Why IoT projects fail & how to beat the odds

An executive summary

software AG

Foreword

Success of IoT projects

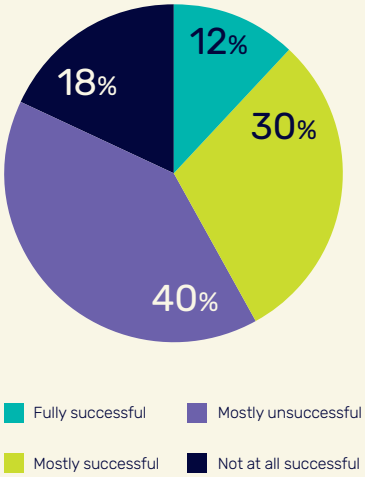


Figure 1: How successful was your IoT project? Why IoT Projects Fail, Beecham Research, 2020

The Internet of Things (IoT) opens up incredible opportunities for industries to connect "things" and change how they operate, market and serve their customers with greater insight, fewer resources and at less cost. It's core to many, even most, of the innovations we see transforming industries, from consumer goods to power transmission.

Much has been written about successes on the IoT. And there have been many projects that have delivered astounding results. Much less has been written about the projects that don't go so well and fail to live up to expectations.

And that was the proposal brought to us by Beecham Research, a leading technology research and analysis firm that specializes in IoT. With support from Software AG and several other partners, Beecham undertook an extensive study into the subject, consisting of both primary and secondary research, including a survey of 25,000 IoT adopters. And some of its findings were dramatic.

Nearly three-fifths (58%) of businesses said that their IoT projects had been unsuccessful—**just 12% said that they'd been fully successful.**

In fact, Beecham estimates that nearly three quarters of IoT projects won't be considered successful. Those are sobering numbers. But we believe that this lack of success has nothing to do with the IoT itself. At Software AG, we see the IoT delivering enormous benefits to businesses of all sizes and across industries. It can improve existing operations within business, as well as introduce new service opportunities.

We would suggest that the high rate of failure is simply a reflection of the fact that implementing IoT isn't straightforward, making it difficult to fully realize the promised benefits.

Beecham's complete findings are now available in its 100-page report, "Why IoT Projects Fail." In the next three pages, Beecham has summarized its key findings. These are structured around the four main reasons it found were behind the failure of IoT projects.

Following that, Software AG offers a list of 10 steps that we believe can help address these challenges and improve your chances of making your projects successful—so you too can realize the incredible potential of the IoT.

I hope that you find this report useful. I'd love to hear from you if you have any questions or feedback. Please reach out to me or my team via LinkedIn or Twitter.

Jürgen Krämer
General Manager, IoT and Analytics
Software AG

software AG

Why IoT projects fail

Beecham Research

The number of connected devices is growing rapidly. This is being driven by both companies extending their use, and more and more organizations wanting to adopt the technology to realize the promised benefits. However, many IoT projects are not meeting expectations, and many are failing completely.

Beecham is focused on the IoT market and talks to many vendors and users about IoT each year. From this contact, we were aware that many organizations were struggling to meet their goals and felt that their projects hadn't delivered on the promise. We wanted to find out how prevalent this was and if there were common factors to projects failing to meet expectations.

We began with a series of one-on-one interviews. These included seven solution providers and 13 end users who have experienced project failures, and we covered projects across a range of sectors and industries—from agriculture to logistics and transport. We also sought out other research conducted in this area.

The second stage of our research was an online survey of 25,000 IoT adopters. Most of the respondents were from North America or Europe, but we had participants from all around the world. The size and reach of this survey helped us to create a more comprehensive picture of the IoT projects being undertaken and compare the successful and unsuccessful ones.

When we analyzed the data, we found that many adopters, both successful and unsuccessful, identified some common hurdles. Across the thousands of projects, we identified four consistent—and significant—challenges at a high level, together with a series of further, lower level reasons for failure.

Business aims not thought out

Company organizational issues

Technological problems not foreseen

Customer/vendor problems

We found that what made the difference between success and failure was how companies addressed these issues. In the next couple of pages we'll discuss each of these challenges in detail.

Robin Duke-Woolley
CEO, Beecham Research

Beecham Research

Beecham Research has been a specialist in the expanding connected devices market for nearly 20 years. Its interest is always in supporting the growth of the market for both vendors and users, and it is consistently recognized by clients as a thought leader. Beecham's deep knowledge of market dynamics comes from its rigorous approach to research which is shared frequently at conferences and events—it offers technical analysis and expertise in IoT services, platforms and security as well as offering advice and support for business strategy and sales development.

beechamresearch.com

96%

of respondents said that a clear under-standing of the desired outcomes was important to the success of IoT projects.[1]

Business aims not thought out

One of the things that makes IoT so exciting is the wide range of things that you can do with it. There's not just enormous variety in what people are connecting but also their objectives.

How important were these objectives?

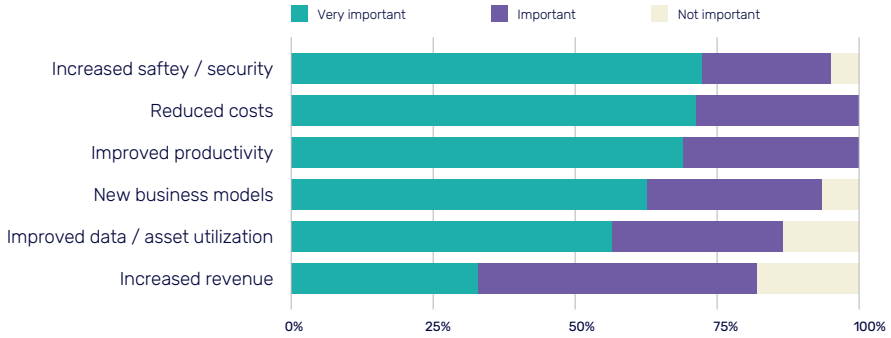


Figure 2: How important were these project objectives? Why IoT Projects Fail, Beecham Research, 2020

We found businesses implementing IoT wanted to increase safety and security, reduce costs, improve productivity and efficiency, and enable new business models. And across these six top objectives, businesses sought an average of 3.7 of them.

Despite these ambitious goals, we found one of the most common reasons for project failure was poorly defined business objectives. And this often led to a lack of clarity on how to achieve them.

To what extent were these objectives achieved?

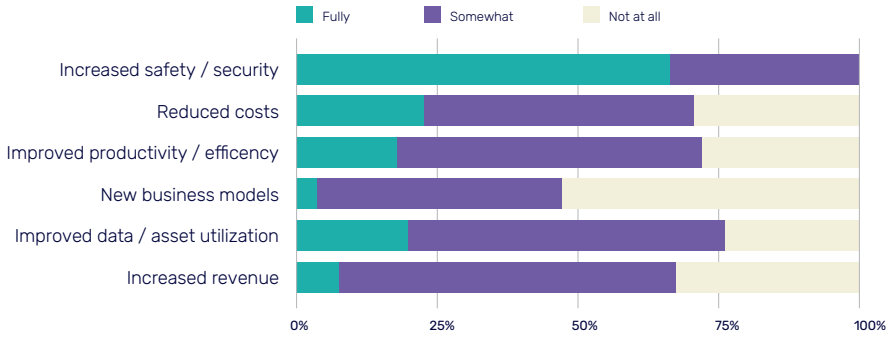


Figure 3: To what extent were these objectives achieved? Why IoT Projects Fail, Beecham Research, 2020

Little wonder then that so many failed to realize their goals—though success/failure was not uniform. All those seeking to improve safety and security said that they'd had some success, and two-thirds (67%) said that they'd fully achieved their objectives. However, companies were not so successful with other objectives.

On average, just 23% said that they'd achieved their objective—though a further 50% said that they'd had some success. Those striving to enable new business models were least likely to say that they'd been fully successful. Just 4% were.

Such difficulties largely come down to a lack of understanding of the specific needs of the project and the complexity of the IoT solutions themselves. That's why building a clear business case is necessary to help identify desired results and how to achieve them.

Engaging with senior management is important to raising the profile of the project and getting everyone on board. This can help you figure out not only how the project will work logistically but also how it aligns with shared objectives.

When it comes to navigating the technical stuff, it's possible users are having difficulty understanding how the IoT components interact, which then prevents the solutions from working effectively. A robust business case should include technical and management support from vendors.

Company organizational issues

Different departments have different goals and different ways of thinking. But IoT projects often span functions and need all concerned to work together to make the project a success.

The importance of cohesion

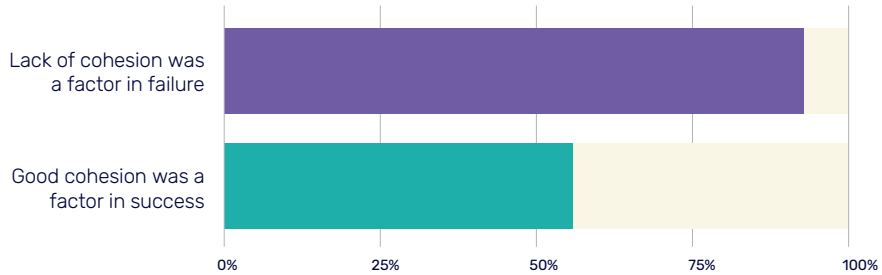


Figure 4: How significant were these business challenges (working with ecosystem partners)? How important were these elements to your IoT project's success (having effective cross-functional teams)? Why IoT Projects Fail, Beecham Research, 2020

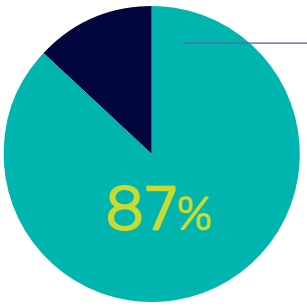
We found that a large number of respondents with unsuccessful projects found working with other business units within the company a challenge, making internal strategy issues a significant contributor to failure. Some simply came up against resistance to change. Others found themselves unable to integrate new IoT practices with older working processes.

By comparison, the majority of those whose projects had been successful attributed having effective cross-functional teams as critical to that success. It's important to recognize that IoT projects cross traditional boundaries and requires coordination and collaboration between both internal—technical and managerial—and external ecosystem partners.

Technological problems not foreseen

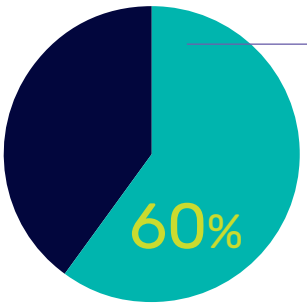
Beyond the initial proof-of-concept phase, many IoT projects require high-bandwidth, high-performance, low-latency network connectivity to transport the data gathered and enable successful integration.

The difficulty in selecting and procuring the right connectivity came out in our research—87% of respondents felt that they didn't have the right expertise, and virtually all respondents said that the connectivity aspect of the project was particularly challenging for them.



87% of respondents felt they didn't have the right expertise to specify the network connectivity they needed.[2]

Part of the problem is people are used to setting up relatively small numbers of devices on "plug and play" wireless networks. Not all networks are designed with the IoT in mind, and scaling from 100 sensors to hundreds of thousands isn't straightforward. As a result, most adopters said that they'd had problems when it came to scaling a solution

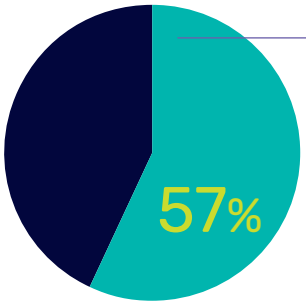


60% of those involved in both successful and unsuccessful IoT projects said that they had problems with scalability.[3]

Connectivity issues also included failure to anticipate, as well as check the availability of suitable coverage everywhere it was needed for the solution to work effectively. A respondent from a logistics company said the success of its nationwide monitoring project was fatally compromised simply because of the lack of rural cellular coverage.

Customer/vendor problems

Because implementing IoT projects can be so complex, we weren't surprised to find the majority of respondents that relied entirely, or almost entirely, on in-house resources saw their project failed to meet expectations.



57% of respondents who relied entirely, or almost entirely, on in-house resources said their project had been unsuccessful.[4]

Many of these organizations had turned to solution providers and consultants for help when things started to go wrong. But that was often too late.

It's not just technical expertise that companies lack. They also need guidance on ensuring that their motivation is right, understanding the feasibility of their plans, and setting realistic return on investment (ROI) targets.

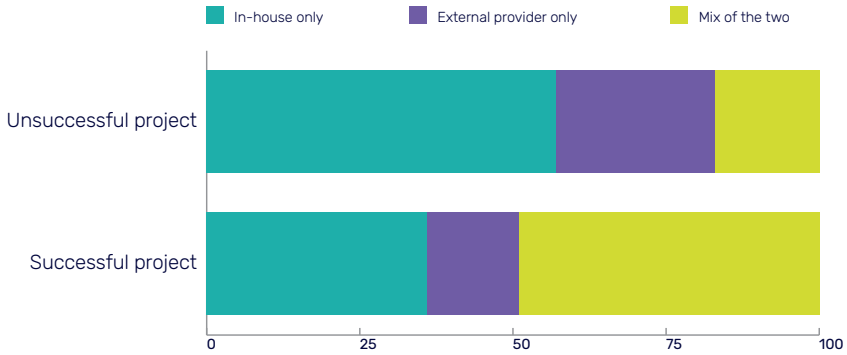


Figure 5: Was your IoT project developed and implemented using in-house / solution providers? Why IoT Projects Fail, Beecham Research, 2020

Bringing in a solution provider was not a panacea. It certainly reduced the likelihood of a project being completely unsuccessful. But projects using just a solution provider without in-house expertise were actually less likely to be fully successful. The most successful approach was a partnership between a solution partner and in-house resource.

49%

of successful projects used a mix of in-house resources and support from IoT solution providers from the beginning.[5]

Beat the odds: **A guide to IoT success**

Response by Software AG

A successful IoT project can increase efficiency, open up revenue opportunities and increase customer engagement. And we're not just talking about incremental change. Time and time again, the IoT has been used to truly transform organizations, create new business models and disrupt entire industries. So it's disappointing to see how many companies are struggling to realize the potential of the technology, make their projects successful and achieve their business goals.

Few companies have as much experience running IoT projects as Software AG, and so the problems identified by Beecham were not a surprise to us. During our past 10+ years on IoT projects, we've seen firsthand the many challenges companies face.

The good news is those challenges can be overcome.

10 steps to IoT success

Based on our experience across thousands of IoT projects we've mapped 10 steps to IoT success to the four challenges Beecham Research identified.

THE CHALLENGE:
Business aims not thought out

Set clear business objectives

1. Think big, start small, move fast
2. Build a business case
3. Unlock the insight in your data

THE CHALLENGE:
Company organizational issues

Take a company-wide approach

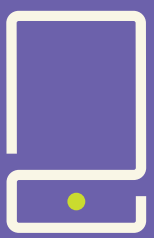
4. Create joined-up solutions
5. Make IoT for everyone

THE CHALLENGE:
Technological problems not foreseen

Understand the technical challenges

6. Think security from the start
7. Don’t limit your range
8. Don’t limit your reach

THE CHALLENGE:
Customer/vendor problems



Don't be afraid to ask for help

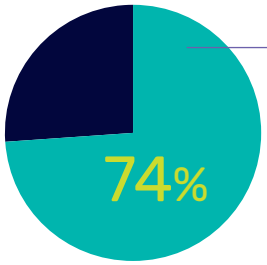
9. Don’t reinvent the wheel
10. Don’t go IoT alone

Set clear business objectives

49%
of companies using IoT lack a clear business case.[7]

1. Think big, start small, move fast

No matter which project or projects you start with, you should establish a clear vision for your future use of the IoT. This will help you make decisions that keep your options open—and avoid getting into contracts or buying hardware you later regret.



74% of global respondents view strategy and planning as most relevant to project success.[6]

The IoT is no longer an emerging trend. It's here and there's no time to lose. Your competitors are innovating on the IoT and if you delay too long you could be left behind.

While it's important to avoid "analysis paralysis," it's important to focus and prioritize your IoT efforts. This could involve choosing the project that promises the most immediate business benefits. You might also consider which project is likely to get the greatest support across the business and deliver the most visible benefits.

2. Build a business case

The "T" in IoT covers an enormous range of things—from elevators to cows, people and trucks. And the potential benefits are numerous too. With so many options and pressure to out-innovate their competitors, many companies get started with IoT without setting clear business objectives.

As with any major investment or IT project, it's vital to set clear goals and targets to measure against. You should think about what secondary benefits your IoT projects might have and how to measure them. For instance, you might introduce the IoT as a solution to improve efficiency. The same sensors might also help reduce risk and improve employee safety.

IoT projects don't have to be capex-intensive yet you should prioritize investment. Defining the costs, expected benefits and risks will help you gain buy-in from your organization's leadership and measure success and ROI.

Talking to others, including peers who are further along in the IoT adoption process, can help you in building a business case.

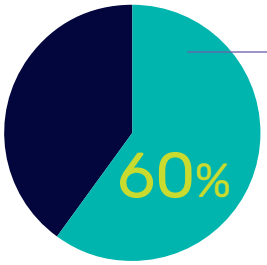
3. Unlock the insight in your data

Even the smallest IoT project can deliver meaningful business benefits. But one of the strongest indicators of IoT maturity is the use of analytics. Adding analytics makes that project a game-changer. When you analyze your IoT data, you have insights you can act on to realize business goals and targets.

Many early adopters had multiple IoT projects, each gathering data from devices independently. While these projects may have been successful, they would have delivered measurable benefits by adding analytics to act on IoT data.

Data from an IoT project can often have multiple uses—for example, data from a fleet tracking solution might help improve maintenance routines as well as optimize route planning. The old saying about "the whole being greater than the sum of the parts" also applies. That same vehicle data when combined with employee schedules could identify the safest, most efficient drivers and who might need additional training.

IoT isn't just about analyzing the past. One of the latest developments is combining IoT from a multitude of sources to create a "digital twin" or "virtual double." As well as helping to analyze data and understand dependencies, a digital twin helps you model the impact of potential changes. For example, you could see how reorganizing the factory floor to accommodate a new piece of equipment would affect operations.



60% of organizations say they have constrained analytical capabilities.[9]

Few companies have the necessary integration and data analytics expertise required to get the most out of the IoT data they're gathering. And there's extensive research to suggest there's a significant skills gap. Leveraging external expertise for integration and analytics could be much easier than trying to recruit and retain these skills internally.

Forrester found that on average 60-73% of IoT data is not used for analytics purposes.[8]

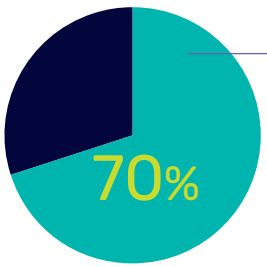
Take a company-wide approach

To unlock the true potential of the data gathered by IoT devices, you need to be able to integrate it into enterprise applications. This includes cloud services and third-party systems.

4. Create joined-up solutions

With IoT, it's all about the connection between the physical and virtual worlds. The data gathered virtually on the use of a vending machine becomes useful information in the real world when it's used to optimize replenishment schedules, automatically adjust ordering and improve decision making, including new product development.

It's not just a case of getting the data into the systems. You need to be able to orchestrate workflows between systems. IoT data plays an important role in the use of artificial intelligence (AI) and machine learning (ML) to transform business processes. Making IoT data useful for AI/ML involves enriching real-time device data with contextual data from other systems.



70% of respondents struggle to integrate IoT solutions into existing workflows.[10]

Integration can be challenging. Your IoT platform should be able to easily integrate device data with enterprise apps, cloud services and third-party systems, as well as enable you to automate actions, workflows and processes spanning applications. To get maximum value from your IoT data, you should have a platform that easily integrates IoT data with the core systems and processes that have run your business for years.

5. Make IoT for everyone

Gone are the days of IoT being just for IT experts. Operational technology (OT) specialists, including people on the manufacturing floor, can use the IoT to improve processes and efficiencies immediately.

With the advent of self-service IoT, OT specialists can connect devices, start consuming data from those devices, and create integrations and analytics on their own—all without the help of IT.

This self-service independence reduces the IT backlog and leverages OT personnel on the "front line" to make rapid improvements on their own.

To achieve agility on the IoT, look for a platform provider that empowers OT teams to connect devices and even create sophisticated IoT solutions without coding. They should be able to apply data science techniques, in a point and click manner, to find patterns within your data as well as define rules to monitor and act on events. As a result, your organization will be able to use the IoT to solve problems faster and make processes more efficient to increase your competitive advantage.

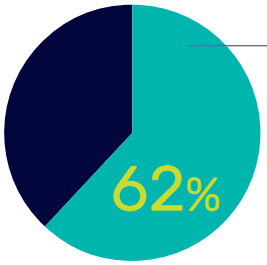
Understand the technical challenges

6. Think security from the start

Security is a common concern for all new technologies. And IoT is no exception. There have been many horror stories about IoT devices—from children's toys to cars—being hacked. This isn't indicative of any particular weakness of the IoT but rather poor product development and management processes.

As a business, it's not just your own data you need to worry about, but also the data you gather from customers and partners. And loss of data isn't the only concern. A security incident could lead to the compromise of other systems and downtime.

An IoT platform can make managing the security of IoT devices much easier. It can help you simplify the addition of new devices—critical if you're going to have thousands of them—and enforce minimum security standards. It can also help you protect data by implementing segmentation and encryption. These help to keep IoT data away from prying eyes, whether they be hackers or other users.



62% of organizations are concerned about cybersecurity and data privacy.[11]

Restricting access to data on a "need to know basis" is a basic security principle. An IoT platform can help you to implement role-based security. This makes it easier to manage what data different groups have access to and what they can do with it.

If you're building IoT into your own products or services, you have an even greater responsibility. Yet according to a recent report by Verizon, 51% of those developing IoT products said that, "security is not a priority for v1.0; it's something they 'can worry about later.'"[12]

Bringing in people who have done it before—either through recruitment or hiring consultants—can help you navigate the world of security, from taking basic precautions to introducing more sophisticated measures.

Many IoT users fail to take even the most basic security precautions, such as changing default/ vendor-supplied passwords.

To unlock the true potential of the data gathered by IoT devices, you need to be able to integrate it into enterprise applications. This includes cloud services and third-party systems.

7. Don't limit your range

No one calls it the Internet of "Specific" Things. Your decisions shouldn't lock you into specific enterprise applications, sensors, modules controllers, protocols, networks, connectivity types, cloud or storage providers. That would be short sighted.

Your success isn't just about having your options limited or avoiding the costs of being locked to particular vendors. It's also about speed. To make the most of IoT, you must be able to connect new "things" quickly.

Make sure you choose a platform that's based on open standards and is designed for rapid application deployment. This will enable you to connect devices fast—often without coding.

Check that the platform you chose has an open API with strong community support. This will be key to expanding your IoT capabilities and getting the most from your investment.

A device certification program—in which an IoT platform operator tests components for reliability, security and compatibility—can help you to accelerate the deployment of new projects. Be careful to choose a platform operator with an open program that supports a wide range of vendors.

8. Don't limit your reach

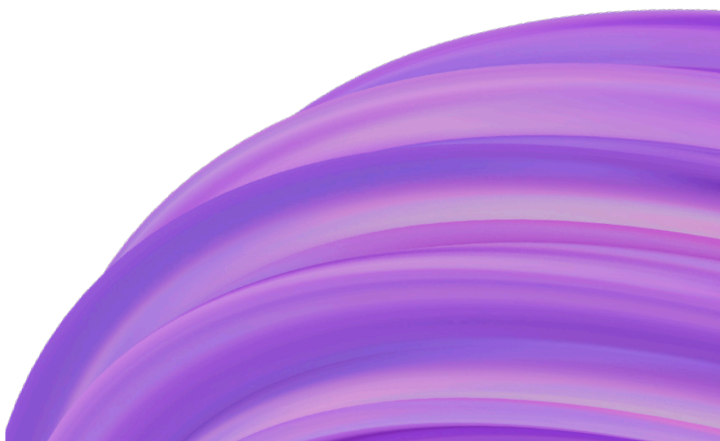
To realize the goal of connecting any "thing," you need to be able to connect things anywhere.

For example, energy and utility companies are seeing the benefits of connecting remote infrastructure, such as pipelines and switching stations. As well as improving efficiency, these connections can enable them to implement predictive maintenance, which can cut costs and downtime.

While cellular remains the most commonly used form of connectivity for IoT projects, it's far from being the only one. In fact, cellular has many limitations due to terrain and geography, and it presents cost and power challenges for some IoT applications.

New network technologies optimized for IoT applications are now available in many areas. Low-power wide area networks (LPWANs) reduce the amount of power required, making it possible to build smaller devices or ones with longer battery life. And the advent of 5G with its close-to-zero latency is opening up countless new applications.

You need to choose an IoT platform that lets you use multiple connectivity types and manage them all seamlessly. Your platform should also enable you to use the right compute and storage resources for you—be that on-premises, in the cloud or at the edge.

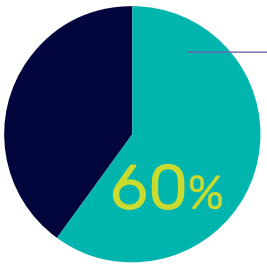


Don’t be afraid to ask for help

9. Don’t reinvent the wheel

One of the most important pieces of advice that we can give anybody considering adopting IoT is not to reinvent the wheel. While IoT is relatively new, the number of people developing for it is huge—from small independents to massive companies and systems integrators.

Look to leverage whatever existing knowledge and tools that you can. Some IoT platforms have their own SDKs and developer communities. Ensure that the one you choose enables you to use the same APIs everywhere—on the edge, in the cloud and on-premises—and can share data and analytics models across computing platforms too.



60% of respondents with successful IoT initiatives engaged outside vendors.[13]

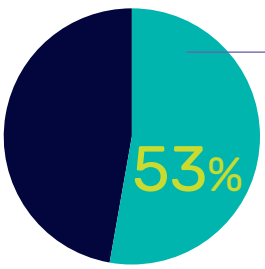
IoT platforms can also help you reduce development time and de-risk your IoT investments. Pre-integrated platforms offer “ready to go” capabilities for connectivity, device management, application enablement, systems integration and analytics. This will allow your team to spend less time worrying about the “plumbing” of how to connect things and devote their energies to building better applications and finding more ways to use the data.

10. Don't go IoT alone

As we've seen, successful implementation of IoT requires a wide range of skills, many of which are in short supply. Beecham found that involving a solution provider could massively reduce the chances of project failure. Combining in-house knowledge and understanding with external expertise and experience was most likely to lead to project success.

One of the main areas where external expertise can help is in developing your IoT strategy. Choose a provider with a proven track record of helping companies to identify use cases, build business cases, develop proofs of concept, and deploy and scale solutions.

Another key area to turn to a third party for help is specifying the technical side of your IoT project. IoT combines many disciplines, including device management, networking, security and systems integration. Choose an IoT platform provider that can help you develop a pilot and also roll out your solution to multiple territories and different types of user. You might also want one that can take some of the burden of day-to-day management off your shoulders.



53% of organizations say they lack technological readiness.[14]

And when choosing a partner, remember to look to the future. You need people who can help you with not only full-scale deployment but also future integration and project expansion. The ideal provider will help you make a success of this project, a great one positions you to make the next one and the one after a success.

A key indicator of IoT maturity—and progress in other things, like digital transformation—is how well you use the data that you gather. Choose a provider with professional services that bring the tools and expertise to help you get the most out of your data.

And finally, don't leave security to someone who is learning on the job. Whether you recruit or bring in external expertise, make sure that security is ingrained in every IoT decision that you make.

Software AG

For 10+ years, we've helped businesses overcome the challenges and successfully implemented 1,000s of IoT solutions around the world.

We've been named a "visionary" in the Gartner Magic Quadrant for Industrial Internet of Things (IIoT), 2019, thanks to our Cumulocity IoT platform. With this platform, we're helping companies transform their business by connecting assets and acting on the data they generate. An open and independent platform, Cumulocity IoT works with the things you've got—IT, OT and protocols—and what you may add in the future.

With Cumulocity IoT, you can:

- Connect any device via any cloud platform and integrate with any application
- Get started in minutes—no coding required, even for analytics
- Use the same APIs, data and analytics models everywhere—on the edge, in the cloud and on-premises

Wherever you are on your IoT journey, Software AG can help you make the most of your investment and achieve the best outcomes for your business. Our enablement services and partnerships can help you develop and deploy your solutions faster while our proven project methodology, solution accelerators and reusable processes can accelerate your time to value.

To find out more about our Cumulocity IoT platform and how we can help you realize your IoT ambitions, visit softwareag.com/iot.

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