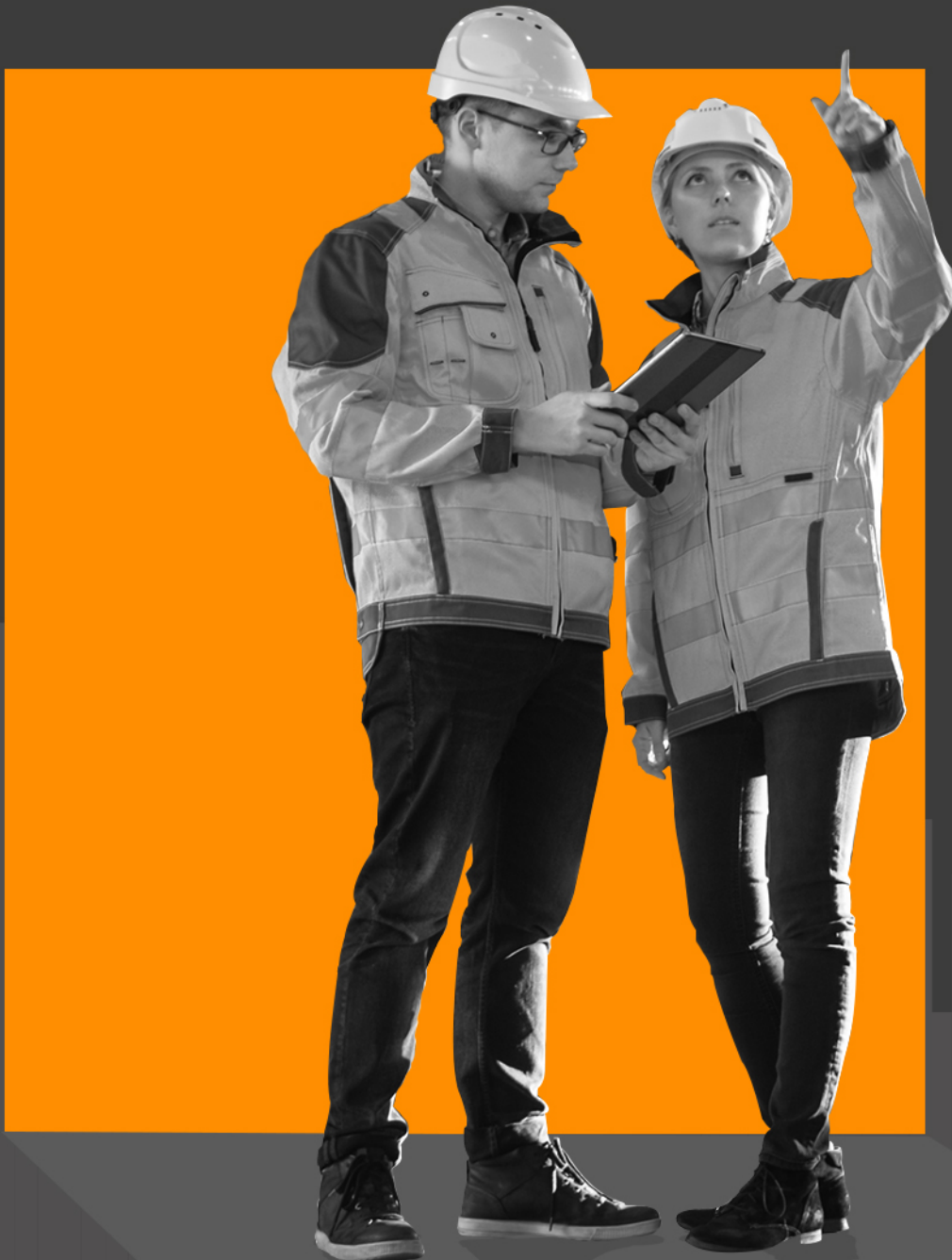


BSQUARE

The Four Stages of IoT Adoption:

Insights for OEMs



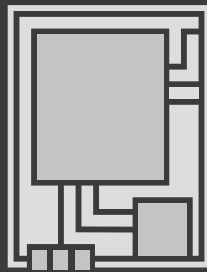
Introduction

As cloud, artificial intelligence, and edge computing technologies advance, Internet of Things (IoT) adoption continues to accelerate. Companies are using IoT to solve business challenges, helping them to improve product quality, reduce costs, and increase operational efficiency.

For OEMs (original equipment manufacturers) building connected products, the increased adoption brings new opportunities and risks. Manufacturers are capturing more data about how the product is being used by customers, which opens the door for new revenue streams such as monetized data platforms. Manufacturers also experience increased expectations from their customers in terms of product uptime and performance.

In fact, according to 2020 [IoT Signals Report](#), 90% of IT decision makers surveyed consider IoT to be critical to their company's success and digital transformation. Additionally, more than half of those respondents expect to expand their use of IoT in the coming years.

In this whitepaper, we'll explore the primary reasons OEMs are integrating IoT technology into their product portfolio. We'll also explore the four key stages of IoT adoption, so that you can accelerate your capabilities in delivering a stable, secure, and innovative connected product.



90%

Consider IoT critical to their company's success

50%

of IoT adopters expect to expand their use of IoT

Top three reasons OEMs offer IoT

With all the benefits IoT offers, it's not surprising that according to [IoT Analytics](#), global IoT spending in 2021 is slated to grow 24%. Below we've compiled three reasons why OEMs are rushing to invest in IoT.

24%

Global IoT spending in 2021 is
slated to grow 24%

1. New revenue models

Subscription models

Manufacturers are leveraging IoT to sell product subscription models to their customers. For example, some industrial OEMs offer equipment subscriptions as an alternative to selling manufacturing equipment. They use technology to enable predictive maintenance and gather other insights to optimize equipment usage. The subscription model can eliminate up-front capital expenditures and lower start-up costs, which can be appealing to customers.

The subscription model has the bonus of valuable data insights. Companies can use insights to improve devices, target device marketing, and even create new products. Because customers engage with their subscription on a regular basis, OEMs can learn exactly how customers use devices, including time of day, location, and purpose.

Aftermarket support models

OEMs also use IoT technologies to offer aftermarket product support. For example, for customers in industrial settings, equipment downtime can be costly. Thanks to the use of device monitoring and predictive analytics, OEMs can keep equipment in top condition and production lines running smoothly. Through monitoring, they get alerted when potential issues are detected. This allows them to mitigate issues proactively, avoid interruptions, extend equipment life, and earn revenue long after the sale of equipment.

2. Cost reduction and efficiency

Reduced maintenance costs

IoT technology can help reduce the cost of maintaining equipment. Predictive maintenance offers multiple benefits ranging from increased asset use and extended asset life to reduced costs.

Reduced operational costs

From an operational standpoint, OEMs have multiple opportunities to help customers trim expenditures. Smart building technology can help companies reduce energy usage. Supply chain solutions can track products from manufacturing floor to your customer's door. Data insights derived from connected devices can help inform more streamlined operations.

Increased productivity

IoT can also deliver insights to help fine-tune operations and increase productivity by connecting employees and automating repetitive tasks. Remote monitoring saves time traveling to locations to check and maintain equipment.

3. Regulatory compliance

Companies turn to manufacturers for IoT-aided regulatory compliance. Compliance is essential for securing information systems. This means customers can be confident their data will remain confidential to threats, while still accessible to their organization. Regulatory compliance also helps signify that devices are trustworthy, allowing customers to purchase your IoT solutions with confidence.

Savvy manufacturers help their customers reduce risk by analyzing the threats faced when using their product and testing to ensure the product is equipped to handle them. This could include data encryption, securing key storage, and creating regular updates for remote patching. Using an audit log also allows manufacturers to continuously ensure regulatory compliance for customers.



Get started with IoT adoption: 4 Phases

In this section, we'll take a high-level exploration of the four key phases of IoT adoption, covering insights as well as tips to help you overcome common hurdles.

Phase 1	Phase 2	Phase 3	Phase 4
Create a business case	Develop your solution	Build your solution	Deploy your solution
<ul style="list-style-type: none">• Define your goals• Establish customer use cases• Quantify the opportunity and calculate ROI	<ul style="list-style-type: none">• Determine which parts of the product you will build or buy• Assess the risks• Develop a device management strategy• Build proof of concept	<ul style="list-style-type: none">• Purchase components• Manage changes• Build in scalability	<ul style="list-style-type: none">• Gather useful data• implement device management and operations• Stay current on security trends

1. Create a business case

Your first step is to clarify what your customer or product needs, and what solution will fit those needs. Building a strong business case will focus and inform the rest of the IoT adoption process. It can help to save time and money in the long run and smooths the way for cross-organizational stakeholder buy-in.

Define your goals

Often IoT projects span multiple internal organizations and functions, each with their own challenges, biases, and needs. Clarifying goals and expectations at the start can reduce frustration and help convince stakeholders who might be hesitant. Unfortunately, many organizations skip this step, leading to stalled projects or less-than-stellar outcomes.

“The 30,000-foot view is important”

says Janan Guillaume, Senior Director of Product Management at Bsquare. “If you start from the tactical level rather than the strategic bigger picture, you’ll often miss out on what’s really important.”

Questions your organization should answer include:

- What is the opportunity or problem are you trying to solve?
- How does a connected IoT solution help address the problem?
- How will you manage the solution once you solve it?

Be sure to gather input from experts in areas such as cloud, IoT, security, and artificial intelligence. This can provide a better perspective of the needs and limitations of your IoT solution.

Establish customer use cases

Once you've set clear goals, explore existing projects to understand how your IoT solution might reasonably function for customers. You can find plenty of large developer communities filled with resources and use cases to explore, including many common scenarios like preventative maintenance, asset tracking, environmental monitoring, and process optimization.

You'll also want to define the specific customer experience with connected devices and explore how the experience will change with your proposed solution. Reaching out to customers during this stage can be a good way to gain valuable data that can inform development.

Quantify the opportunity and calculate ROI

Before ideation becomes something more substantial, it's worth considering project costs—and whether the projected results are worth the investment. During this stage, vet your plans to support the devices, the limitations of your current IoT model, the ideal outcome, and how far below the ideal outcome will still provide a reasonable ROI.

When it comes to defining customer success, Rik Attrill, Director of Project Management at Bsquare, says,

“When we're building a product, it needs to be something that solves a need and that enables a customer to change the way they do business.”

Pro tip

The expenses for building and adopting new IoT products can be daunting. If this is the case, consider returning to the first step—defining goals—and narrowing your focus. Simplifying goals can help reduce costs and make the ROI more accessible.

Did you know?

A device operations strategy that includes a management solution helps manufacturers on both sides of the equation—creating recurring revenue opportunities and reducing warranty costs.

2. Develop your solution

Once you've done preliminary research, it's time to dig into the logistics of creating your product. Follow these high-level steps to develop your solution.

Determine what you will build or buy

When integrating new technology into your products, you will need to determine which technologies are best suited for the purpose. Whether you opt to build from the ground up (allowing you to own the IP) or purchase a pre-built solution (often reducing time to market), there is no one-size-fits-all approach. Your decision depends on multiple factors, a few of which are outlined below.

Research existing solutions

For starters, you will want to determine if what you want already exists. There are many solutions on the market that address common usage scenarios. However, if your need is highly specialized, or you have very specific goals in mind, it might be more difficult to find something off the shelf.

Assess capability vs capacity

The decision to build or buy also depends on the expertise of your workforce. According to the [IoT Signals Report](#), more than a quarter of respondents find that IoT solutions are simply too complex. Many teams simply don't have the time or skillsets to build a solution from the ground up. Furthermore, from a capability standpoint, be sure to choose a solution that can scale as customer needs evolve.

Build a realistic timeline

Additionally, your decision may hinge upon how quickly the solution needs to be developed. Nailing down the ideal time to market can determine whether you buy or build.

Consider a hybrid approach

Finally, it's always possible to mix and match your development approach. For instance, if you feel comfortable building the hardware, but need more assistance with the software, considering outsourcing the software portion of your IoT solution.

Assess the risks

While IoT adoption offers multiple advantages, it's not without risks. Inventory the potential risks you may encounter, so that you can be proactive in addressing and minimizing issues during the build process.

Security

The [IoT Signals Report](#) notes that security is the biggest concern around IoT adoption, with the top priorities including software and firmware management, hardware and software testing, and updates to software and firmware. According to David Rogers, Founder and CEO of Copper Horse Ltd, a Bsquare partner specializing in mobile and IoT security,

“Sometimes customers perceive that there is no risk just because they can't see it. They think they can cut corners.”

Privacy

With the amount of data generated by IoT solutions, privacy poses another common risk. Make sure that your solution protects data and complies with privacy laws and that data is secure from hackers

Customer expectations

Many of the risks around security also tie into the general risks that come from managing customer expectations. For example, customers might be reluctant to adopt IoT solutions in the wake of recent data breaches in distributed systems. To manage this and other fears, be clear about security risks, as well as the ways you plan to handle them. Maintaining clear communication with customers is crucial to ensure that as a project evolves, it continues to fit their needs.

Develop a device management strategy

It's easy to get caught up in the short-term aspects of solution development. But the best way to ensure you can manage and scale your solution as business needs evolve is to plan in the development phase.

Device management increases security and can reduce costs and downtime. Ideally, select a device management solution that enables you to manage and update all your devices remotely and securely. A quality device management strategy offers the following capabilities:

- 24x7 monitoring and alerts
- Remotely update and provision devices
- Remotely manage system software, OS, firmware, and other settings
- Recovery from system failures without downtime
- Ability to scale as needed

Perform a proof of concept

For many businesses, this stage can be the most difficult. It can be helpful to partner with an experienced company like Bsquare, which will bring additional perspectives and expertise to your project. Whether you get outside help or not, however, here are a few tips for handling your proof of concept.

Define success criteria

Your proof of concept needs to focus on meeting the technical and operational requirements you have set forth, rather than ROI, since IoT needs to scale. Look to decision makers to define their specific criteria for success.

Start small

Start your proof-of-concept project with a small-scale product line. You can preview the product with potential customers, review performance, and refine. For example, you could begin with building sensors. Once your sensors meet customer needs, you can start building devices that act based on the information collected by these sensors. Starting small allows you to save money and time.

Learn from data

Document your learnings from both successes and failures. In fact, failed attempts yield important learnings about your IoT solution as well as your operations. Incorporate this knowledge into future attempts.

Did you know?

SquareOne from Bsquare is a scalable device management solution that enables you to remotely secure and update devices 24/7.

3. Build your solution

By now, all your research and development will have come together, and cross-functional teams are collaborating to ensure all aspects of your product function seamlessly. It's time to take your IoT project from concept to execution.

Purchase components

Even if you decide to build your product from scratch, you'll still have to purchase components. Setting up licensing can be a complicated process that can span days or weeks. Give yourself ample time to make these purchases. Work with suppliers to nail down costs, timeframes, and service level agreements.

Manage changes

Stay Flexible

Like most projects, building a product often deviates from the plan, whether due to technical difficulties or evolution of technology. To handle unexpected shifts, build wiggle room into your project timeline and, ideally, into your budget. Look for opportunities to allow for future technology improvements to be incorporated in your design. IoT is a fast-moving industry and what is cutting-edge today can be obsolete tomorrow.

Seek outside help

Once solution development gets underway, you may encounter knowledge gaps in your team. If your employees aren't comfortable handling the entire project, consider working with external partners like Bsquare. Tapping outside expertise with the right skillsets, whether you hire employees or find vendors, can ease the strain on your team, keep your build on track, and ensure you have ongoing support for the future.

Build in scalability

As noted earlier, it's critical to ensure your solution is designed to scale with your customer's business. This could be anything from cloud connectivity to analytics applications to device management.

“For me, an IoT project is not just about designing the product itself, but also the whole ecosystem around it”

says Jonathan Henderson of Shipshape Design Co.

Pro tip

Part of scaling depends on the network and coverage your devices have. It can be tempting to choose cheaper networks or platforms for your current set-up, but this can make scaling more difficult later. Investing in something that can scale with your solution can pay off in the long-term.



Did you know?

From [Windows IoT](#) to [Linux](#), Bsquare can walk you through complicated licensing processes and help you set up software.

4. Deploy your solution

If you've reached this phase, congratulations! Your solution has made its big debut. Now that you and your customers are up and running, be proactive in making the most of your solution.

Implement device management and operations

Device management

Device management is one way you can start gathering information, though its uses go far beyond data collection. If you didn't initially include a device management solution in your IoT solution, it can be a useful addition to your product, since it includes everything from device provisioning to routine diagnostics.

Device provisioning allows you to add more devices safely and easily to your current system by providing authentication and configuration features to the process. This helps prevent bad actors from joining the system and customize devices to fit your needs.

Diagnostics

Catch potential problems early and collect data that can inform future patches or products with routine diagnostics. Providing long-term, constant coverage can also save money and reduce downtime, whether from fixing issues earlier or optimizing processes.

Gather useful data

Understanding how your product is being used can provide valuable insights into maintaining the current devices, meeting customer expectations, and generating ideas for future projects. This information can come through customer surveys, as well as information from the devices themselves. Exploring bugs, use times, and common pain points can inform future patches or updates.

When it comes to data collection, the more information you gather, the better. Data from one device (or customer) can give you some useful insights, but data from a larger network of devices can indicate trends and patterns. This helps you catch potential issues early.

Stay current on security trends

Maintaining a high level of security helps you build trust with customers and provide products that people can use with confidence. When it comes to helping devices remain secure, make sure you're actively monitoring and applying security patches and updates as needed. Ensure security policies and practices are up to date and being implemented.

As Eric French, Director of Customer Operations at Bsquare, explains, "To use a forest analogy, it's essentially preventing the next fire from happening. We want to spend less time with fires and more time with preventative maintenance to prevent fires."

Pro tip

While implementing current security trends is important, many security risks can come from poor security practices by your customers or employees. Consider educating users on basics such as the importance of changing default passwords and updating firmware regularly.



Did you know?

If you'd like to get started with [device management](#) and operations, Bsquare has you covered. Our experts can offer support at all stages of your digital transformation.

Accelerate your digital transformation with Bsquare

Digital transformation through IoT adoption can be a complex undertaking with plenty of challenges. But the numerous benefits make it worthwhile.

The good news is that [Bsquare](#) can help. As a software and services company, Bsquare designs, deploys, and operates technologies that solve difficult problems for manufacturers and operators of connected devices.

We help companies realize the promise of IoT through the development of intelligent devices and systems that are cloud-enabled, share data seamlessly, facilitate distributed learning and control, and operate securely at scale.

[Contact Bsquare](#) now to get expert insights and assistance in all stages of your digital transformation.

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