ACHIEVING MORE WITH CONNECTED PRODUCTS
Six best practices to build for success
April 2019
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Introduction

A few years ago when the Internet of Things reached the peak of the hype cycle, many promises were made about its disruptive potential. In manufacturing, headline after headline promoted the massive market opportunity for scenarios such as connected products and data monetization. A 2015 IDC report predicted that by 2018, 40% of the top 100 discrete manufacturers would rely on connected products to provide product-as-a-service. Instead, many manufacturers approached IoT as a science experiment, testing numerous ideas to see what would stick.

Today’s manufacturers recognize that IoT is no longer an experiment—it’s a new way of doing business. By 2020, the number of connected devices per person is expected to be 6.58, resulting in about 50 billion connected devices worldwide. Whether you’re adding IoT sensors to standby generators or considering how smart garage doors could fundamentally change the home delivery experience, IoT can create new value and help transform your organization. As a result, global manufacturers are estimated to invest $70 billion on IoT solutions in 2020, up from $29 billion in 2015.

One of the most promising IoT scenarios continues to be connected products—devices and equipment embedded with sensors, software and connectivity that exchange data with other products, operators, or environments. Connected products are different from operational scenarios, which use IoT sensors to connect and monitor the manufacturing production process.

Though some manufacturers may implement connected products with data monetization in mind, there’s a wide spectrum of scenarios that help you derive value from IoT data and transform your business. For example, you may want to better understand how customers use your products or begin exploring new value-added services.

Yet, while manufacturers have the best intentions, initiatives are stalling out. According to Capgemini, only 21% of manufacturers are at an advanced stage of IoT innovation. Nearly 70% of manufacturing business executives in a recent McKinsey survey said their IoT initiatives are stuck in pilot purgatory, unable to reach company-wide scale. Furthermore, respondents said only 15% of Industrial IoT initiatives move to scale within one year.

In our conversations with customers, we’ve learned that IoT is a marathon, not a sprint. Most of the success stories come from manufacturers who adopted an incremental approach to connected products; taking small, thoughtful steps to realize value, prepare for organizational change, and position themselves for future growth.
In this paper, we’ll outline six tactics for how manufacturers can take a similar approach towards connected products to achieve short-term wins while setting themselves up for long-term success.

Six best practices to build for success

Don’t let perfect get in the way of progress

With the IoT market shifting so rapidly, connected products are constantly evolving. Today’s smart buildings and smart cities, for instance, are a vast network of hundreds of IoT-enabled devices that communicate information. With this level of complexity, it’s no surprise that connected product manufacturers can get caught in “perfection paralysis”—waiting for the right moment to step into the fray. Yet, every moment you delay, you give the competition an opportunity to outpace you.

Many of our customers have found staying ahead means standing up a connected product despite some unknowns. Start with a scenario built on a strong business case that aligns with your company vision and proves value. Trek Bicycles, a world leader in bicycle manufacturing and creator of the BCycle fleet of smart bikes, recognized the importance of having clear goals. “If you start with a grand vision or ideal way of doing things and then you try to make it into a reality, you find a lot of things start to backfire and not actually fit the plan,” notes Software Developer Eric McIntyre. “It’s better to start with a goal you’re heading towards and stay flexible.”

To avoid pilot purgatory, get the right stakeholders on board and accelerate toward a minimum viable product (MVP). Ask questions such as: What products can I connect now? How would connecting them provide a greater understanding of product performance and usage? How could we layer IoT data with data from other departments, external sources, or environmental variables to gain deeper insight? And don’t let the lure of the “next big thing” delay your go-to-market efforts—there will always be new technologies or capabilities on the horizon. You can always incorporate them later, but they shouldn’t be a blocker to launching your connected product.

“We stayed on track by constantly asking ourselves ‘Is this useful for the customer?’ That helped us avoid paralysis because we knew we had something tangible to bring to the table”

Steve Nackers
Corporate Manager of Electronic Controls
Sub-Zero Group, Inc.
Sub-Zero Group, Inc., a global leader in luxury appliances, avoided this blocker when developing their first connected refrigerator by keeping their focus on customer needs. “We didn’t worry about how much more we could do or measure ourselves against what else was out there” says Steve Nackars, Corporate Manager of Electronic Controls. “We stayed on track by constantly asking ourselves ‘Is this useful for the customer?’ That helped us avoid paralysis because we knew we had something tangible to bring to the table.”

By getting your connected products in the field now, not only will you be able to achieve quick wins and deliver value, you’ll open the door for data-driven innovation.

Build in an engineering feedback loop

Connected product data is a gold mine for engineering iteration. It grants manufacturers deep, real-time visibility into how their products are used in the field, enabling them to better meet customer needs without having to wait for traditional data sources like market surveys or customer feedback. However, only 25% of manufacturers are currently using data to deliver actionable insights for product innovation.⁶ Many manufacturers struggle to capitalize on the opportunity because they aren’t capturing the right data.

When creating your digital feedback loop, work with engineering to ensure your products generate data that can be easily cascaded into the product development lifecycle. Explore questions such as: What product parts need to be monitored? What variables should be measured? How can we gain data when we sell through a dealer? Will we need to add a user interface to ensure operator safety or enable remote troubleshooting? How will we protect our customers and ensure our products are secure? Once you’ve aligned on these components, you can design your connected products with the results in mind. “We wanted to take that data and feed it back
to our engineering group so they could see how it’s working in the field. Then they can get insights into how they can improve their designs,” said Bill Witt, Director of Software Development at Generac, a market leader in backup power generation products. “By collecting all of this data to feed back into our analytics and machine learning, we are able to be more intelligent.”

Collecting the right type of data is an important first step, but all that work will be wasted if you can’t interpret it. To convert raw data into actionable insight, a robust analytics layer is required to help you ingest, clean, and store information. While some manufacturers may have these capabilities in-house, many bring in a partner who can offer expertise.

“By collecting all of this data to feed back into our analytics and machine learning, we are able to be more intelligent”

Bill Witt
Director of Software Development
Generac

Once you’ve started collecting the right data, engineering teams can begin leveraging it to improve product design and ensure greater flexibility.

Design products with a flexible architecture

While it would be ideal if manufacturers could always push updates via software, the reality is sometimes software isn’t enough. Over-the-air updates may suffice for consumer products with short lifespans, but for products and equipment expected to last well into the future, hardware updates will likely be required as connectivity methods evolve and bandwidth needs change. Forward-thinking manufacturers are minimizing future update costs by building more modular products with flexible architectures to enable efficient, affordable updates down the road.

Flexibility also helps you learn as you mature in the connected products market. “When you invent something new, it’s a process of trial and error. Trek’s core competency is the actual bike itself, so we had no problems there, but some of our initial hardware decisions were
“Only one year after launch, we’re already redesigning our bike docks to make them more user friendly and evaluating hardware options to address issues such as battery depletion.”

Eric McIntyre
Software Developer
Trek Bicycles

Approach, the development lifecycle doesn’t stop at product launch. Instead, it extends into consumer homes and customer sites, creating a deeper connection between the manufacturer and end user. However, as you refine the development lifecycle, don’t sacrifice vital aspects of your connected device such as security. We’ll talk more about security later, but it’s important to note that unintentionally releasing an unsecured connected product puts your brand and customers at risk.

By designing your products with a flexible architecture, you’re better equipped to improve your products with insights from your data. Connected products also open the door for new data-driven service offerings to keep customers coming back.

Develop new value-added services

Connected products enable manufacturers to offer services that deliver new value to customers. While the products themselves are becoming more commoditized, services give manufacturers an opportunity to grow new revenue streams and differentiate themselves by enhancing customer loyalty. In fact, 72% of manufacturing enterprises predict their use of data analytics will substantially improve customer relationships along the product lifecycle.⁷ Here are a few value-added service scenarios manufacturers are typically looking to explore.

Condition monitoring

Troubleshooting product issues is traditionally slow, costly, and inefficient for manufacturers. It often takes technicians days to get out into the field and evaluate a problem, thereby increasing downtime. When they do arrive, sometimes they don’t have the tools or expertise to fix the problem, leading to further delays and unhappy customers.

Connected products accelerate the troubleshooting process through condition monitoring, collecting IoT data from each product and storing it in a central repository. This empowers experts to remotely diagnose issues, sometimes before the customer even knows they exist.⁸ Some issues can be solved remotely, but if onsite maintenance is required, condition monitoring helps service teams dispatch the right technician with the right tools to deliver a first-time fix, maximizing uptime and customer satisfaction.
Your ability to monetize condition monitoring data will vary based on the market you serve. Condition monitoring is a particularly valuable scenario for manufacturers in markets with mission-critical operational technology such as industrial or medical equipment. It is also highly effective for safety use cases.

**Predictive maintenance**

The natural next step beyond condition monitoring is IoT-enabled predictive maintenance services. While condition monitoring helps manufacturers track equipment performance and health, predictive maintenance helps them predict failures before they occur and conduct field service during optimal times. Not only does this keep customers happy, it helps ensure their safety.

Like condition monitoring, predictive maintenance requires manufacturers to collect and store asset data. However, instead of following a more reactive “break/fix” repair model, manufacturers can estimate when an asset will start underperforming and take proactive steps to prevent breakdowns. This leads to extended equipment life and 50% less downtime.9

Generac first connected their generators to monitor status and performance, but quickly realized the potential to ensure generator readiness via communication with home owners prior to a predicted power outage. In preparation for adverse conditions such as hurricanes, connected generators send home owners real-time status updates, giving them time to address any problems before conditions worsen. “People said it was nice to know that their homes wouldn’t lose power and pipes wouldn’t freeze,” notes Matt Kowalski, Software Development Lead at Generac. “This is a real example of what we can do with connected generators.”
Traditionally, manufacturers would develop a product and sell an instance of that product to a customer, who would own and use it until purchasing another product. However, increased commoditization has led to customer experience overtaking price and product as the main differentiator for manufacturers.

As a result, instead of selling a singular product, many organizations have adopted a product-as-a-service model. Due to connected products and the usage data they generate, manufacturers can now retain ownership of their products and charge by usage rather than selling the product directly to a customer. For example, most Rolls-Royce jet engines are no longer sold outright. Instead, they offer a TotalCare Service that allows customers to only pay for each hour of use.\(^\text{10}\)

This has led to a major paradigm shift within the industry. Manufacturers prefer the product-as-a-service model because they retain ownership of their product. It enables them to reach more customers at a time, increasing their profits while decreasing overhead. Customers appreciate the new model because they only pay for what they use.

Offering new services and adjusting your business model is a significant effort and requires buy-in from numerous people across your organization, but leading manufacturers make it possible by giving change management careful consideration.

Prioritize change management

Change management is one of the most critical components of any business initiative, and IoT is typically a major change agent. Before implementing IoT, it helps to consider how it will fundamentally transform business processes and operations. By recognizing institutional changes and securing employee and stakeholder buy-in early on, you’ll be able to implement connected products more efficiently and at scale.

Effective IoT change management has two components: top down and bottom up. From a top-down perspective, it’s helpful to focus on securing senior leadership champions, otherwise you’ll find it challenging to gain critical support across business units and stakeholder groups. According to McKinsey, 72% of companies with mature IoT programs have an appointed C-suite champion to lead their IoT effort.\(^\text{11}\) From there, the full value of IoT data can only be realized when all business units are on board and sharing information (as well as funding).

From a bottom-up perspective, you’ll want to educate your employees on the importance of their role in the change and why it adds value.

HELPFUL TIP:
Usage data for connected products also helps validate warranty claims, which are historically a major cost center for manufacturers
“Connectivity is a key corporate strategy for Generac, ensuring buy-in at all levels of the organization,” says Witt. “It’s a huge cultural shift for Generac to utilize data to make decisions in all parts of the organization. Employee skills will have to evolve—in some cases their jobs may change entirely—and to drive adoption, you’ll want to provide the right tools and training for them to be successful.”

It’s likely you’ll also identify new skill gaps, such as data science, IoT, artificial intelligence, and machine learning, that you must navigate. Well as training. Leaning on partner expertise will help augment your internal teams and prepare employees for the changes to come.

After getting the right people on board and ensuring their alignment, our customers have often found that working cross-functionally helps them define and overcome barriers, as well as establish best practices. “Sub-Zero had a solid cross-functional steering committee that was a team of sales, marketing, design engineering, and customer service. We took opportunities and ideas to them, and because

“Turning a manufacturing company into a tech company is difficult to support,” says Witt. “Generac has a call center that’s used to receiving questions about the generators, but now they’re taking calls about network problems. The need for a new skill set adds challenges, but we’re making changes and building our team as we grow.” Since the emergent nature of IoT and cloud technologies makes talent harder to find, bring in partners that can help with solution development as it was a broad group, it created buy-in,” says Steve Knox, Manager of Connected Customer Experience at Sub-Zero Group, Inc.

By working as an agile team, your business will be positioned to act quickly as the market changes and new insights surface. Improved alignment will also help ensure everyone is on the same page about firm-wide priorities such as security.
**Adopt an end-to-end security approach**

Connected products deliver value for customers and manufacturers alike, but when unsecured, they can prove valuable to hackers as well. The connected product attack surface is already large and steadily increasing: by 2020 there will be an estimated 50 billion connected devices in use, and 25% of all cyber-attacks will target IoT devices.

Connected products have been subject to multiple high-profile breaches over the past few years, most notably the 2016 Mirai botnet attack. As a result, security is becoming more top-of-mind—93% of recently surveyed consumers believe manufacturers need to do more to secure their devices. Yet, with every manufacturer trying to manage costs while sprinting to maintain market position, it comes as no surprise that some connected products are inadvertently shipped with vulnerabilities.

To protect themselves from substantial damage to their bottom line and their brand, connected product manufacturers are increasingly adopting an end-to-end security approach. “Generac is focusing intensely on security and how the different pieces of our cloud security posture fit together. Obviously, every manufacturer wants to avoid making headlines for the wrong reasons,” says Witt. End-to-end security means making security a priority throughout the entire product lifecycle, from the first concept sketch until the product is no longer in use. “Security is a foundational requirement of connected products and is a prerequisite to success in this space,” says Ryan Kools, Senior Project Engineer at Sub-Zero Group, Inc. “If you choose to prioritize price or speed-to-market over security, everything you do afterwards will be more costly and take more time.”

Effective security starts at the silicon level with a secure MCU, then extends across other hardware and software layers, and further maintains its security posture through remote updates. Even after connected products reach end-of-life and are cycled out, their data still must be encrypted so bad actors can’t gain access to customer or consumer networks.

By embracing their responsibility for customer safety and making security a priority, manufacturers can take a leading role in the next generation of connected products to become a trusted brand and role model for the industry.

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Conclusion

No athlete hops off the couch to compete in a triathlon. They train, pay attention to how their body responds, and adjust accordingly to build stamina and ability. The same is true with IoT and connected products. By approaching connected products incrementally, with clear goals grounded in business value at each step, manufacturers can develop a solid foundation of agility and success. Through quick wins, real-time insights, and a supportive, skilled workforce, you’ll enable new innovations, backed by end-to-end security. Our customers may have started small, but what they discovered on their IoT journey often paved the way to broader organizational transformation that positively impacted their business.

And they didn’t pursue their goals alone. The right partner can provide invaluable expertise to help you answer complex questions or develop an effective IoT strategy. Contact Microsoft to connect with one of our IoT specialists or reach out to one of our partners today.

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