GUIDE

Internet of Things (IoT) buyer's guide

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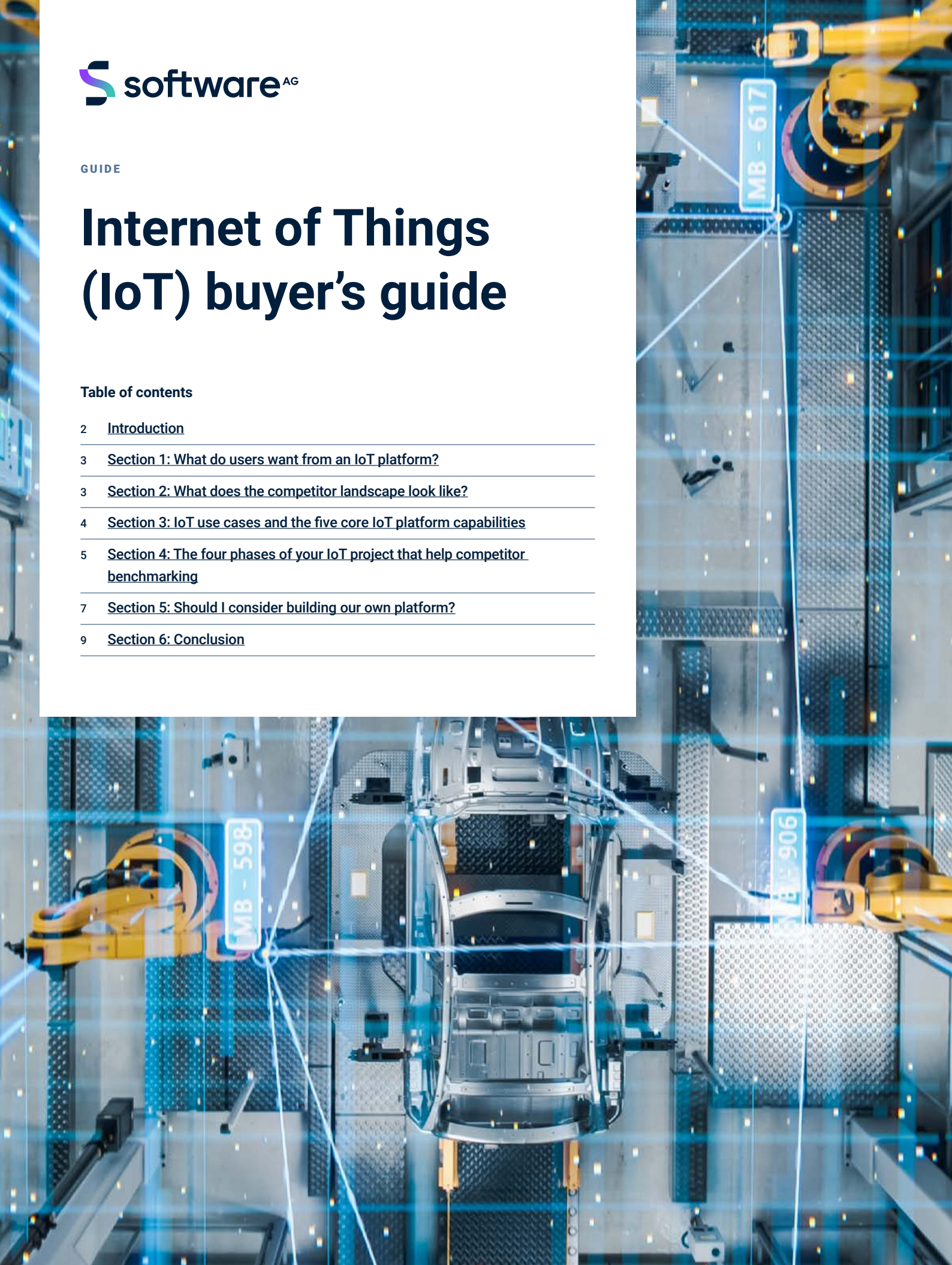


What is in this IoT buyer's guide?

You're a machine maker, looking to connect and monitor industrial equipment on site as well as out in the field. Perhaps you also plan to go a step further by creating value—added IoT—enabled services that significantly differentiate your products, and create new revenue streams?

This buyer's guide to IoT was created to help you find the **best IoT platform** to deliver the outcomes you want. The marketplace itself is very active! There are a lot of competitors, so it's important to have a framework to compare them all by.

This guide is divided into six sections:

1. What buyers looking for an IoT platform typically want
2. The competitor landscape: The four categories that vendors typically fall into.
3. Use cases and the five core capabilities that all IoT projects have in common.
4. The four critical phases of an IoT project that help with competitor benchmarking.
5. Answering the question: Build or buy? And calculating total cost of ownership.
6. Conclusion, including a look at how organizational factors play a role in your IoT project success.

A recent **Beecham survey of companies who had implemented IoT projects** found that 58% said their project had been unsuccessful, and just 12% thought they'd been fully successful. When you're looking at a sizeable investment, these are scary numbers. But you can put yourself in that 12%, by understanding the market and asking the right questions. Read the following IoT buyer's guide to find out how.

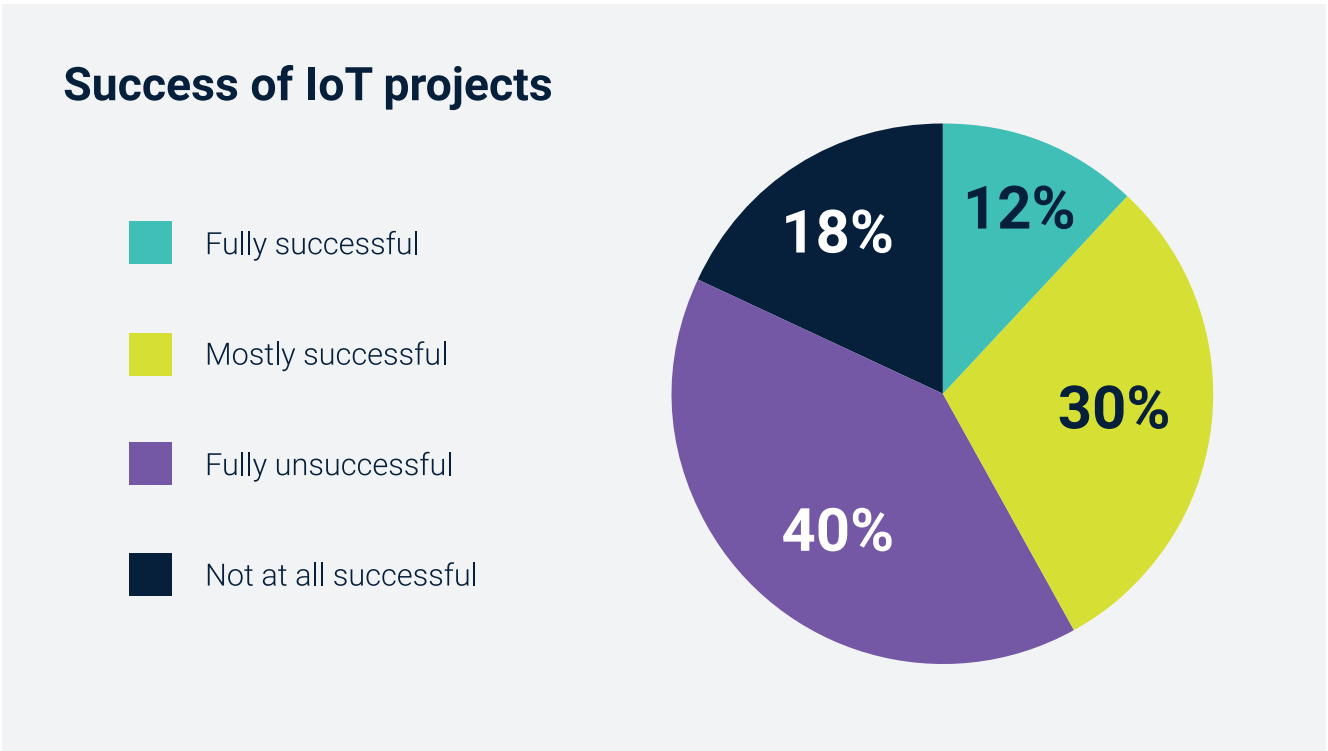


Figure 1: How successful was your IoT project? Why IoT Projects Fail, Beecham Research, 2020

Section 1: What do users want from an IoT platform?

With so many competing providers on the market, finding the right solution for your particular situation can be daunting. A Forrester survey of business leaders covering their experiences on IoT projects found that there are seven things IoT users want from their platform.

1. **Low technical barriers to entry**
   Users want a platform that is both technically sophisticated and easy to deploy. This combination gives them the flexibility to test new ideas and stand up proofs of concept (PoCs). It also means they can offer lightweight IoT services to their own customers, without the need for their own software engineering team.
2. **Ability to rebrand**
   An important decision criterion is the ability to put your own corporate branding on all customer—facing interfaces. This is essential to make the most of your own brand equity.
3. **Costs that scale with usage**
   Transparent, usage—aligned pricing was a must-have, to allow an IoT offering to grow organically the same way a business does.
4. **Ease of adding new devices and protocols**
   Powerful computing without the necessity for coding is not just useful at the beginning of the IoT journey. Who knows what the future will bring, and a platform that can be easily adapted to include new devices or new protocols is a must.
5. **Scalability and multitenancy**
   The ideal solution hosts different users, from external agencies working on different solutions within a larger project, to hundreds or thousands of end users, all within one overall system.
6. **Portability and flexibility**
   Users need a system that supports a range of devices in a multitude of diverse and distributed environments. Another key factor is the availability of a range of deployment options, from container—based architecture to different cloud solutions, in out—of—premises data centers and a host of different edge devices.
7. **Analytics and dashboards**
   The perfect system focuses not only on the interface between machine and data, but also on the human side. Here the range of requirements is huge and changing all the time, so flexibility is the only way forward. The ability to add different analytics without dedicated software engineers, and full flexibility on designing a UI to suit each individual user persona made up the final major differentiator.

Section 2: What does the competitor landscape look like?

If IoT is the bridge between devices and data, it should come as no surprise that the different solutions we see today entered the IoT marketplace from one of these two sides. In terms of the technology and engineering aspects of IoT, there is still today a clear separation between the hardware and software platforms, with the majority of vendors focused on the hardware. Interestingly, according to recent research (IoT Analytics, 2021), the number of fully-fledged IoT software platforms has started to drop, falling by 188 companies over the past two years. And of the remaining 613 platform providers (globally) the top 10 have 65% of the market.

The reality of the marketplace makes the following categorization useful for assessing the strengths and weaknesses of different players in the market:

Some providers offer **device-focused platforms**, with expertise in **device management**, including provisioning, monitoring, and **maintenance**. In an overall competitor analysis, these solutions tend to lose points on the data analysis and integration side. These providers typically have a hardware background and might look like a good fit for your needs if you're interested in a quite narrow, single location implementation such as a smart factory. However, they can't offer the depth of analytics and data power that other solutions can.

Other providers come from a background in software and offer **data-focused platforms**. These solutions have proven functionality in data ingestion, processing and aggregation, and typically come from a trusted consumer software giant. They are able to unlock the full power of the data your devices collect—but if their weakness is in managing devices, how much potentially valuable data is being left on the table?

Very few providers offer **balanced platforms**, leveraging their experience and expertise in both devices and data. These tend to be the larger, more established IoT providers, and they offer new users the opportunity to benefit from their hard—earned know-how, and partnership ecosystems. But do your own research—you might be surprised at the big players who have yet to develop a balanced solution!

There are also **challenger platforms** who present themselves as the innovators in the field, selling themselves on simplicity and out—of—the—box functionality. They often offer attractive pricing models and even freeware capabilities, but in the end, they can't compete with the expertise of providers with tens of thousands of successful implementations, in a full spectrum of industries.

What this means for your decision process is clear: If you have existing smart devices and are looking at a primarily data—focused project, it makes sense to speak to a data—focused provider. The same argument can be made that for data—light, narrowly defined smart machinery applications, a device—focused provider might be the right one for you. But in both cases, a balanced provider can offer more than comparable functionality, and you'll likely future proof your IoT ambitions. Of course, a challenger platform might offer an unbeatable price. How do you make a principled comparison between such different solutions, each one making bold promises? We recommend a structured approach, which we will introduce in section 4. But before that, let's take a quick look at the most common use cases and the five vital capabilities of an IoT platform.

Section 3: IoT use cases and the five core IoT platform capabilities

As a machine maker, you can use IoT technology to increase the differentiation of your products and create new revenue streams from service contracts. The power of data allows you to decrease costs for maintenance services, avoid unexpected downtime and improve customer satisfaction at the same time. Higher machine uptime means improved asset utilization as well as optimized energy consumption. There are numerous use cases, but maybe you're thinking in terms of:

1. Remote monitoring
2. Smart maintenance
3. Performance management
4. Product life cycle management (PLM)
5. Field service management (FSM)
6. Equipment-as-a-Service

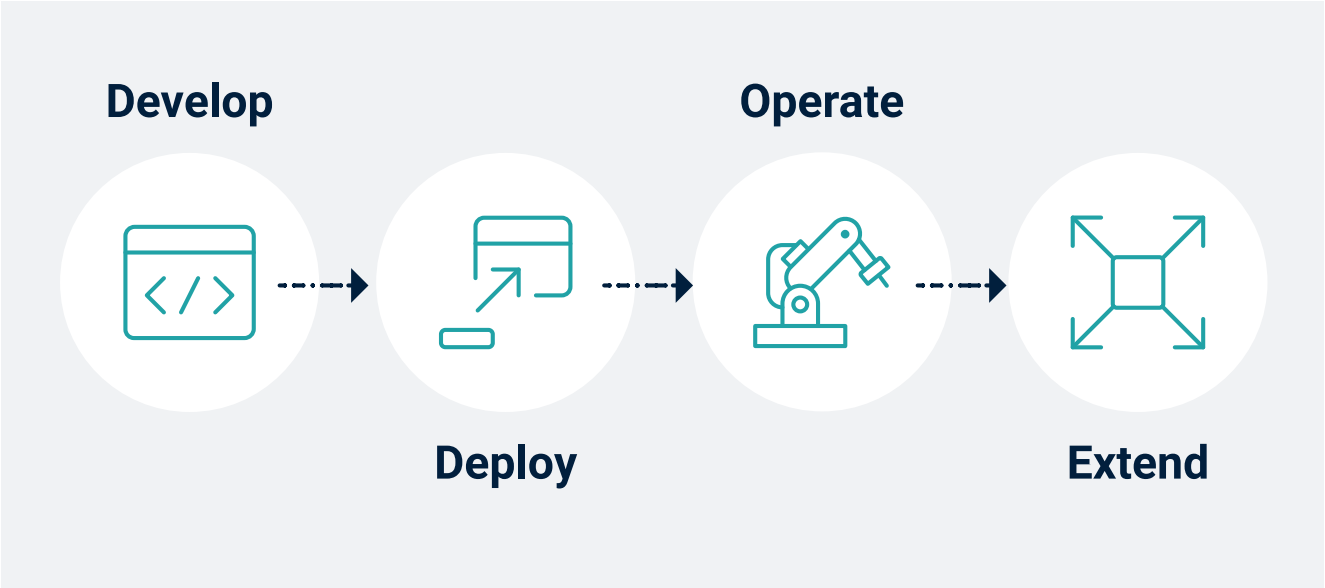
Whatever the use case, there are five core capabilities that you'll require of your IoT platform across all IoT projects:

1. **Connectivity and device management at scale:** This function includes software that enables manual and automated tasks to create, provision, configure, troubleshoot and manage fleets of IoT devices and gateways remotely, in bulk or individually, and securely. This one might sound obvious, but finding a solution that offers reliable, intuitive device management at scale is harder than it looks. And every difficulty is magnified at scale—an unusual process or counterintuitive workflow might cost ten minutes of headache when running 20 devices but becomes a nightmare when you're running a thousand.
2. **Integration with any architecture or system:** The best data in the world with the most interesting actionable insights is of no use at all if it's stuck inside an IoT platform. It needs to be connected with the other computer systems your company runs, to make sure the data and the lessons learned from it get to where they need to be. This function includes software, tools and technologies, such as communications protocols, APIs and application adapters, which minimally address the data, process, enterprise application, and IoT ecosystem integration requirements, across cloud and on-premises implementations for end—to—end IoT solutions.
3. **Data management:** This function includes capabilities that support ingesting IoT endpoint and **IoT edge** device data, storing data from edge to enterprise platforms, providing data accessibility (by devices, IT and OT systems, and external parties, when required), tracking lineage and flow of data, and enforcing data and analytics governance policies, to ensure the quality, security, privacy and currency of data.
4. **Application enablement and management:** This function includes software that enables business applications in any deployment model to analyze data and accomplish IoT—related business functions. Core software components manage the OS as well as standard input and output or file systems, to enable other software components on the platform. The application platform—for example, application platform as a service (aPaaS)—includes application—enabling infrastructure components, application development, runtime management and **digital twins.** The platform allows users to achieve "cloud scale" scalability and reliability, and to deploy and deliver **IoT solutions** quickly and seamlessly.
5. **IoT Analytics:** This capability includes processing data streams in real-time, such as device, enterprise, and contextual data, to provide insights into asset state by monitoring use, providing indicators, tracking patterns and optimizing asset use. A variety of techniques can be applied, such as rule engines, event stream processing, data visualization and **machine learning.**

Section 4: The four phases of your IoT project that help competitor benchmarking

If you want to cut through the marketing and compare two or more solutions to see what they really do, it's vital to have a structured system to carry out your own research. **Third-party reports** are all based on different comparison methodologies, and so can disagree on the details of which solution is the very best in each field, but they're a great place to start. To start, but not to finish, because each IoT project is unique, and what's right for others might not be the best for your business.

In order to assess an IoT solution, you have to look in detail at the challenges to be overcome at each phase of the IoT project, and every project has four phases.



A project begins with **development**, and a good solution is built with developers in mind, focused on the developer persona, to enable quick, easy delivery of powerful functionality.

The second phase to consider is **deployment**, when the theory of use case and platform meets the reality of your devices, your locations, and your system architecture.

Operation is where things really get difficult. Ultimately, you need a platform that offers exceptional operational performance. Research shows, however, that many providers struggle to offer anything here that's more than average.

The final phase to consider is **extension**—after your platform is performing its designed use cases and delivering business value, what's next? Both in terms of growth in volume and in identifying new implementations and additional sources of revenue. This is where you need to know about the provider's platform ecosystem of hardware and software partners, to help you get the most out of your IoT system.

In the next section, we'll drill down to look at the key differentiators in each of these four phases.

How do I choose the IoT solution that's right for me?

When it comes to selecting the right provider, here are the key differentiators you need to consider at each of the four phases of an IoT project.

Development

The right solution	The wrong solution
• Can develop a solution in days that provides fast ROI. • Offers seamless integration with your other computer systems, regardless of manufacturer. • Offers full access to their software development kit (SDK) so you can develop your own functionality.	• Takes weeks or months to get from development to implementation. • Has system lock-in – will only integrate with other systems from the same technology provider. • Has gatekeepers so you have to go through them to implement changes.

Deployment

The right solution	The wrong solution
• Has a platform that supports various system architecture configurations, including hybrid, cloud and edge computing, whether thick or thin – this means it can support not only where your business is now, but where it will be in the future as well. • Can offer multitenancy: tailored access and permissions for different users – allowing you to share the insights from your data with your customers. • Has out-of-the-box functionality for standard use cases.	• A solution that is specialized in one narrow architecture might look like a better bet in the short term, but it could end up locking you in should your use cases and business evolve. • If you need one system for your internal IoT use cases, and a different system to support your customer-facing interface, you're doubling cost, maintenance, and headaches. • Requires everything be developed from scratch, with additional engineering costs.

Operation

The right solution	The wrong solution
• Offers flexible UI and dashboards that are easy to configure, without the need to write code. • Supports B2B2X – giving you full control over your relationships with your customers. • Provides self-service analytics to allow you to change the way you use your data over time, without writing code. • Enables seamless integration with any software you're running now, as well as any new systems you might add in the future, from any vendor. • Has security baked in, so your data and devices are protected from outside access.	• Requires rigid and detailed interface specs before development begins. • Requires all customer relationships be mediated by the technology provider. • Needs all analytics defined from the beginning or requires expensive coding to add or adapt functionality. • Locks you in to a proprietary information ecosystem, which will significantly narrow your flexibility to choose other solutions in the future. • Has security as an afterthought.

Extension

The right solution	The wrong solution
• Is scalable and can grow with your business, regardless of what the future brings, by adding data collection points, analytic options and package features as needed. • Has a rich professional services/partner ecosystem that your application can leverage to identify new revenue sources and ensure that future deployments are best in field. • Can be rebranded as your own in-house solution	• Is focused only on projects at a particular scale or has expensive barriers to adaptation and growth. If you implement with a small player now, you may need to switch later on, when your requirements outgrow what they can provide. • Solutions from smaller providers or disruptors can only provide you support on what they themselves know how to do. They are blind to the potential that lies outside their experience. • If your customer interface carries another provider's branding, you miss the chance to leverage the power of your own brand equity.

How do vendors compare?

In its **2022 application enablement scorecard** MachNation assessed 14 IoT application enablement platform (AEP) vendors across the four categories identified above. Its goal was to provide enterprises with a more comprehensive overview of which vendors rank high in terms of ease, transparency, sophistication, and reach. You can view a complimentary snapshot of the report **here**.

The MachNation report shows us one thing: **it's difficult to be good at all four phases of an IoT project**. There is a clear top three in the market: of the 14 platforms assessed, 11 were not awarded the top score in any of the four phases. Two platforms scored top in two phases: Deploy and Extend, but both were rated as "above average" in Develop and "average" in Operate. The clear winner scored top in Develop, Deploy and Operate, and was rated "average" in Extend. That's three out of four phases.

There also seems to be a difference between the four phases. Only one platform scored top in Develop, with five assessed as "above average." In contrast, when it comes to Deployment, there were three platforms that scored top, with only one "above average." In Operate, again only a single platform was awarded the top score, with four scoring "above average." In the Extension phase, two platforms shared the top score, while three were rated "above average." **This indicates that of the four phases, Develop and Operate are the most difficult for solution providers to get right, and so should perhaps be given a higher weight in the overall assessment of competing solutions.**

What all of this tells us is that research matters—there are a few elite providers in the IoT world, and a host of average also-rans. How do you tell the difference? By doing your research and asking the questions that allow you to find out if their solution is right for you.

Section 5: Should I consider building our own platform?

In an ideal world, when you want something to be exactly the way you like it, you go out and build it yourself. The same question is often asked at the beginning of Internet of Things projects. Do you have a go yourself? Is your IT staff experienced and do they have the proper domain expertise? Will you be able to integrate your systems and scale properly? Will you be able to meet security requirements and adapt to future IoT sensors and networking complexity?

Many early pioneers of IoT built their own IoT platforms and then had "builder's remorse" when they were unable to **scale the IoT solution** or required outsized investments of time and resources to stand up and maintain. After all, if my current IoT use cases are narrow and well-defined, does it make sense to pay an external IoT platform provider, or would I be better off building a simpler **application enablement platform** in—house?

This is where external, empirical research can be particularly helpful. In 2021, MachNation released a whitepaper on choosing a new IoT architecture, with 4 main findings:

1. **In-house platforms become a financial drag.**
   Business moves fast and use cases and user profiles can change completely in a few months. The data shows that using an expert IoT provider can save a business more than 90% in TCO over five years.
2. **Common IoT tasks take much longer on the wrong IoT platforms.**
   All IoT platforms are basically the same, right? Wrong. Testers found it took up to ten times longer to complete a range of typical tasks on a lower-quality solution, compared to the best in class.

3. **Enterprises need higher levels of quality and resiliency than legacy IoT platforms can provide.** Legacy systems, designed to provide a narrower range of IoT services are often unable to support business critical IoT applications and typical IoT workflows that emerge later.
4. **In-house built and legacy IoT platforms slow time-to-market and are more expensive to support than initially thought.** All of which, of course, has a negative impact on the return on investment for IoT solutions.

The way this question is usually phrased gives the impression that there are really only two options: build or buy. However, there is a third option, a hybrid model that is gaining share in the IoT market—this is what some providers are calling **Buy & Build**. The idea is to start with a proven IoT platform, which can deliver initial operations, and so value and return on investment, in weeks rather than months. The user can then invest software engineering time and money to build out custom functionality on this stable foundation. Building your own solution from scratch can take months to deliver a working piece of software, even if you're working with a partner who can provide you with the building blocks of code, and as anyone in the industry can tell you: it's not the coding that's painful. It's the testing. This is the hidden risk inside every software development project—and it's a risk you can bypass by going with a provider who can supply an IoT platform that's ready to use: tested, secure and reliable. You can then build the functionality you need on this stable, proven foundation.

Another important decision factor, of course, is cost, and the best way to get a handle on this is to calculate the Total Cost of Ownership of your chosen solution. By inputting the number of IoT devices you predict you will use over a 5—year period, and adding up all the associated costs of each device, your deployment model and the cost of labor, as well as your preferred model: device/data/both—you can start to get an impression of what the total cost of building an enterprise-grade platform is, compared to buying one in as a service. Why don't you try our **sponsored TCO calculator** to see if it can help you?

Section 6: Conclusion

So, what are the most important things to bear in mind when choosing the right IoT platform for your business? First, you should probably be choosing a provider that can offer a balanced platform, with expertise in both devices and data. Flexibility is key, to fit to diverse and changing system architecture and be able to pivot to new use cases and revenue streams as they arise. You're looking for a provider that is strong on application and **business systems integration**. You need a solution that can face the challenges of all four project phases. And a provider that has a strong vision of where their solution fits into the marketplace, coupled with a rich partner ecosystem. This last point cannot be emphasized enough: IoT is a team sport. The big players in the field don't only offer their customers a partnership with them—they open the doors to a rich ecosystem of **professional services** and **partners**, which can be of benefit now and in the future. This includes hardware manufacturers, connectivity experts, security consultants, data scientists, domain experts, systems integrators, and application designers.

But choosing the right IoT platform is only half the battle. Organizational alignment also plays a central role in the success of IoT projects. Research has identified four major differences **between IoT projects that win and those that fail**, so here is what needs to be done in your business to make sure you're in that magic 12 percent of IoT projects that fully succeed:

1. **Set clear goals** — Be clear from the beginning what functionality you need, and what use cases you plan on using. Remember, other use cases can and do emerge over time, but if you don't have a plan for what you want, it's hard to know if you're going the right way.
2. **Take an organization-wide approach** — the data that you will collect and the insights it will generate are just not an IT issue — they can impact every part of your organization. It's vital to elicit contributions and ensure buy—in across the organization before implementing an IoT project.

3. **Understand the tech challenges** — Working with an experienced partner allows you to benefit from their experience, and ideally learn from the mistakes of others without having to make them yourself! The right solution depends on what your devices are, where they are, how accessible they are, and a whole host of other questions. It's vital to understand the project and its technical scope before you get started.
4. **Leverage the power of ecosystems** — While the primary function of your IoT project might be to enable a single use case, be alert for secondary uses this data can be put to. Your customers can benefit from the predictive maintenance data you collect from the machines they use, just to give one common example. However, if your provider doesn't enable the flexibility to adapt to evolving use cases in an increasingly digital world, you're going to miss out on the potential of IoT to unlock business value in areas you never even dreamed of.

We think the information in this IoT buyer's guide will help you to make the choice that's right for your business and your customers. Naturally, we believe there's a good chance that **Cumulocity IoT** might be the platform you're looking for. If you'd like to find out more about what we can do for your business, feel free to **get in touch**.

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