type: none"><li>• Demonstrated ability to design, develop and verify electronic hardware systems for compact, low-power, embedded microcontroller electronic products.</li><li>• Proven track record for keeping abreast of industry concepts, products, and trends to evaluate and deploy optimal solutions.</li><li>• Process oriented, with a proven track record of driving decisions collaboratively, resolving conflicts and ensuring follow through.</li><li>• Problem solving mentality leveraging internal and/or external resources.</li><li>• Exceptional verbal and written communication.</li></ul>
<b>Technologies</b>	<ul style="list-style-type: none"><li>• Digital/Analog circuit design, RF/Microwave design, Digital Signal Processing, Communications Theory, Electronics packaging</li><li>• ALTIUM, ALDEC, AMPQ, Bluetooth, FPGA, GPW, Maple Analysis Tool, MatLab, MathCad, MQTT, ORCAD, REST/HTTPS, Simulink, SPICE, Websockets, WiFi, 3G/LTE Radio, Zigbee</li><li>• <b>Programming/Scripting Languages:</b> C, C#, C++, Java, JavaScript, Perl, PHP, PowerShell, Python, Ruby, SQL, VBScript, VHDL</li><li>• <b>Platforms:</b> Linux, Windows</li></ul>
<b>Certifications</b>	<ul style="list-style-type: none"><li>• International Society of Certified Electronics Technicians Certified Electronics Technician (CET), or Electronics Technicians Association certifications</li><li>• Exam priority: <a href="#">Associated-level CET</a>, <a href="#">Journeyman-level CET</a>, <a href="#">FCC Exam</a>, <a href="#">Associate Certified Electronics Technician (CETA)</a>.</li></ul>

**Project Experience  
Types/Qualities**

- 3+ years of experience contributing to IoT hardware design, implementation, testing, and debugging.
- 2+ years of experience working with consumer or industrial embedded electronics.
- Design experience with motors, motor controllers, power supplies, inverters / converters, and/or power electronics.
- 2+ years of experience with embedded firmware.
- 3+ years of experience researching, developing, verifying and releasing to production compact, power-conscious electronic systems.
- 5+ years translating high-level project and system requirements into well-defined hardware architectures by developing design concepts, performing component selection and schematic capture, directing PCB layout, bring up and verify prototypes, and support the product through manufacturing.
- 5+ years of experience creating and maintaining clear project documentation, including design requirements, functional specifications, BOMs, schematics, and test plans and reports.
- 3+ years of experience conducting preliminary and detailed hardware reviews to ensure adherence to design requirements and performance expectations.
- 3+ years of experience designing products for deployment in commercial environments and meeting regulatory certification (UL, FCC, CE, IC).
- BS/MS in Electrical Engineering, Computer Engineering or Computer Science.

## Product Designer

The Product Designer will work at the intersection of hardware and software, actively engaging in the detailed work needed to support the user experience (UX) for IoT hardware components, including setup and configuration, device interface, device cosmetics, and product packaging. This position will engage deeply with new hardware programs and with new features being developed. This person should have a strong understanding of design thinking, human-centered design, and human computer interaction and be fluent in the latest technology trends. The product designer will work in partnership with other UX designers, product managers, development and test teams, user research, and more to work through the details of early experience ideas, prototyping, testing, refinement, detailed specification, and development.

<b>Technical Skills</b>	<ul style="list-style-type: none"><li>Proven success designing products that are both pleasurable and easy to use.</li><li>Solid experience in sharing design directions and experience visions with stakeholders and clients.</li><li>Strong communication skills and the ability to thrive in cross-functional teams.</li><li>Deep technical experience working with software engineers in the Agile process and delivering the UX specification work needed for complex experiences.</li><li>Solid understanding of the tools needed to build engaging user experiences, including Sketch, Zeplin, Abstract, Framer, Flint, JIRA and Confluence.</li><li>Proven aptitude for taking input from multiple sources and synthesizing it into coherent designs.</li></ul>
<b>Non-Technical Skills</b>	<ul style="list-style-type: none"><li>Demonstrated ability to design and develop engaging user experiences for compact, low-power, embedded microcontroller electronic products.</li><li>Ability to work within time and technical constraints and still deliver outstanding user experiences.</li><li>Proven track record for keeping abreast of industry concepts, products, and trends to evaluate and deploy optimal solutions.</li><li>Process oriented, with a proven track record of driving decisions collaboratively, resolving conflicts and ensuring follow through.</li><li>Problem solving mentality leveraging internal and/or external resources.</li><li>Exceptional verbal and written communication.</li></ul>
<b>Technologies</b>	<ul style="list-style-type: none"><li>Abstract, Adobe After Effects, Adobe CS, Confluence, Craft, Figma, Flint, Framer, Hype, InVision, JIRA, Principle, Sketch, Zeplin</li></ul>
<b>Certifications</b>	<ul style="list-style-type: none"><li>Nielsen Norman Group User Experience Certification program</li><li>Exam priority: <a href="#">UX Certification</a>, <a href="#">UX Master Certification</a></li></ul>
<b>Project Experience Types/Qualities</b>	<ul style="list-style-type: none"><li>3+ years of experience in user experience design and/or user interface design.</li><li>3+ years of proven experience delivering concepts, personas, user journeys, storyboards, user flows, wireframes, prototypes, etc.</li><li>2+ years of experience performing Research and user testing.</li><li>4+ years of experience with Sketch and/or other prototyping software</li><li>A current portfolio available for viewing demonstrating the detailed work needed to ship products.</li><li>Bachelors degree or 3+ years of experience in a related discipline, such as user experience design, industrial design, HCI, user interface design, or graphic design.</li></ul>

## Information Security Analyst

An Information Security Analyst assesses and provides security advice on your cloud infrastructure, including network, service, and application components. This role conducts risk assessments, architectural reviews, provides cyber security subject matter expertise, and assists in the building and design of secure solutions. Additional duties may include network and application penetration testing, and support for cyber security investigations as well as on-call response for cyber security incidents. A computer science or related engineering degree is required, or the equivalent combination of education, professional training, or work experience.

- **Top Qualities:** Problem Solving (69%), Integrity (49%), Verbal Communication Skills (34%), Highly Organized (34%)
- **Previous Roles:** IT Administrator (66%), Solution Architect (37%), Developer (19%)
- **Certifications:** Certified Cloud Security Professional (CCSP) (22%), Certified Ethical Hacker (CEH) (19%), Cisco Certified Network Professional (CCNP) (17%). Certified Information Systems Security Professional (CISSP) (17%)

<b>Technical Skills</b>	<ul style="list-style-type: none"><li>• Solid understanding of modern authentication protocols and a background in cyber security.</li><li>• Deep understanding of cloud computing technologies.</li><li>• Experience with Windows, Linux, iOS, Android.</li><li>• Experience in network security: TCP/IP, DNS, proxies, firewall configuration, intrusion detection and prevention systems, IPSec and TLS/SSL.</li><li>• Experience with cryptography: symmetric and asymmetric cryptography, hashing.</li><li>• Experience with tools for conducting port scans, network scans, fingerprinting and vulnerability scans.</li><li>• Experience with tools for conducting enumeration of target environment and configuration.</li><li>• Experience with tools used for system hacking (e.g., password cracking), malware creation/deployment, network traffic sniffers, session hijacking, denial of service and SQL injection.</li></ul>
<b>Non-Technical Skills</b>	<ul style="list-style-type: none"><li>• Proven track record of conducting vulnerability assessments and delivering clear, actionable reports.</li><li>• Problem-solving mentality leveraging internal and/or external resources.</li><li>• Exceptional written communication and strong verbal communication skills.</li><li>• Awareness of current laws that may affect penetration testing and analysis, and in conducting test that stay within the law.</li><li>• Experience with non-technical attacks and social engineering.</li></ul>
<b>Technologies</b>	<ul style="list-style-type: none"><li>• Access, Active Directory, ASP.NET, AWS, Azure, Burp Suite, Chef, Excel, firewalls, HP Fortify, Db2, Jira, Metasploit, Microsoft IIS, MySQL, Nessus, Nmap, Node.js, Oracle, PaaS, Microsoft Project, Puppet, Radius, ServiceNow, SharePoint, sniffers, Oracle Solaris, SQL Server, Sybase, Visio, VMware, WSDL</li><li>• <b>Programming/Scripting Languages:</b> C#, C++, Java, JavaScript, Perl, PowerShell, Python, Ruby</li><li>• <b>Platforms:</b> Linux, Windows</li></ul>
<b>Certifications</b>	<ul style="list-style-type: none"><li>• Relevant security certifications, such as <a href="#">CISSP</a>, <a href="#">Certified Ethical Hacker</a>, <a href="#">AWS Certified Security</a>.</li><li>• <a href="#">Certified Penetration Testing Consultant (CPTC)</a>, <a href="#">GIAC Exploit Researcher and Advanced Penetration Tester (GXPN)</a>, <a href="#">Certified Penetration Testing Engineer (CPTE)</a>, <a href="#">Licensed Penetration Tester (LPT)</a>, <a href="#">GIAC Penetration Tester (GPEN)</a>, <a href="#">GIAC Web Application Penetration Tester (GWAPT)</a>, <a href="#">Cisco CyberSecurity Specialist</a>, <a href="#">Offensive Security Certified Expert (OSCE)</a>.</li></ul>
<b>Project Experience Types/Qualities</b>	<ul style="list-style-type: none"><li>• 5+ years of experience implementing and validating security postures, performing vulnerability assessments and remediations, implementing intrusion detection and prevention system, and performing cloud-based security audits.</li><li>• 5-10 years of working with security testing frameworks such as OWASP.</li><li>• 8-10 years of experience with identity audit log review strategies, and SIEM tool implementation and configuration.</li><li>• 3+ years of experience in legal investigations working with state and federal authorities.</li><li>• 5+ years of successful prevention of phishing and social engineering campaigns.</li></ul>

# Recruiting Resources

## Top 10 Sources to Find Skilled Labor and What to Look For

Sourcing skilled labor can be a challenge. In the Microsoft Hiring and Onboarding Playbook Study, referrals (63%), website (57%) and LinkedIn (56%) were reported as the top approaches for generating leads.

Top Candidate Lead Sources	Total (n=275)
Referrals from employees or partnerships	63%
Posting on website	57%
<a href="#">LinkedIn</a>	56%
Social media	42%
Former employees	36%
University recruiting	36%
Local technical communities	35%
Recruit from competitors	23%
Meetups	16%
Recruitment agency	4%
Other	4%

Source: Microsoft Hiring and Onboarding Playbook Study, MDC Research, June 2018

Now that you have an understanding of where to look, what are the most important factors to look for in a potential hire's skillset? In the Microsoft Cloud Practice Development Study, we asked the Azure partners this question. What they told us was that the top three most important factors were work history, cultural fit, and years of experience.

	TOTAL (n=1136)	SMB (n=886)	ENTERPRISE (n=250)
Work history	69%	68%	74%
Cultural fit	43%	40%	53%
Years of experience	42%	41%	47%
Professional certifications	32%	34%	22%
Referrals	28%	29%	26%
Professional training received	20%	21%	16%
Reputation through community	16%	15%	19%
Formal education	13%	14%	11%
Contract-to-hire or other means to test skills "hands-on"	13%	13%	13%
Publications	3%	3%	2%
Awards received	2%	2%	2%
Attitude	0%	0%	1%
Other	4%	4%	4%

Source: Microsoft Cloud Practice Development Study, MDC Research, November 2016.



# Training & Readiness

## Preparing and Training Technical Staff for IoT

For technical staff to function as change agents supporting current and emerging IoT technologies, their buy-in for the use and integration of these technologies is needed. For this, staff need three things:

- An understanding of their roles and any changes to their current position.
- Time and resources to explore the technologies.
- An understanding of the business case for the technologies.

### NURTURE IOT CAPABILITIES

Microsoft created the [IoT School](#) to provide a place for IoT professionals to develop and nurture IoT expertise. This portal provides learning paths that are defined by a curated collection of tutorials and guides for all skill levels from beginner, to intermediate, to advanced presented in an easily searchable fashion that enables the partner team to find the right content, at the right level and for the amount of time they have to commit to the effort.

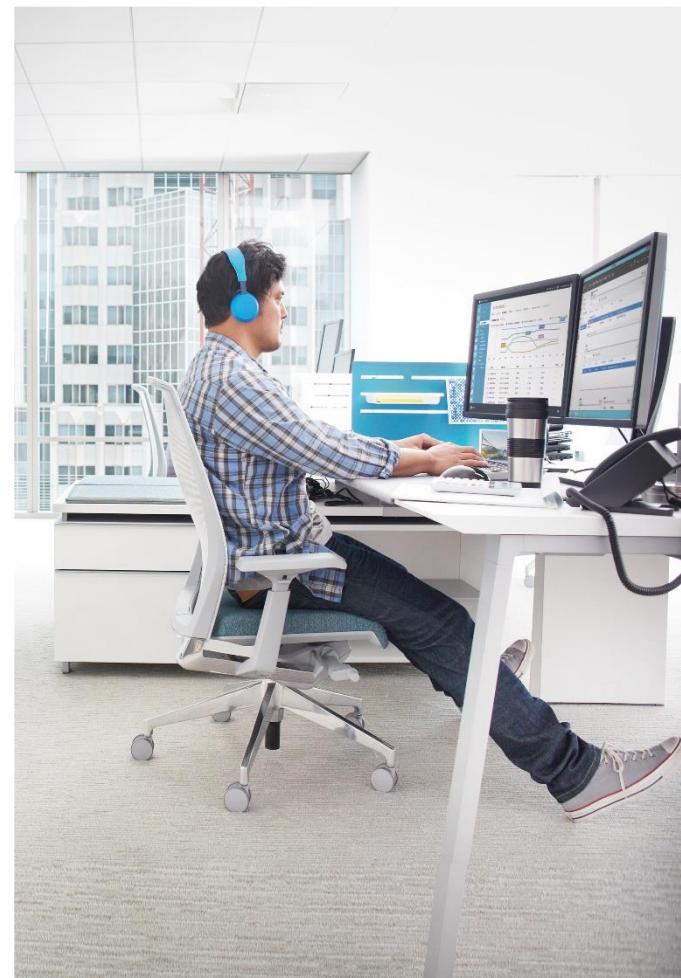
In addition to technical training, some of the partners interview for this book suggested using non-traditional ways to level up the team's IoT skill.

- **Innovation hours:** a percentage of the employee's weekly time (as much as 20%) is allotted to let them work on their own projects of interest, alone or with fellow employees. Partners suggest that the creativity unleashed during these free thinking projects have yielded insights and intellectual property.
- **Hackathons, competitions and community labs:** Partners also suggested encouraging employees to participate in community events that leverage IoT to try and solve specific problems. These range from 1-2 day hackathons where the team is fully engaged in the project at hand, typically over a weekend. Finally, community labs are opportunities for employees to work together with academia, domain experts and others learning the trade to help the local community solve worthwhile challenges.
- **Partner with startups:** Some partners interviewed expressed a novel approach to skilling up the team. In the absence of enterprise customers, they have partnered with startups working on interesting problems requiring IoT. The start-up receives support from the partner at no or low cost (or for some small amount of equity) and partner team gets real-world experience.

## AZURE ONBOARDING RESOURCES

Use the following resources as part of your Azure onboarding for new and existing staff:

- [Azure Training and Certification](#) provides free online training options including online courses, learning paths, hands-on labs as well as resources to help you find learning partners who can help you achieve your skills development goals using Microsoft Azure services.
- [Microsoft Azure Hands-on Labs](#) provides free, self-paced labs to help you stay current with Azure. The live environments are fully self-contained. You do not need your own Azure subscription to complete the labs, just login with a remote desktop (RDP) client and get started.
- [Microsoft Virtual Academy](#) offers training from the people who helped to build Microsoft Azure. From the basic overview to deep technical training, IT staff will learn how to leverage Microsoft Azure for their business.
- [Microsoft IT Pro Cloud Essentials](#) is a free annual subscription that includes cloud services, education, and support benefits. IT Pro Cloud Essentials provides IT implementers with hands-on experience, targeted educational opportunities, and access to experts in areas that matter most to increase knowledge and create a path to career advancement.
- [The Microsoft IT Pro Career Center](#) is a free online resource to help map your cloud career path. Learn what industry experts suggest for your cloud role and the skills to get you there.
- [Microsoft Learning](#) offers a wide variety of official curriculum on-demand, as well as [edX courses that are taught by Microsoft experts](#), and help you learn through hands-on experiences with a broad reach of Azure technologies.
- [The Microsoft Partner Network \(MPN\) Learning Portal](#) provides a centralized interface with training opportunities and certification options organized by products, competencies, certifications, and job role.
- [Microsoft Learn](#) is another free online learning resource that includes different learning paths based on role. It is a more rewards-centric approach, awarding points and levels based on curriculum completed.



Follow a learning curriculum at your own pace to build the skills you need most to stay relevant. Suggested resources to help onboard your team for training success are available in this section.

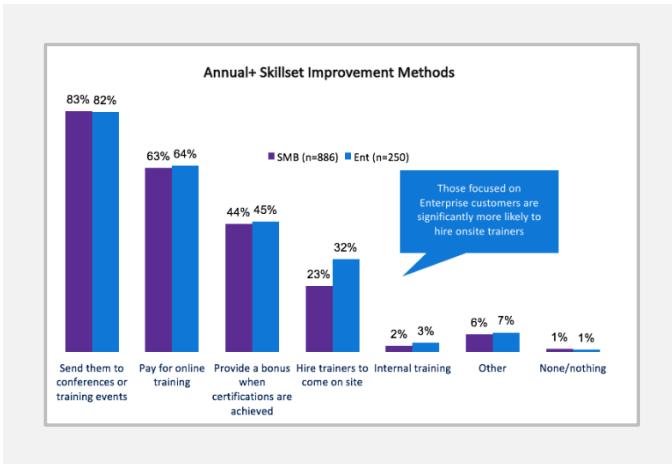
## General Technical Training

Whether you need to fill a skills gap or are looking to improve your team's skill surface area, technical training is critical to your success.

The screenshot shows the Microsoft Partner Network Training Center. At the top, there are navigation links for Microsoft, Partner Network, Membership, Support, and a search bar labeled "Search Partner Network". Below the header is a dashboard with a large blue geometric background image. A central call-to-action button says "Let's get started". Below it, text reads: "Find your role, select a product or solution and pick the learning path for your skill level to begin the recommended training for Microsoft products and solutions." There are six main categories displayed as cards:

- Administrator**: Shows a person icon and a link to "Administrator content".
- Architect**: Shows a gear icon and a link to "Architect content".
- Developer**: Shows a code icon and a link to "Developer content".
- Consultant**: Shows a chart icon and a link to "Consultant content".
- Generalist Seller**: Shows a chart icon and a link to "Seller content".
- Technical Presales**: Shows a document icon and a link to "Presales content".

In our research, we found conferences and paid online training are the most common learning mechanisms.



Source: Microsoft Cloud Practice Development Study, MDC Research, November 2016

## MPN PARTNER TRAINING CENTER

The MPN [Partner Training Center](#) provides a simplified experience that offers new role-based learning paths with curated training recommendations based on technical role, skill level, and solutions being developed.

## CLOUD AND ENTERPRISE PARTNER RESOURCES

The [Cloud and Enterprise Partner Resources Portal](#) provides a source of sales and technical training for partner practices and key areas of specialization. Resources include customer success stories, sales and technical training, tools, engines, and resources available to help build your skills around selling, deploying, and architecting cloud infrastructure and management, cloud application development, data platform and analytics, and security and compliance solutions.

## CLOUD + ENTERPRISE UNIVERSITY ONLINE

Leverage the [Cloud + Enterprise University Online](#) to build knowledge, stay sharp, and prove your expertise on selling and supporting Microsoft cloud solutions through our live and on demand webcasts and virtual, instructor-led courses—giving you the flexibility to train at your own pace.

## MICROSOFT CONFERENCE RECORDINGS

Even if you missed the annual live events, the [Microsoft Inspire Conference](#) and [Microsoft Ignite](#) conferences provide many of its sessions as on-demand recordings — no conference pass required.

## PARTNER COMMUNITY EVENTS, CALLS & WEBINARS

The [Microsoft Partner Enablement Blog](#) maintains a schedule of trainings available to partners. Visit often and plan your training calendar.

## SMART PARTNER MARKETING

Leverage the [Microsoft Smart Partner Marketing](#) site as your starting point for training marketing resources.

## Learning Paths & Assessments

Training content for the assessments can be found in the learning paths available from the [Learning Portal](#). Use the search field to identify new content as it becomes available.

The screenshot shows a search results page for 'iot' in the Microsoft Learning Portal. The search bar at the top contains 'iot'. On the left, there is a filter sidebar with sections for Solution Area (Modern Workplace, Business Applications, Apps and Infrastructure, Data and AI), Role (Business Decision Maker, Technical, Sales & Marketing), Asset Type, Level, Solution, Partner Competency, Building Block, and Product. The main area displays 9 items under the heading 'Showing 1-9 of 9 items'. Each item has a thumbnail, title, description, and date. The items are:

- IoT Fundamentals (17630)**  
Introducing IoT Fundamentals.  
2017-05-02
- IoT Analytics (17625)**  
Advanced topics on IoT analytics.  
2017-05-02
- IoT Architecture (17629)**  
Advanced topics on IoT architecture.  
2017-05-02
- Windows 10 IoT (17998)**  
Intermediate topics on Windows 10 IoT.  
2017-05-02
- Azure IoT Technical (16252)**  
MPN Competency Technical Assessment Microsoft Azure for IoT Solutions  
2017-05-02
- Getting Started with IoT Development (17628)**  
Introducing IoT Development.  
2017-05-02

## Additional Training Resources

[Microsoft Learning Partners](#) are available worldwide to help enable your team for Microsoft Azure via live instructor-led training. This can be scheduled as a dedicated delivery at your location or virtually using remote learning technologies. Many courses are scheduled as open-enrollment courses, which doesn't require you to schedule a dedicated class.

- [Pluralsight](#) is a key Microsoft partner that offers Azure training, as well as courses related to data science. Gain the know-how and confidence your job demands through these free online courses, delivered in partnership with Pluralsight.
- [O'Reilly Safari](#) provides subscription access to more than 40,000 books, videos, and interactive tutorials from over 200 of the world's best publishers, including O'Reilly, Pearson, Harvard Business Review, and Packt. It also offers live online training courses led by instructors from O'Reilly's network of tech innovators and expert practitioners.



# Competencies and Certifications

## MPN Competencies

One of the next steps is to ensure you align the technical team to the MPN competency for your practice.

**The competencies most applicable to the IoT practice are:**

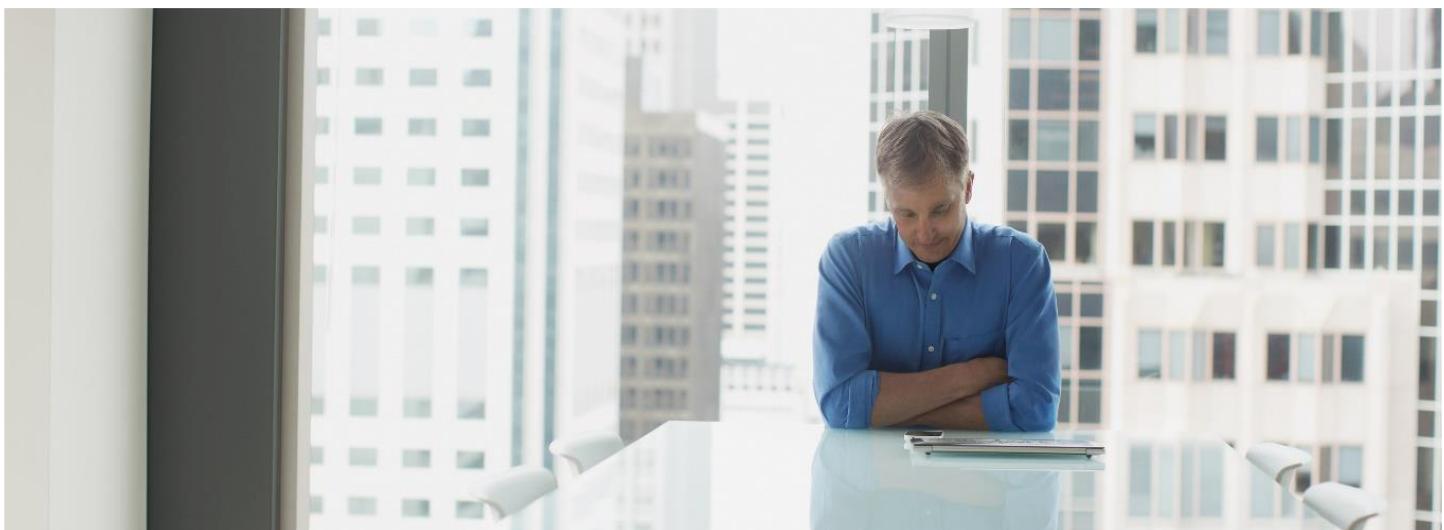
- [Application Development](#)
- [Cloud Platform](#)
- [Data Analytics](#)

The following tables summarize the **skill requirements** needed by people in your organization to achieve either a gold or silver competency for the competencies relevant to an IoT practice. Some competencies have alternative options your organization can elect to meet in order to achieve the competency. You only need to meet the requirements of one option in any given competency.

APPLICATION DEVELOPMENT COMPETENCY	SILVER REQUIREMENTS	GOLD REQUIREMENTS
<b>Custom Application Builder Option</b>	<p>Two individuals must pass one of the following exams:</p> <p><b>Web and Mobile Client App Dev</b> Focus:</p> <ul style="list-style-type: none"><li>• <a href="#">Exam 70-480: Programming in HTML5 with JavaScript and CSS3</a></li><li>• <a href="#">Exam 70-483: Programming in C#</a></li><li>• <a href="#">Exam 70-486: Developing ASP.NET MVC Web Applications</a></li></ul> <p><b>Universal Windows Platform</b> Focus:</p> <ul style="list-style-type: none"><li>• <a href="#">Exam 70-357: Developing Mobile Apps</a></li></ul>	<p>Four individuals must each hold a current version of the following certification:</p> <ul style="list-style-type: none"><li>• <a href="#">MCSD: App Builder</a></li></ul>

	<p><b>Azure App Dev Focus:</b></p> <ul style="list-style-type: none"><li>• <a href="#">Exam 70-532: Developing Microsoft Azure Solutions*</a></li><li>• <a href="#">Exam 70-533: Implementing Microsoft Azure Infrastructure Solutions*</a></li><li>• <a href="#">Exam 70-487: Developing Microsoft Azure and Web Services</a></li></ul> <p>*These exams retired on December 31, 2018, but will be valid for competencies until December 31, 2019.</p>	
CLOUD PLATFORM COMPETENCY	SILVER REQUIREMENTS	GOLD REQUIREMENTS
<b>Azure Consumption Option</b>	<p>One individual must pass one of the following assessments:</p> <ul style="list-style-type: none"><li>• <a href="#">Technical Assessment for Cloud Platform*</a></li><li>• <a href="#">Technical Assessment for Remote Desktop Services on Azure*</a></li><li>• <a href="#">Technical Assessment for Using Azure for Data Analytics and Data Platform Solutions*</a></li><li>• <a href="#">Technical Assessment for Using Microsoft Azure for Application Development*</a></li><li>• <a href="#">Technical Assessment for Using Azure for Internet of Things Solutions*</a></li></ul> <p>Or, one individual must pass one of the following exams:</p> <ul style="list-style-type: none"><li>• <a href="#">Exam 70-532: Developing Microsoft Azure Solutions*</a></li><li>• <a href="#">Exam 70-533: Implementing Microsoft Azure Infrastructure Solutions*</a></li><li>• <a href="#">Exam 70-535: Architecting Microsoft Azure Solutions*</a></li><li>• <a href="#">Exam 70-473: Designing and Implementing Cloud Data Platform Solutions</a></li></ul>	<p>Two individuals must pass one of the following assessments:</p> <ul style="list-style-type: none"><li>• <a href="#">Technical Assessment for Cloud Platform*</a></li><li>• <a href="#">Technical Assessment for Remote Desktop Services on Azure*</a></li><li>• <a href="#">Technical Assessment for Using Azure for Data Analytics and Data Platform Solutions*</a></li><li>• <a href="#">Technical Assessment for Using Microsoft Azure for Application Development*</a></li><li>• <a href="#">Technical Assessment for Using Azure for Internet of Things Solutions*</a></li></ul> <p>Or, two individuals must pass one of the following exams:</p> <ul style="list-style-type: none"><li>• <a href="#">Exam 70-532: Developing Microsoft Azure Solutions*</a></li><li>• <a href="#">Exam 70-533: Implementing Microsoft Azure Infrastructure Solutions*</a></li><li>• <a href="#">Exam 70-535: Architecting Microsoft Azure Solutions*</a></li><li>• <a href="#">Exam 70-473: Designing and Implementing Cloud Data Platform Solutions</a></li></ul>

DATA ANALYTICS COMPETENCY	SILVER REQUIREMENTS	GOLD REQUIREMENTS
<p><b>Data Analytics Specialist Option</b></p> <p>One individual must pass all of the exams in any focus area:</p> <p><b>Business Intelligence</b> focus:</p> <ul style="list-style-type: none"><li>• <a href="#">Exam 70-475: Designing and Implementing Big Data Analytics Solutions</a></li><li>• <a href="#">MCSA: Linux on Azure*</a></li></ul> <p>*These exams retired on December 31, 2018, but will be valid for competencies until December 31, 2019.</p> <p><b>Advanced Analytics</b> focus:</p> <ul style="list-style-type: none"><li>• <a href="#">Exam 70-767: Implementing a SQL Data Warehouse</a></li><li>• <a href="#">Exam 70-768: Developing SQL Data Models</a></li></ul> <p><b>Big Data</b> focus:</p> <ul style="list-style-type: none"><li>• <a href="#">Exam 70-475: Designing and Implementing Big Data Analytics Solutions*</a></li><li>• <a href="#">Exam 70-774: Perform Cloud Data Science with Azure Machine Learning*</a></li></ul> <p>And, the same individual must pass the following assessment:</p> <ul style="list-style-type: none"><li>• <a href="#">Technical Assessment Data Analytics Foundational*</a></li></ul> <p>*These exams and assessments are retiring on June 30, 2019, but will be valid for competencies until June 30, 2020.</p>	<p>• <a href="#">Exam 70-475: Designing and Implementing Big Data Analytics Solutions</a></p> <p>• <a href="#">MCSA: Linux on Azure*</a></p> <p>*These exams retired on December 31, 2018, but will be valid for competencies until December 31, 2019.</p>	<p>Two individuals must pass all of the exams in any focus area:</p> <p><b>Business Intelligence</b> focus:</p> <ul style="list-style-type: none"><li>• <a href="#">Exam 70-767: Implementing a SQL Data Warehouse</a></li><li>• <a href="#">Exam 70-768: Developing SQL Data Models</a></li></ul> <p><b>Advanced Analytics</b> focus:</p> <ul style="list-style-type: none"><li>• <a href="#">Exam 70-773: Analyzing Big Data with Microsoft R*</a></li><li>• <a href="#">Exam 70-774: Perform Cloud Data Science with Azure Machine Learning*</a></li></ul> <p><b>Big Data</b> focus:</p> <ul style="list-style-type: none"><li>• <a href="#">Exam 70-475: Designing and Implementing Big Data Analytics Solutions*</a></li><li>• <a href="#">Exam 70-775: Perform Data Engineering on Microsoft HD Insight*</a></li></ul> <p>Both individuals must pass the following assessment:</p> <ul style="list-style-type: none"><li>• <a href="#">Technical Assessment Data Analytics Foundational*</a></li><li>• *These exams and assessments are retiring on June 30, 2019, but will be valid for competencies until June 30, 2020.</li></ul>



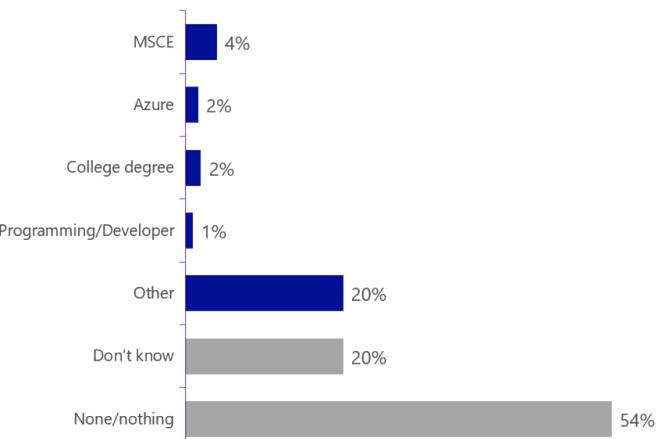
## Certifications

Increase readiness and marketability with MCSA, MCSD, or MCSE certifications.

There are numerous assessments and certifications your team should consider as motivation for advancing their skills, creating proof points for your practice, earning [certification badges](#), and enabling you to achieve Microsoft Partner Network Competencies.

While half of the IoT partners interviewed in the MDC Research study indicated that they are not currently requiring their IoT experts to hold or obtain any certifications, encouraging team members to pursue the certifications listed below provides both individual and organization benefits.

**Certifications Expected of IoT Experts**  
(n=92\*; coded subset)



### MCSA, MCSD, AND MCSE CERTIFICATIONS

MCSA CERTIFICATIONS AND DESCRIPTIONS	REQUIRED EXAMS
<b><u>MCSA: MACHINE LEARNING</u></b> Demonstrate your expertise in operationalizing Microsoft Azure machine learning and Big Data with R Server and SQL R Services.	<ul style="list-style-type: none"><li>• <a href="#">70-773: Analyzing Big Data with Microsoft R</a></li><li>• <a href="#">70-774: Perform Cloud Data Science with Azure Machine Learning</a></li></ul>
<b><u>MICROSOFT CERTIFIED ASSOCIATE: AZURE ADMINISTRATOR ASSOCIATE</u></b>	Required exams: Exam AZ-100 and Exam AZ-101, or Transition Exam AZ-102

Demonstrate your ability to implement, monitor, and maintain Microsoft Azure solutions, including major services related to compute, storage, network, and security.

- [Exam AZ-100: Microsoft Azure Infrastructure and Deployment](#) (retires May 2019)
- [Exam AZ-101: Microsoft Azure Integration and Security](#) (retires May 2019)
- [Exam AZ-102: Microsoft Azure Administrator Certification Transition](#) (retires June 2019)

### **MICROSOFT CERTIFIED ASSOCIATE: AZURE DEVELOPER ASSOCIATE**

Demonstrate your ability to design, build, test, and maintain cloud solutions, such as applications and services, partnering with cloud solution architects, cloud DBAs, cloud administrators, and clients to implement these solutions.

- [Exam AZ-203: Developing Solutions for Microsoft Azure](#)

### **MICROSOFT CERTIFIED EXPERT: AZURE SOLUTIONS ARCHITECT EXPERT**

Demonstrate your expertise in compute, network, storage, and security to design solutions that run on Azure.

Required exams: Exam AZ-300 and Exam AZ-301, or Transition Exam AZ-302

- [Exam AZ-300: Microsoft Azure Architect Technologies](#)
- [Exam AZ-301: Microsoft Azure Architect Design](#)
- [Exam AZ-302: Microsoft Azure Solutions Architect Certification Transition](#)

### **MICROSOFT CERTIFIED EXPERT: AZURE DEVOPS ENGINEER EXPERT**

Demonstrate your expertise in combining people, process, and technologies to continuously deliver valuable products and services that meet end user needs and business objectives.

- [Exam AZ-400: Microsoft Azure DevOps Solutions](#)

### **MCSA: BI REPORTING**

Demonstrate your expertise in analyzing data with both Power BI and Excel.

- [70-778: Analyzing and Visualizing Data with Power BI](#)
- [70-779: Analyzing and Visualizing Data with Microsoft Excel](#)

### **MCSA: WEB APPLICATIONS**

Demonstrate your expertise at implementing modern web applications.

- [70-480: Programming in HTML5 with JavaScript and CSS3](#)
- [70-483: Programming in C#](#)
- [70-486: Developing ASP.NET MVC Web Applications](#)

### **MCSD CERTIFICATIONS AND DESCRIPTIONS**

### **REQUIRED EXAMS**

### **MCSD: APP BUILDER**

The Microsoft Certified Solutions Developer (MCSD): App Builder certification validates that you have the

Pre-requisites:

- [MCSA: Web Applications](#)
- [MCSA: Universal Windows Platform](#)

skills needed to build modern mobile and/or web applications and services.	Choose one of the following Azure exams: <ul style="list-style-type: none"><li>• <a href="#">70-357: Developing Mobile Apps</a></li><li>• <a href="#">70-486: Developing ASP.NET MVC Web Applications</a></li><li>• <a href="#">70-487: Developing Microsoft Azure and Web Services</a></li></ul>
MCSE CERTIFICATIONS AND DESCRIPTIONS	REQUIRED EXAMS
<p><b>MCSE: DATA MANAGEMENT AND ANALYTICS</b></p> <p>Demonstrate your broad skillset in SQL administration, building enterprise-scale data solutions and leveraging business intelligence data — both on-premises and in cloud environments.</p>	<p>Pre-requisites (one of the following):</p> <ul style="list-style-type: none"><li>• <a href="#">MCSA – SQL Server 2012/2014</a></li><li>• <a href="#">MCSA – SQL 2016 Database Administration</a></li><li>• <a href="#">MCSA – SQL 2016 Database Development</a></li><li>• <a href="#">MCSA – SQL 2016 BI Development</a></li><li>• <a href="#">MCSA: Machine Learning</a></li><li>• <a href="#">MCSA: BI Reporting</a></li><li>• <a href="#">MCSA: Data Engineering with Azure</a></li></ul> <p>Choose one of the following Azure exams:</p> <ul style="list-style-type: none"><li>• <a href="#">70-473: Designing and Implementing Cloud Data Platform</a></li><li>• <a href="#">70-475: Designing and Implementing Big Data Analytics Solutions</a></li><li>• <a href="#">70-464: Developing Microsoft SQL Server Databases</a></li><li>• <a href="#">70-465: Designing Database Solutions for Microsoft SQL Server</a></li><li>• <a href="#">70-466: Implementing Data Models and Reports with Microsoft SQL Server</a></li><li>• <a href="#">70-467: Designing Business Intelligence Solutions with Microsoft SQL Server</a></li><li>• <a href="#">70-762: Developing SQL Databases</a></li><li>• <a href="#">70-767: Implementing a Data Warehouse using SQL</a></li><li>• <a href="#">70-768: Developing SQL Data Models</a></li><li>• <a href="#">70-773: Analyzing Big Data with Microsoft R</a></li><li>• <a href="#">70-774: Perform Cloud Data Science with Azure Machine Learning</a></li><li>• <a href="#">70-775: Perform Data Engineering on Microsoft HDInsight</a></li><li>• <a href="#">70-777: Implementing Microsoft Azure Cosmos DB Solutions</a></li></ul>

# Operationalize

## Internet of Things

[aka.ms/practiceplaybooks](http://aka.ms/practiceplaybooks)



# Executive Summary



In the previous section, we reviewed how you should hire, train, and equip your staff. In this section, we will guide you through the steps to operationalize your business plan.

We walk you through the options for leveraging your internal use benefits that provide you complimentary software licenses and subscriptions for use within your organization, as well as how you can deepen relationships with your customer by re-selling it as an overall package along with your custom software, creating a new revenue stream for your business.

This section also provides guidance on how to operate your business, from how to build materials to support your sales and marketing efforts to the key contracts you will want to put in place.

Whether you're building products, providing managed services, or performing project work for customers, your success may be impacted by your ability to manage your customer records, your projects, and your support trouble tickets. We provide guidance on what tools and systems you should consider implementing.

We also cover how you can increase visibility for your practice by reviewing the Microsoft marketplaces and how to get listed on them as well as provide guidance on the social offerings your practice should setup.

We conclude this section with checklists and templates you can use to standardize your customer engagement process.

## Top 5 things to do

Get your practice off ground by putting your plan into action. These are the top 5 things you should do to get the momentum going.

- Implement processes
- Claim your internal use benefits
- Set up key contracts and tools
- Set up customer support process
- Standardize your engagements using checklists



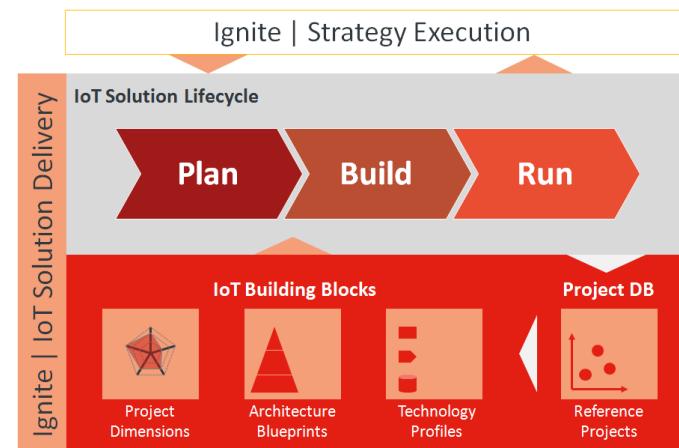
## Implement an IoT Solution Delivery Process

The process you follow in delivering your IoT solution to your customer is just as important as the technologies you use to deliver it.

With the relative newness and rapid growth of IoT, many of the processes and best practices needed for standardization are still being worked out. Most IoT projects consist of components derived from multiple different disciplines, such as product design and manufacturing, embedded hardware and software, cross-domain security and many others. This multi-disciplinary aspect of IoT makes creating a standardized solution delivery process quite complex.

Given that there are very few experts with the experience required to deliver multi-disciplinary projects, the [Eclipse Ignite|IoT project](#) was created with the goal of providing "a high-level methodology that bridges these different required IoT disciplines, and then collaborate with experts from the different disciplines to capture their experiences and best practices and integrate them to the methodology," and sharing that expertise with the broader IoT practitioner community.

Details of this approach can be found in [Enterprise IoT](#) published by O'Reilly Media.



Source: [Eclipse Ignite|IoT project](#)

# Claim Your Internal Use Benefits

A key benefit of being a Microsoft Partner is access to Internal Use Rights, providing your IoT practice access to complimentary credits and licenses of Microsoft products and services, including Microsoft Azure, Office 365 and Visual Studio.

## AZURE CREDITS

Providing access to Azure for your team is one of the key first steps to preparing for a successful IoT practice. Microsoft provides several ways for your organization to gain access to Microsoft Azure for the development of new services, delivering services, or learning in general.

Members of the [Microsoft Action Pack](#) program receive \$100 monthly Azure credits.

Microsoft Partners with the Cloud Productivity Competency get Azure credits as a part of the Visual Studio subscription's core benefit (see the next section on Visual Studio).

Microsoft Partners with a Cloud Platform Competency at the Silver or Gold level get even more — \$6,000 per year and \$12,000 per year, respectively.

## OFFICE 365 BENEFITS

As a Microsoft Partner, your core benefits include access to the Microsoft Office 365 Demo tenant that you can use to sell Microsoft Office 365, Power BI Pro, Microsoft Dynamics CRM Online and Project Online. You also get 25 seats of Office 365 E3 at the silver level or 100 seats of Office 365 E3 at the gold level from your core benefits.

As a Microsoft Partner with the Small & Midmarket Cloud Solutions competency, in addition to your core benefits, you get 10 seats of Office 365 E3 at the silver level and 25 seats of Office 365 at the gold level.

As a Microsoft Partner with the Cloud Productivity or Communications Competency, you get 25 seats to Office 365 E5 and 100 seats with the Gold competency.

## VISUAL STUDIO

If your organization has Visual Studio subscriptions, you should know that each subscription has a set amount of Azure credits built in that the subscriber can use. The credit amount varies depending on the type of subscription purchased. You can also use MSDN software within your MSDN subscription on Azure Virtual Machines for development and test at no extra charge. The rate you will pay does not include any licensing costs — even virtual machines with SQL Server, SharePoint Server, or other software that is normally billed at a higher rate.

\$50 AZURE CREDIT	\$100 AZURE CREDIT	\$150 AZURE CREDIT
<ul style="list-style-type: none"><li>• Visual Studio Professional – annual</li><li>• Visual Studio Professional with MSDN</li><li>• Visual Studio Test Professional with MSDN</li></ul>	<ul style="list-style-type: none"><li>• MSDN Platforms</li></ul>	<ul style="list-style-type: none"><li>• Visual Studio Enterprise – annual</li><li>• Visual Studio Enterprise with MSDN</li><li>• Visual Studio Enterprise with MSDN (BizSpark)</li><li>• Visual Studio Enterprise with MSDN (MPN)</li></ul>



## Ways to Purchase Azure

There are a few ways you can purchase Azure and if you are a CSP, you have a built-in usage for testing your solution.

### ENTERPRISE AGREEMENTS

Another option for getting access to your technical professionals is to purchase an Enterprise Agreement (EA). This arrangement is ideal for larger organizations that require the ability to create subscriptions for different departments, and even implement charge-back based on the department. Azure subscriptions within an EA agreement are managed through the Azure EA portal and allow for delegated administration and the ability to set quotas at the department or subscription level. For more information on how to get started with purchasing an enterprise agreement for Azure usage or adding Azure to an existing EA, visit: <https://azure.microsoft.com/en-us/pricing/enterprise-agreement/>.

### PAY AS YOU GO AND TRIAL ACCOUNTS

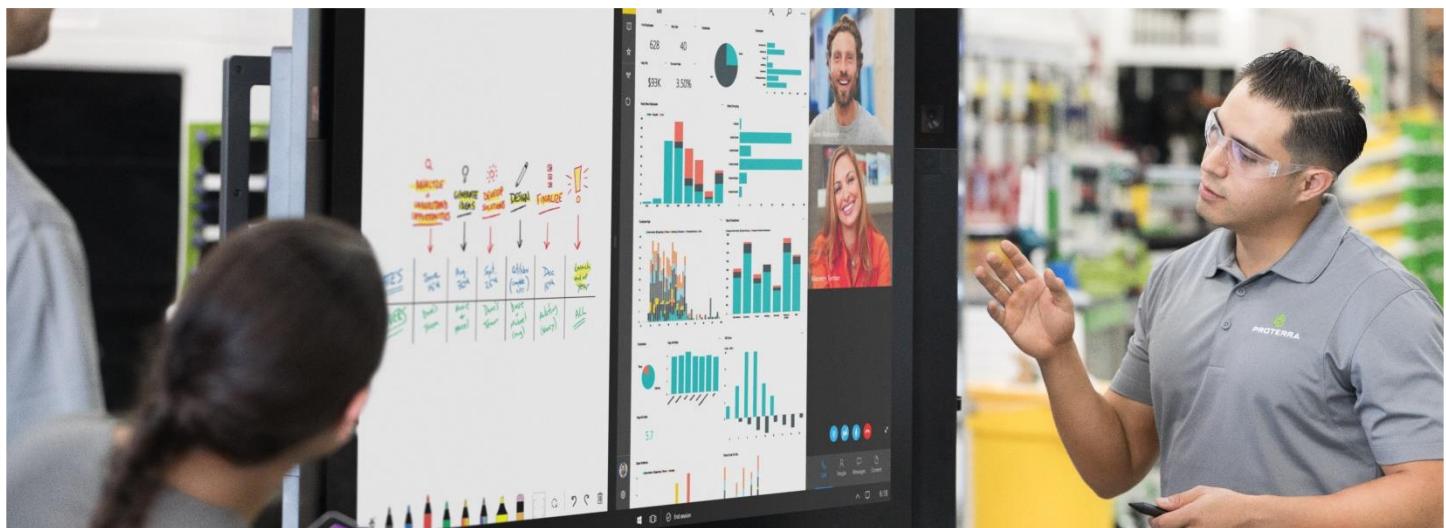
You can also create a free trial with Azure and allow it to convert to a pay-as-you-go subscription. An Azure free trial is valid for 30 days and allows up to \$200 in Azure credits. After the initial 30 days, any Azure usage is billed directly to you on your credit card. You can start a free trial by browsing <http://azure.microsoft.com> and clicking the free trial link.

### OPEN LICENSE

You can also purchase Azure through a reseller using the Microsoft Open License Program. Open Value is the recommended program if you have a small to midsize organization with five or more desktop PCs and want to simplify license management, manage software costs, and get better control over your investment. It also includes Software Assurance, providing access to valuable benefits such as training, deployment planning, software upgrades, and product support to help you boost the productivity of your entire organization. For more information on the Microsoft Open Licensing program, visit: <https://www.microsoft.com/en-us/licensing/licensing-programs/open-license.aspx>.

### CSP SANDBOX

Make sure you take advantage of the CSP sandbox capability. Every Microsoft Partner onboarded in CSP has access to \$200 worth of test accounts for every subscription they provision.



## Key Contracts and Tools for Your Practice

Practices need to use a set of legal documents to ensure compliance and deliverables, and an implementation process, to track the progress of a project both in terms of progress against a project plan and project budget, as well as protect your IP.

### KEY CONTRACTS

Leverage the [Key Contracts for Your Practice guide](#), to learn more about developing service level agreements, master services agreements, a statement of work, and a mutual non-disclosure agreement.

### MICROSOFT PROJECT ONLINE

[Microsoft Project Online](#) is a flexible online solution for project portfolio management (PPM) and everyday work. Delivered through Office 365, Project Online provides powerful project management capabilities for planning, prioritizing, and managing projects and project portfolio investments — from almost anywhere on almost any device. Project Online can be used by administrators, portfolio managers and viewers, project and resource managers, and team leads and members.

### AZURE DEVOPS

[Azure DevOps](#) provides various tools for tasks like running agile teams, providing support for Kanban boards, handling work item backlogs, scrum boards, source control, continuous integration and release management. Source control functionality provides Git support, which enables integration with GitHub, if such integration is desired.

While Azure DevOps will help you manage the technical aspects of your project, cost-containment requires a different set of tools.

### MICROSOFT DYNAMICS 365 FOR PROJECT SERVICE AUTOMATION

[Microsoft Dynamics 365 for Project Service Automation](#) provides users with the capabilities required for setting up a project organization, engaging with customers, project scheduling and costing, managing and approving time and expenses, and closing projects. It is specially targeted to address the needs of a Project Services based practices, as it is designed for professionals who manage projects and the associated customer engagement process end to end.

### GITHUB

[GitHub](#) provides the hosted environment for the IoT implementation team to version control and share their source code, notebooks and other artifacts, both privately (e.g., internally to a team) and publicly (e.g., an open source project), and collaborate on development projects.





## Collaboration Tools and File Sharing

Collaborating with customers through the lifecycle of a project or the duration of a managed services agreement is critical. There are several services that can help you share project plans or set up lists for shared data.

### AZURE DATABRICKS

Machine learning and AI are critical components of any IoT solution. [Azure Databricks](#) provides a fast, and collaborative Apache Spark based analytics platform optimized for Azure. Designed with collaboration between data scientists, data engineers, and business analyst in mind, Databricks notebooks simplify sharing.

Databricks also integrate effortlessly with a wide variety of data stores and services such as Azure SQL Data Warehouse, Azure Cosmos DB, Azure Data Lake Store, Azure Blob storage, and Azure Event Hubs, and Power BI.

### MICROSOFT TEAMS

[Microsoft Teams](#) is the latest collaboration tool from Microsoft and is designed to make your content, tools, people, and conversations available in a single location.

### YAMMER

[Yammer](#) is an enterprise social network collaboration offering to help teams collaborate and share files with each other.

### ONEDRIVE FOR BUSINESS

[OneDrive for Business](#) is an enterprise file sharing service that is designed for automatic synchronization of files between your computer and the cloud. OneDrive makes it easy to share files with your customers or partners.

### SKYPE FOR BUSINESS

[Skype for Business](#) is an enterprise online meeting and conference service designed for business communications.

### SURFACE HUB

[Microsoft Surface Hub](#) is a Skype Online-integrated collaborations device, or “meeting room in a box.” In addition to the built-in team experiences like Skype for Business, Microsoft Office, and Whiteboard, Microsoft Surface Hub is customizable with a wide array of applications. Universal apps built for Windows 10 shine on Microsoft Surface Hub and scale to the large screen. You can also connect apps from your personal device and drive them from Microsoft Surface Hub.

## Using CRM to grow your business

CRM solutions streamline processes and increase profitability in your sales, marketing, and service divisions.

A strong CRM solution is a multifaceted platform where everything crucial to developing, improving, and retaining your customer relationships is stored. Without the support of an integrated CRM solution, you may miss growth opportunities and lose revenue because you're not maximizing your business relationships. Imagine misplacing customer contact information, only to learn that your delay pushed your client into the arms of a competitor. Or, picture your top two salespeople pursuing the same prospect, resulting in an annoyed potential customer and some unfriendly, in-house competition. Without a centralized program where your people can log and track customer interactions, your business falls behind schedule and out of touch.

### THE FUNDAMENTALS OF CUSTOMER RELATIONSHIP MANAGEMENT

CRM tools make the customer-facing functions of business easier. They help you:

- Centralize customer information
- Automate marketing interactions
- Provide business intelligence
- Facilitate communications
- Track sales opportunities
- Analyze data
- Enable responsive customer service

Running a successful business is no simple task. When marketing campaigns, data analysis, meetings, customer care, and more, all happen simultaneously, you need a powerful CRM solution to bring all these functions together in one place.

As a sales professional, you'll be working with the following types of records:

**ACCOUNTS:** Account records contain information about the companies you do business with.

**CONTACTS:** Contact records contain information about the people you know and work with. Usually, multiple contacts are associated with one account. Contacts could include people responsible for making purchasing decisions or paying invoices, support technicians, or anyone you work with at the company.

**LEADS:** Leads are potential sales, and you or your company can get leads from many different sources. For example, you can generate sales leads from marketing campaigns, inquiries from your website, mailing lists, social media posts, or in person at a trade convention.

**OPPORTUNITIES:** When you qualify a lead, it becomes an opportunity, or a deal that you're getting ready to close.

[Microsoft Dynamics 365](#) can be customized, so you can also work with records relevant to your field and the way your organization does business, including [sales](#), [customer service](#), [field service](#), [project service automation](#), and [marketing](#).



# Define Customer Support Program and Process



## Support overview

It has been said that an unhappy customer represents an opportunity to make a customer for life. Studies have found when a customer gets to the point of a complaint, they are very emotionally engaged. If you can turn that negative around to a positive, you may just have a customer for life.

When it comes to support, there are two perspectives you should consider. First, how will you support your customers when they have engaged you for project services, managed services, or are utilizing your intellectual property. Second, where do you go for [Azure support from Microsoft](#) for a solution you are building, or because you need assistance on behalf of your customer?

### THE ITEMS YOU WILL NEED TO WORK THROUGH INCLUDE:

- Defining your support model
- Provisioning your support infrastructure
- Defining and implementing your escalation process
- Selecting and enabling your support options for Azure

We cover each of these topics in the pages that follow.

# Supporting Your Customers

Let's begin with the first scenario in which you support your customers directly. It should go without saying that one of the most important functions for your IoT practice will be supporting your customer once their applications and data are firmly in the cloud or sitting in a hybrid deployment. No matter how well a cloud or hybrid environment is planned, provisioned, operated, or monitored, problems will arise — and those problems will need to be remediated. It's your job as an MSP to offer support to your customers to deal with outages, breaches, inefficiencies, and disaster scenarios. MSPs need to consider the level of support that makes sense for their practice — in terms of resources and revenue — as well as what makes sense to the customers they serve.

## SUPPORT MODEL

How do you package and sell your support? The typical options are to provide support either on a retainer basis (where the customer pays a monthly fee for up to a certain number of "use it or lose it" support hours) or per incident (where the customer pays a fee every time they utilize your support). You must also define your support availability so your customers have a realistic expectation of when they can access your service.



## ESCALATION PROCESS

How does a customer get help at the right technical level? For your support process to make economic sense, avoid having your most skilled and most expensive resources (e.g., architects, senior developers, data scientists, etc.) answer every support call. For your particular solution offering, consider implementing a tiered support offering of junior-level resources that are equipped to handle common issues. These resources should be equipped to escalate a customer support case to a more senior-level resource once the common issues have been ruled out. You will need to decide how many levels of tiered support to offer, but two to three tiers are most common. When defining your escalation process, do not forget about the basics. For example, how do customers get in touch with you for support in the first place? This could be a dedicated support telephone number, forum or chat room, Twitter handle, email address, etc.



**Support infrastructure:** How will you manage customer support requests and track them to closure? Many MSPs offer premium support offerings such as a Technical Account Manager who is responsible for tracking, reporting, and escalating an issue.

# Support Options from Microsoft

How do you receive support for your implementation efforts or on behalf of your customer?

## SIGNATURE CLOUD SUPPORT

[Microsoft Signature Cloud Support](#) is provided as benefit to Silver and Gold Partners. It primarily provides support for issues occurring in Azure subscriptions you own or on which you are a co-admin. It is not intended for use in supporting issues in subscriptions owned by your customers.

## MICROSOFT ADVANCED SUPPORT FOR PARTNERS

[Microsoft Advanced Support for Partners](#) is the ideal solution for partners who are growing their cloud business. Not quite ready for Premier Support, but need a higher level of service than the Microsoft Partner Network core benefits provide? The Advanced Support program delivers the right level of support to meet you in the middle while your business grows. With Advanced Support for Partners, you get cloud support at an accessible price point, which helps you be a great ally to your customers and grow your business faster. The program includes valuable proactive and reactive services delivered by experienced Services Account Managers and Partner Technical Consultants. Advanced Support for partners enables you to provide support on behalf of your end customers, in addition to providing support on subscriptions you own directly. Designed from the feedback of over 1,500 partners like you, Microsoft Advanced Support for Partners addresses the specific needs of Cloud Solutions Providers (CSPs), born-in-the-cloud partners, and all other partners selling Microsoft cloud services.

## MICROSOFT PREMIER SUPPORT FOR PARTNERS

[Microsoft Premier Support for Partners](#) delivers a managed support offering for you and your customers — proactive support services for developing, deploying, and supporting Microsoft technology whether on-premises, hybrid, or in the cloud. As the only partner program with complete, end-to-end managed support across the full Microsoft platform, Premier Support for Partners also provides a powerful marketing tool to gain competitive advantage in the marketplace.

Microsoft offers a range of paid [Azure support plan](#) options for customers from developers starting their journey in the cloud to enterprises deploying business-critical, strategic applications on Microsoft Azure. These options are available in tiers — **Premier, Professional Direct, Standard and Developer Support Plans** — that are available for purchase directly for those who are not Microsoft Partners. In addition to these paid plans, Azure offers **core support**, which is free and provides support via forums, and help with account billing or management questions.

## SUBMITTING AZURE SUPPORT REQUESTS

Support requests need to be submitted using the Azure Portal. First you must log in to the subscription for which you want to receive support. Next, submit a support request. Once submitted, you can manage the incident from the Azure Portal.

## PARTNER ADVISORY HOURS

Partner advisory hours are used as currency for technical presales and advisory services offered by the Microsoft Partner Services team.

As part of your company's Microsoft Partner Network membership, your organization receives partner advisory hours for attaining a Microsoft competency, membership in Microsoft Cloud Accelerate, and subscribing to Microsoft Action Pack Develop and Design.

PARTNER LEVEL	NETWORK MEMBER	ACTION PACK	SILVER	GOLD	THESE HOURS CAN BE USED TO:
	0 hours	5 hours (after first cloud sale)	20 hours	50 hours	<ul style="list-style-type: none"><li>Deploy the latest Microsoft technologies internally</li><li>Build skills and knowledge</li><li>Close deals faster</li><li>Get expert advice</li><li>Chalk talks</li></ul>

## SUPPORT OPTIONS

PARTNER-FACING OPTIONS	RESPONSE TIME
Signature Cloud Support	Less than 2 hours
Microsoft Advanced Support for Partners	Less than 1 hour
Microsoft Premier Support for Partners	Less than 1 hour
Partner Advisory Hours	N/A

CUSTOMER-FACING OPTIONS	RESPONSE TIME
Premier	Less than 1 hour
Professional-Direct	Less than 1 hour
Standard	Less than 2 hours
Developer	Less than 8 hours
Core	N/A

# Manage/Support an IoT solution deployed in Azure

## Support Resources

Supporting an Azure deployment involves transitioning from deployment focus to ongoing health and occasional troubleshooting. Microsoft Azure offers several services to help manage and monitor workloads running in Azure, documentation for troubleshooting the services for your practice, and the [Azure Community](#) where you can ask questions, get answers, and connect with Microsoft engineers and Azure community experts.

### KEEPING AN EYE ON COSTS

If your IoT solution is deployed to Azure, there are a lot of ways you can both forecast spend and keep track of your actual costs.

- You can get estimated costs before adding Azure services by using the [Azure Pricing Calculator](#). This calculator includes all Azure services, including those relevant to the IoT practice like IoT Hub, SQL Server, Cognitive Services, Azure Machine Learning and Databricks.
- Once you have resources deployed to Azure, you should regularly check the Subscription blade in the [Azure Portal](#) for cost breakdown and burn rate. From here, you use the Cost analysis feature to analyze the cost breakdown by resource.
- You can also report on your Azure costs programmatically by using the [Azure Billing APIs](#). There are two APIs available that when used together enable you estimate your spend by resource: the Azure Resource Usage API enables you to get your Azure consumption data, and with the Azure Resource RateCard API you can get the pricing information for each Azure resource.
- There are other situations, such as for an EA, a sponsored Azure subscription, or subscriptions acquired thru a CSP provider. These have their own portals for analyzing consumption and costs. For details on how to monitor these, view [this Azure billing and cost management article](#).

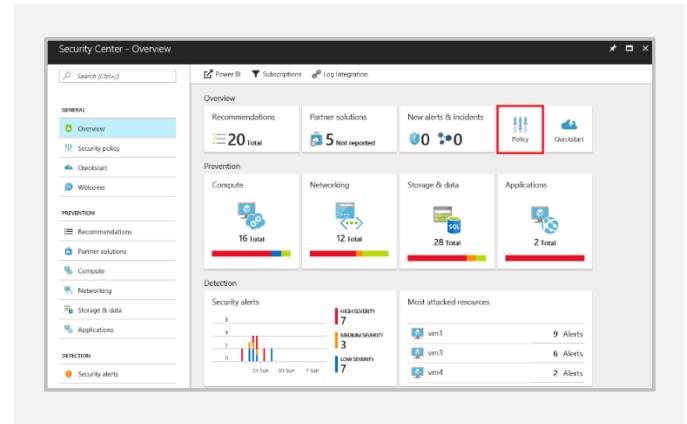


## AZURE SECURITY CENTER

[Azure Security Center](#) helps you prevent, detect, and respond to threats with increased visibility into and control over the security of your Azure resources. It provides integrated security monitoring and policy management across your Azure subscriptions, helps detect threats that might otherwise go unnoticed, and works with a broad ecosystem of security solutions. Azure Security Center should be part of any managed service practice to assist with monitoring and support.

Security Center delivers easy-to-use and effective threat prevention, detection, and response capabilities that are built in to Azure. Some of its key capabilities are:

- Monitor the security state of your Azure resources
- Defines policies for your Azure subscriptions and resource groups based on your company's security requirements, the types of applications that you use, and the sensitivity of your data
- Uses policy-driven security recommendations to guide service owners through the process of implementing needed controls
- Rapidly deploy security services and appliances from Microsoft and partners
- Automatically collect and analyze security data from your Azure resources, the network, and partner solutions like antimalware programs and firewalls
- Leverages global threat intelligence from Microsoft products and services, the Microsoft Digital Crimes Unit (DCU), the Microsoft Security Response Center (MSRC), and external feeds
- Apply advanced analytics, including machine learning and behavioral analysis
- Provides prioritized security incidents/alerts
- Offers insights into the source of the attack and impacted resources
- Suggests ways to stop the current attack and help prevent future attacks



## AZURE ADVISOR

[Azure Advisor](#) analyzes your resource configuration and usage telemetry to detect risks and potential issues. It then draws on Azure best practices to recommend solutions that will reduce your cost and improve the security, performance, and reliability of your applications.

## OMS LOG ANALYTICS

Even if you are not offering OMS as part of your core offering, using [Log Analytics](#) for support and monitoring can be a huge time saver. Log Analytics can help you collect and analyze data generated by resources in your cloud and on-premises environments. It gives you real-time insights using integrated search and custom dashboards to readily analyze millions of records across all your workloads and servers regardless of their physical location.

## ENGAGING MICROSOFT SUPPORT

If you are a CSP or have sold support as part of your managed services solution you are the front-line support for your customer. At some point, you may need to contact Microsoft to escalate an issue. Microsoft offers several options via forum support or via paid options as discussed in the preceding [Support Options from Microsoft](#) section.

# Support Ticket Setup and Tracking

## Customer Support

Setting up tickets, tracking issue resolution, and managing customer success are fundamentals of your practice.

Providing support to your customers from your practice is a non-trivial, omni-channel effort. Consider using Azure Machine Learning to monitor the performance of production deployed models. We suggest you implement [Microsoft Dynamics 365 for Customer Service](#) to help you quickly set up and start managing your overall customer support efforts.



### MICROSOFT DYNAMICS 365 FOR CUSTOMER SERVICE

Microsoft Dynamics 365 for Customer Service is designed to manage the efforts of your customer support teams. It

provides licensed users with access to core customer service capabilities for a significantly lower price than comparable offerings from other vendors, including enterprise case management, Interactive Service Hub, Unified Service Desk, SLAs and Entitlements, and other service group management functionality.

### CREATE CONSISTENCY AND LOYALTY

Provide the seamless service your customers expect by meeting them where they are with the information they need, every time.

- Give customers great service on their channel of choice.
- Make help easy by providing relevant, personalized service.
- Proactively address issues by detecting customers' intent and social sentiment.

### MAKE YOUR AGENTS' JOBS EASIER

Give your agents complete information — in a single customer service software app — to make smart decisions and provide great service.

- Reveal customers' case histories, preferences, and feedback.
- Provide guidance on entitlements and service-level agreements.
- Display it all in a single interface tailored to their job and skillset.

### GET AN ADAPTIVE ENGINE

Respond quickly to customer and market changes within an agile, cloud-based environment that has digital intelligence built in.

- Adapt and customize easily using configuration, not code.
- Extend your functionality through a single interface.
- Rely on advanced analytics and a trusted cloud platform.

# Implement Intellectual Property Offerings

## Implementing IP in Your IoT Practice Offerings

Consider these tips to start productizing your IP and go to market.

### DEFINE YOUR SOLUTION

When we ask partners how they determined what IP they were going to build, we often get the same answer, which is that they realized most of their customers were asking for the same thing or something very similar. And rather than continuing to do high-cost custom work for every customer, they decided to productize what their customers were asking for. Bring your sales, marketing, technical, and delivery teams together to brainstorm and define what your solution will look like.



### DETERMINE WHAT WILL DIFFERENTIATE YOUR SOLUTION FROM OTHERS IN THE MARKET

It is important that you think about your differentiation strategy. What is going to make your solution better than other similar solutions in the industry?

### MAINTAIN RIGHTS TO THE IP

As partners make the transition from project or custom services to packaged IP, it is critical they revise their customer agreements so the partner can maintain the IP rights to the solutions.

### PROTECT YOUR IP

As we mentioned in Understanding Intellectual Property, you should engage legal counsel to help you protect and maintain ownership of the IP you create. Key to partner success with IP is taking care with licenses, contracts and terms of use and the acquisition of patents.

### ESTABLISH A RECURRING REVENUE MODEL

The beauty of deploying IP in the cloud space is that you can light up the recurring revenue model, which will have a positive impact on the valuation of your business and even help your cash flows in the future.

### CONSIDER YOUR CHANNEL STRATEGY

One of the advantages of productizing your IP is that it opens up a lot of doors to sell your solution through channel partners.

## Resources

- [Building IP to Drive Margins](#)
- [Create Stickiness with IP](#)

# Setup Social Offerings

## Blogging, Meetups, and More

Contributing to the technical community can help you increase credibility for your practice. It has the side benefit of strengthening the technical acumen of your delivery team by having them focus on a specific subject for a public-facing deliverable. Below are some suggested options to get started.

### BLOGGING

Technical blogging is a great way to increase the skills of your technical team, as well as grow stature in the community at large with your organization. Blog posts should be well thought out and simple to digest. Visual aids such as diagrams or nicely formatted source code snippets go a long way towards readability.

### MEETUPS, USER GROUPS & ASSOCIATIONS

Speaking at user groups and association events is another valuable tool to increase the skills of your team. Similar to blog posts, it's great practice for honing vital communication skills with your team, as well as a great opportunity to dig deeper into a specific subject related to your practice. For an IoT practice, consider the following:

[Meetup.com Internet of Things Meetups](#)

[The Internet of Things Association](#)

### GLOBAL AZURE BOOTCAMP

Each user group will organize their own one-day deep dive class on Azure the way they see fit. The result is that thousands of people get to learn about Azure and join online under the social hashtag #GlobalAzure! This is a great opportunity to attend, participate as a speaker

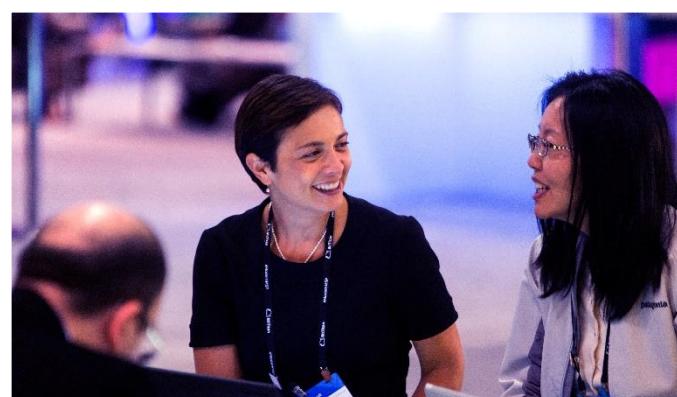
(reach out to your local organizer to see how you can help) or host your own. For more information, visit <http://global.azurebootcamp.net/>. **WEBINARS**

Webinars are another resource to extend your teams skills. Similar in scope to speaking at a meetup or user group, the webinar allows a much broader reach as attendees from all over the globe can attend.

### MICROSOFT MVP COMMUNITY

For more than two decades, the Microsoft MVP Award is our way of saying thank you to outstanding community leaders. The contributions MVPs make to the community, ranging from speaking engagements and social media posts to writing books and helping others in online communities, have incredible impact. Among other benefits, MVPs get early access to Microsoft products and direct communication channels with product teams, and are invited to the Global MVP Summit, an exclusive annual event hosted in Microsoft's global HQ in Redmond. They also have a very close relationship with the local Microsoft teams in their area, who are there to support and empower MVPs to address needs and opportunities in the local ecosystem.

Contributing to the Azure community not only helps the reputation of your practice, but it can also hone much-needed skills for your delivery team.



# Create Engagement Checklists & Templates

## Standardize Customer Engagement

Repeatable processes make for profitable practices. Use the following example to kickstart your own checklist for executing a new engagement.

- Conduct envisioning session to capture vision for the IoT solution.
- Conduct initial requirements meeting.
- Identify product owner/manager(s).
- Conduct follow-up meeting to clarify and establish next steps.
- Discuss minimal viable product (MVP) criteria and decide on proceeding with a PoC or Pilot.
- Conduct an architecture design session to capture solution detailed solution architecture.
- Identify milestones, tasks, evaluation criteria and exit criteria; share with customer.
- Provide cost estimates for research, hardware, development, cloud services, and ongoing maintenance/support.
- Address customer objections to proposed technology and services.
- Establish project repository for code, models, and project issues, tasks and documentation artifacts (e.g., GitHub or Visual Studio Team Services).
- Setup realistic device simulation.
- Perform solution development of the PoC or Pilot.
- Deploy solution.
- Follow up with customer and provide reports/status/demos on a regular basis (e.g., two-week sprint).
- Conduct a final handoff to customer.
- Conduct project debrief with customer.
- Customer conducts acceptance tests.
- Conduct internal project post-mortem.
- Monitor performance of the solution in production.

# Go to Market and Close Deals

## Internet of Things

[aka.ms/practiceplaybooks](http://aka.ms/practiceplaybooks)



# Executive Summary

In previous sections in the playbook, we covered topics from how to build your practice by selecting products or services to specialize in, to building and training your team help turn your ideas into reality, to bringing your special offering to market and finding and keeping great customers. So, what's left to do? In this section, we'll discover strategies to compel potential customers that may be sitting on the fence to take action, from creating a good value proposition to building marketing and sales materials that tell your story.

It has been said that your current customers are your best customers. Do you know who your best customers are? What do they have in common? And how do you find more like them? We'll start by helping you build foundational marketing materials such as marketing personas, points of differentiation, value propositions, and customer business needs.

Once you've built the foundation, we'll look at how you can put these materials to work. We'll go through the different ways you can attract new customers and look at best practices. How do you put it all together? We'll discuss why integrated marketing campaigns work the

best, and the tools you need to run them, such as a CRM system and marketing automation.

But marketing is only half of the story. Your sales team is the other half. Don't forget how the two work together and what marketing can do to support sales. The job of the marketing team is to build out not only customer facing materials, but also compelling materials that can be used to train and arm your sales team.

The sales end of the bargain is to close the sale. One way to do this is by writing a winning proposal. Another way is to build a proof of concept or pilot project of your product or service offering, which could help a prospect understand what it is you're offering, or solidify their vision of what you can help make possible. Microsoft is committed to helping your business grow, and provides both co-selling and co-marketing opportunities.

Finally, don't miss the Microsoft resources available in the [Go-to-Market and Close Deals guide](#), which you can leverage to help build your marketing materials and campaigns, as well as resources to help your team close the deal.

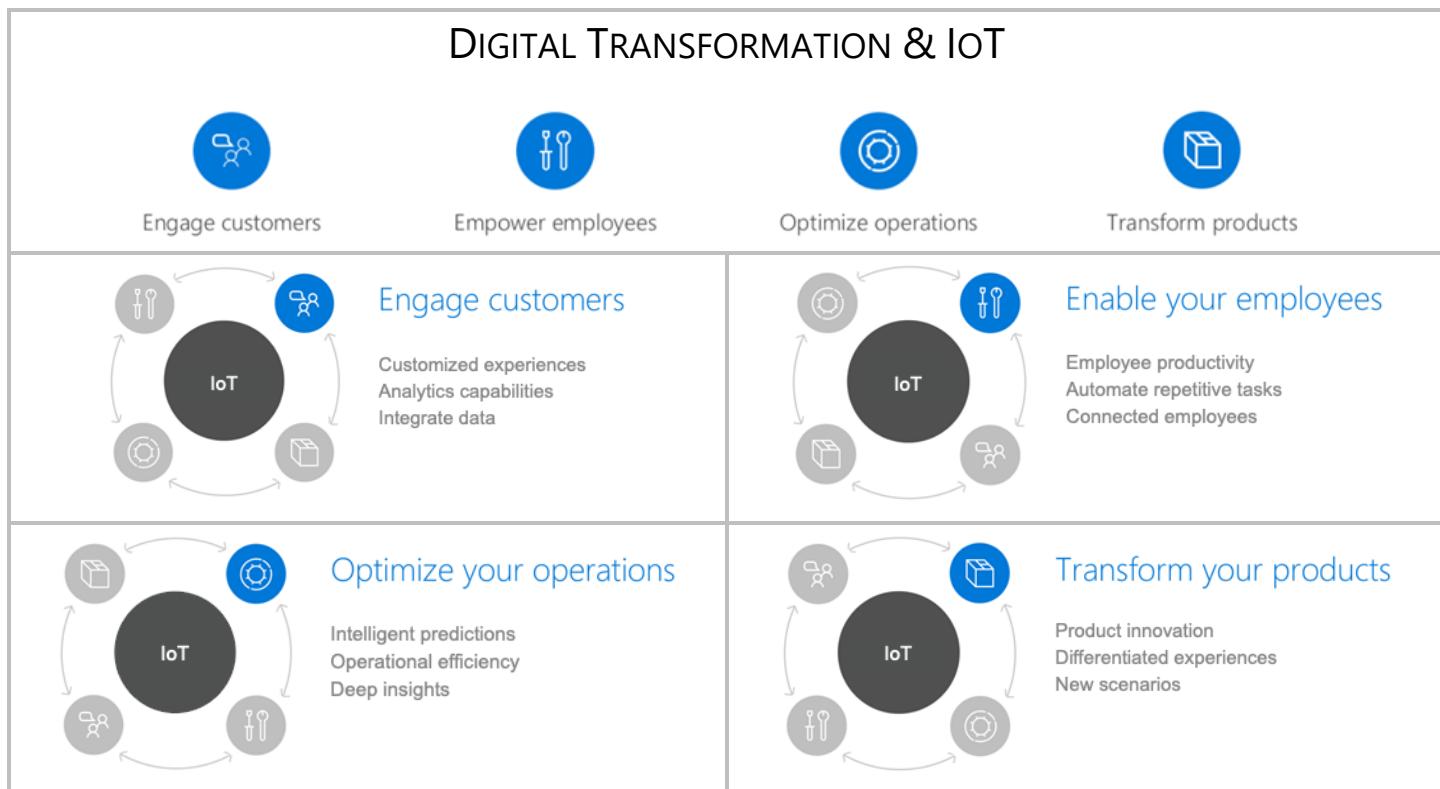
## Top 5 things to do

Add value to your practice and turn your prospective customers into lasting ones. These are the top 5 things you should do to go to market and get deals done.

- Identify your customer's business needs
- Write a compelling value proposition
- Leverage marketing to find customers
- Build marketing and sales materials
- Collaborate with partners

# Marketing to the IoT Buyer

What is different about the IoT buyer? According to the partners interviewed for this book, buyers for IoT solutions are still relatively unsure of the full capabilities that IoT can deliver, how its benefits can be applied to their business, and if IoT is secure. They are interested in learning more about IoT and are looking for partners to help them understand how IoT can be tailored to their use cases and solve domain specific problems. It is up to the you to recognize the opportunity to apply and sell IoT.



## DO's and DON'Ts for Marketing to the IoT Buyer

**DO** target your existing customers with envisioning sessions and PoCs before marketing to win new customers.

**DO** emphasize how IoT solutions augment human ingenuity and productivity.

**DO** help them envision the possibilities enabled with the use of IoT technologies.

**DO** describe the benefits of in terms of the business needs (e.g., "Our technology provides remote monitoring of refrigeration temperature so that you can focus your employees on less menial tasks that directly affect the bottom line.")

**DO** explain how IoT might benefit the customer's digital transformation.

**DO** provide realistic benefits based on your experience with your IoT solution.

**DO** lead with IoT as the value proposition, and how it can help to improve the customers business insights.

**DON'T** expect customers to fully understand the intricacies of an IoT solution.

**DON'T** describe the benefits solely in terms of the "cool" technology (e.g., "Leverage Machine Learning with IoT pressure sensors and solve all of your current and future problems.")

**DON'T** overpromise the capabilities of IoT.

## Go-to-Market and Close Deals Guide

Leverage the Microsoft resources available in the [Go-to-Market and Close Deals guide](#), for details on marketing to the cloud buyer, aligning marketing goals with business goals, developing value propositions, and marketing and sales assets, resources, and best practices.





## Buyer engagement

Buyers buy differently than in the past. With all the information on the internet, buyers tend to research and self-educate long before they engage with salespeople. By the time they do engage with sales, they've already made some decisions.

To help illustrate this, just think about the way a buyer might go about buying a new car. Before going to the car dealership, the buyer will likely read about various car models on the internet, read reviews, and make some decisions. When the buyer is ready to visit a dealership, they already know what they want and how much they are willing to pay for that car. This poses a challenge for sellers. How can you get prospects to engage with you earlier in the process? Through marketing.

Another way partner businesses are changing is that when selling cloud-based solutions, you can gain recurring revenue streams. Recurring revenues provide business stability and confidence for business owners and managers, allowing them to make business decisions that may not be as easy when revenues are irregular and lumpy. While these recurring revenues are

smaller on a per-transaction basis than buyers' large capital expenditures, you adjust for this. You'll need a higher volume of transactions. To support that, you'll need a higher volume of high quality sales leads (through modern marketing techniques) coming in to create larger sales pipelines. Clients who are buying on a recurring basis represent great opportunities for you to upsell and cross-sell additional products and services.

Marketing is not an option anymore. Marketing helps you educate, identify, and engage with prospects earlier in the sales process. By identifying prospects who indicate interest in your products and services via their behavior (website visits, clicks, downloads, etc.), marketing can deliver high-quality leads.

Inbound marketing techniques such as search engine optimization and pay-per-click advertising make it easy for prospects to find you. Outbound marketing techniques, such as e-mail and telemarketing, enable you to tell prospects about your company's solutions.

Marketing is the toolset that addresses all these changes. Marketing today is digital and has the power to reach more people. Again, it's not to say that more traditional, non-digital marketing is ineffective. But to be found by prospective buyers that you don't have a relationship with, you need to employ digital marketing techniques. Modern marketing is focused on the prospects' and clients' views of the world.

# Consultative Selling and Technical Pre-Sales

## Discovering the art of the possible

From the very start of your engagement with a prospect, you need to be aware of the need for technical pre-sales assistance. Many times, you are dealing with business decision makers during the buying cycle. In that case, you are less likely to have a need for technical assistance. However more than ever before, technical staff are a part of decision making with IoT practices as they help envision a solution to solve a customer need.

Your technical pre-sales staff should be very experienced users of your products and services. These employees need training or experience as a user of your products. Former support employees often make good technical pre-sales staff. The technical pre-sales staff is in place to explain technology, how it works, how it meets a business need and to answer any other questions. They should excel at the more complex issues that come from prospects, and be focused on pre-sales, working together with sales and marketing, who address the business benefits. One without the other cannot be effective. You need the sales staff to speak to business decision makers and envision the art of the possible, with IoT solutions this often occurs jointly with technical expertise.

Examples of technical probing questions to ask during pre-sales conversations supporting an IoT practice:

- What are the challenges you are looking to solve?
- Are you looking to improve communication, learn from your data (such as predicting future events)?
- Is the data generated and captured with your system or is it external and provided by 3<sup>rd</sup> parties?
- What application development and technologies are within your existing team's comfort zone? Do you have any data scientists on the team?
- What application platforms would you like to target? Web, mobile, desktop, IoT, etc.
- Do you have any compliance or regulatory requirements that pertain to the handling of your data?

- Can you walk us thru the high level of where data enters your system and how it is ultimately consumed?

### BEST PRACTICES – CONSULTATIVE SELLING:

Rather than just promoting an existing product, the salesperson focuses on the customer's problems and addresses the issue with appropriate offerings (products and services). The problem resolution is what constitutes a "solution".

#### **The best reps combine solution selling with insights.**

To gain credibility in the eyes of the buyer, the solutions sales rep must introduce content and data that adds value to the sales call.

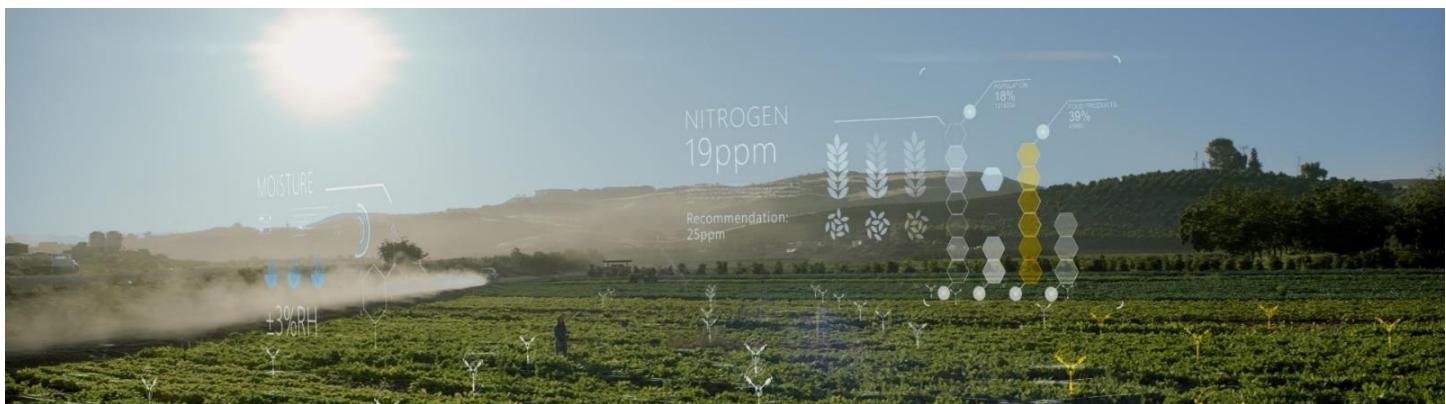
**Ask good questions.** The successful solutions seller remains sensitive to the buyer's needs and asks important questions at the right moment.

**Listen actively.** Solution selling requires considerable understanding of the buyer's needs, which will only come from listening attentively. Solution sellers should actively listen as the buyer details their organizational needs, taking notes and asking considerate questions in the process.

**Offer guidance.** Solution sellers must guide the buyer towards the solution being offered. This guidance comes as the solution seller adopts something of a teaching role, helping the buyer to overcome business challenges by utilizing their deep knowledge of industry pain points and trends.

### RESOURCES

→ [Azure Pre-Sales Resources](#)



# Microsoft Technology Centers

The [Microsoft Technology Center \(MTC\)](#) can help you find the right solutions to transform your customer's business in a mobile-first, cloud-first world.

With over 40 locations around the globe, the MTCs bring together the right resources to help you accelerate your customer's digital transformation.

- **People:** The MTC staff is comprised of experts in Microsoft solutions. Their tenure in the industry ensures they will effectively guide your team to rapidly find solutions to your technology challenges.
- **Partners:** The MTCs have formed alliances with industry leaders who provide comprehensive resources, including hardware, software, and services to explore during your engagements.
- **Place:** The MTC environment provides rich interactive and immersive experiences for you to learn first-hand how Microsoft and partner technologies can help you take on your most difficult challenges.

Start your digital transformation by experiencing the Microsoft cloud at one of the 40+ centers around the globe.

The MTC can work with you to help you close sales with these engagement offerings:

[aka.ms/practiceplaybooks](http://aka.ms/practiceplaybooks)

- **Strategy Briefing:** This one-day briefing starts by examining your current IT environment and business objectives. Then it moves into the Envisioning Center, where you'll see Microsoft solutions in action through powerful demos and scenarios customized to meet your needs. The day includes mutual discovery, tailored product and technology drill-downs, and expert presentations. It culminates with the delivery of a clear and actionable picture of how Microsoft and partner technologies can help you reach your business goals.
- **Architecture Design Session:** This custom session focuses on your business objectives and aligns them with specific applications of Microsoft software to help you not only meet your goals, but also capitalize on them. We'll provide architectural guidance, consultation on preferred practices, and risk analysis to chief technology officers, architects, and senior members of your development team.
- **Proof-of-Concept:** In this multi week, in-depth workshop, our architects work closely with key members of your technical staff to transfer knowledge and prove out customized solutions. This workshop may also include detailed demos and training sessions. Your team will have a private, secure, and fully loaded development suite that's preconfigured prior to their arrival.
- **Workshops:** If seeing is believing, then imagine what a hands-on immersive experience can do! Attend a custom briefing that includes a facilitated, hands-on environment where you and your colleagues can experience the vision of Microsoft's platform and solutions firsthand.

# Optimize and Grow

## Internet of Things

[aka.ms/practiceplaybooks](http://aka.ms/practiceplaybooks)



# Executive Summary

So far we've covered strategies for building your IoT practice, finding and keeping customers, and providing them with ongoing support.

In this section, we'll focus on how to optimize your IoT practice, strengthen your relationship with customers, and evaluate your performance to help you continue to delight prospects and customers.

Are your customers delighted by your services and products? Delighted and not just satisfied? In this section, you'll learn why customer lifetime value is so important, and how to create more customers for life. We'll share how to get to know your customers better by following their journey with secret shopping and analysis. We'll also explore the use of a "land and expand" strategy and see how getting to know your customers better can lead to incremental opportunities to provide additional services.

You will also discover ways you can keep your solutions top of mind for prospects and customers through nurture marketing, and how to grow and improve your lead generation practice through a well-planned referral marketing program. We'll show you how to make the

most of your renewal process, and how to get ahead of deadlines.

We will help you learn how to grow your business by identifying the best customer personas and creating "look-alike" prospects, deepening your expertise in key verticals and marketing that expertise, and collaborating with other partners to offer your customers a more comprehensive level of service and support.

We will end by discussing how important it is to create advocates for your company. This includes turning a customer into a fan and collecting testimonials to create case studies that can be used in future marketing campaigns. Map your customer's experience and ask for feedback to ensure you are turning satisfied customers into delighted customers who can wait to tell your story!

Use the strategies we provide in this section and in the [Optimize and Grow guide](#) to optimize and grow your practice.

## Top 5 things to do

Learn from your customers and experience to optimize your practice, and expand to new markets through strategic partnerships. These are the top 5 things you should do to optimize and grow your practice.

- Gather feedback from your customers
- Nurture existing customers
- Turn customers into advocates
- Generate referrals with marketing
- Nurture strategic partnerships

# Understanding Customer Lifetime Value

Customer lifetime value (CLV) is the revenue from a customer over the lifetime of their relationship with you.

As most businesses have experienced within the tech industry, a lifelong customer is of far greater value than any one-off transaction. It's no longer enough for companies to invest their time and resources into the generation of single purchases. This is particularly true in the IoT world, where your devices and software will be tightly integrated with the customer's systems. Given the investment customers will make to incorporate your products into their critical infrastructure, it is vital that you develop relationships and solutions that engage a customer for life.

CLV allows you to step back and look at not just one sale, not just one customer, but the customer base as a whole. It's about defining the economic value of each customer within that base and using that metric to make data-based decisions. If you don't know what a client is worth, you don't know what you should spend to get or keep one.

Knowing the CLV helps you make critical business decisions about sales, marketing, product development, and customer support. For example:

- **Marketing:** What should my acquisition costs be?
- **Sales:** What types of customers should sales reps spend the most time on trying to acquire?
- **Product:** How can I tailor my products and services to my best customers?

- **Customer Support:** How much can I afford to spend to provide customer service to my customers?



CLV is also a good way to guide and reward your sales team. Pay them more for bringing in customers with high potential lifetime value. By measuring and monitoring your cloud customer CLV, you can:

- Gain insight into your customers' cloud consumption and usage.
- Qualify for MPN cloud competencies that will help you grow your business.
- Help your customers reach their desired business outcomes.
- Leverage insight for cross-sell/upsell and proactively engage customers for extension opportunities.

By increasing your customer adoption rates, you can increase your CLV, particularly with cloud customers. The more employees you can get to use your service or solution, the more likely you are to increase CLV. Here are some ways to improve adoption:

## What do you need to do to be successful?

Key attributes of a successful adoption approach

Define a vision & identify business scenarios	Prioritize solution & create an adoption plan	Commit resources & execute an adoption plan	Measure, share success, & iterate
A deep understanding of the business goals, as well as people challenges and needs to achieve them.	A solution that people love and that helps them achieve business goals and get things done more effectively.	A strategy to drive adoption including communications, readiness, and community.	A benchmark, KPIs, and success stories to help demonstrate success internally, improve, & expand.



While it's important to define and track your metrics, there are some simple things you can do to increase your CLV.

Your customer strategy must be built on a culture of customer success and tracking customer satisfaction. Critical success factors, when it comes to CLV, are:

- Being sensitive to customer emotions.
- Maintaining good communication.
- Listening to customer pain points.
- Understanding that there are multiple layers to any one concern.
- Doing business with an understanding and empathy for where your customer is coming from.

## Guide: Optimize and Grow

Leverage the Microsoft resources available in the [Optimize and Grow guide](#), for details on building customer lifetime value, executing nurture marketing efforts, optimizing and growing from feedback, refining your customer value proposition, growing partnerships, and measuring results.

## Next Steps

- Identify customer lifetime value of your five best customers.
- Identify your average customer lifetime value along with your Microsoft contact.
- Identify actions to increase your average customer lifetime value.

Learn more about CLV in the Modern Microsoft Partner Series eBook, [Deliver Customer Lifetime Value](#). To model CLV as it relates to your business, explore the modeling tool available on the MPN portal.



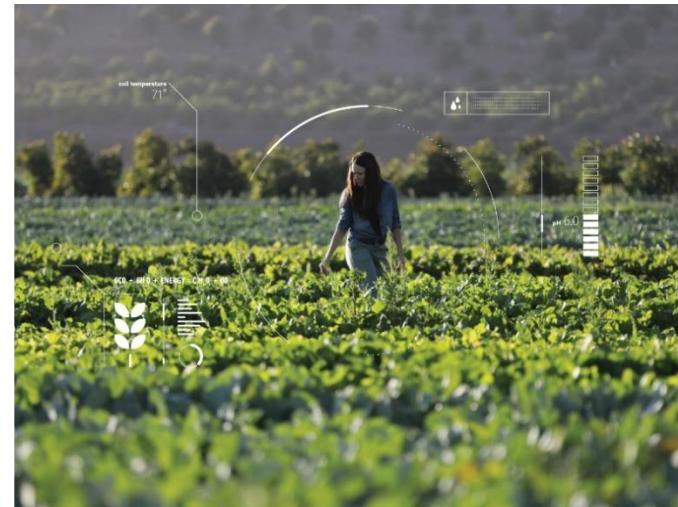
# IoT Playbook Summary

Thank you for taking the time to review this playbook. We hope you have gained new insight on how to successfully grow your IoT practice by taking advantage of unique offerings from Microsoft, engaging with your customers, & forming strategic partnerships.

Our goal, when creating this playbook, was to establish a baseline definition of IoT, organize resources and provide insight that you can use to quickly accelerate or optimize your IoT practice. To this end, we laid out the practice's opportunity, emphasized that IoT is a broad opportunity that presents itself across industry verticals, and provided relevant information on business strategies and technical topics to capitalize on the opportunity, within five sections that you can review in order, or individually at any time.

In the first section, **Define Your Strategy**, we helped you define the strategy upon which to build your practice. Here we provided an introduction to Microsoft's approach to IoT and the technologies you can leverage from the Microsoft IoT platform, and examples of the various project services, managed services and intellectual property your practice could sell. The services critical to the IoT practice that we detailed were the envisioning session, the proof of concept and support. The key actions we prompted you to take are: identify your unique value proposition, develop your solution offer leverage the Microsoft Partner Network, and plan your support options.

In the second section, **Hire & Train**, we focused on the importance of hiring the right team, and provided details around the skills, certifications, and experience you should look for in each role. In addition, we provided specific guidance for ongoing training and certifications, including those from Microsoft like the MCSA.



In the third section, **Operationalize**, we suggested you put your plan into action. We recommended that you leverage your internal use benefits to get your Microsoft licenses and subscriptions to help reduce the costs of your IoT solution in Azure, create your key contracts, set up your support process, set up your social offerings and organize your engagement process into checklists.

The fourth section, **Go to Market & Close Deals**, emphasized getting your practice off the ground by defining your sales process, building materials to support sales and marketing, finding new customers, and then nurturing and investing in them to build lasting relationships. Here we examined how marketing to the IoT buyer requires a different approach as most prospects are not asking for IoT specifically. Similarly we identified how the sale is also different, suggesting it is more akin to selling an on-going experiment than a one time project.

The final section, **Optimize & Grow your Practice**, stressed the importance of learning from your customers and your experience with post-mortem analysis that help optimize your practice and help it expand to new vertical markets through strategic partnerships. The top five actions we provided for you in this section were: Gather feedback from your customers, learn from your project successes and failures, create case studies and a marketing plan to expand into new vertical markets, maximize your efficiency and profit to fuel growth, and establish and nurture strategic partnerships.