Roland Berger Focus

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Mastering the Industrial Internet of Things (IIoT)

IIoT offers major opportunities for industrial companies, but only if you handle them right.

Roland Berger

50 years

navigating complexity

Management summary

The Internet of Things (IoT) refers to the networking, via the internet, of objects fitted with sensors that are able to collect data. By extension, the Industrial internet of Things (IIoT) refers to the application of the internet of Things to the manufacturing industry.

In the next three to five years, the IIoT is forecast to become a multibillion-dollar industry. Technology is advancing rapidly as platforms such as Predix from General Electric and MindSphere from Siemens enable manufacturers to connect more and more devices to rich cloud services. Just as the internet transformed the way people interact with each other, IIoT platforms are transforming the way we interact with machines – and the way machines interact with each other.

This process of change is the source of uncertainty for companies, particularly those in the engineered products and high-tech industries. Not only is the new landscape difficult to navigate, it is hard to know where to position yourself within it. What will its impact be on your traditional business? What should your new business model look like? Should you develop your own IIoT platform or choose an existing one? How can you harvest additional value through new digital services? And what should you keep in mind when embarking on this challenging journey?

These were the questions we asked as we put together this study. We offer a structured view of IIoT and the layers of companies operating within it. First, we offer guidance on how to define a future role for your company (Step 1). We then outline the options for your offering (Step 2) and what to consider when choosing an IIoT platform (Step 3). We also identify where you can leverage IIoT to create additional value for your core offering (Step 4). Finally, we look at some of the key success factors for mastering the process, based on our insights from companies that started adapting their business models early on.

Contents

Chapter 1:

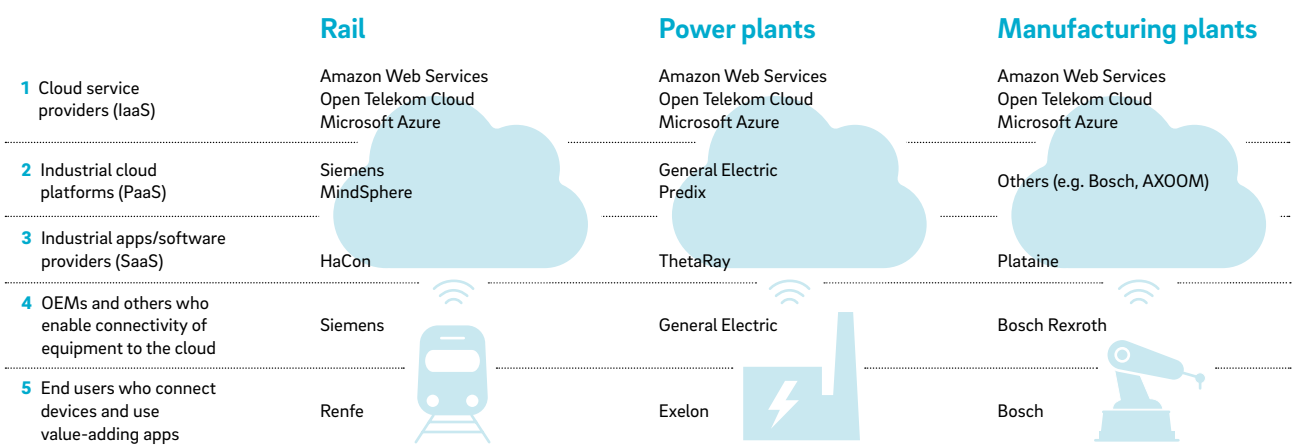
The lowdown – layer by layer

A structured view of IIoT and the layers of companies operating within it.

We identify five layers within IIoT: (1) cloud service providers; (2) operators of industrial cloud platforms; (3) providers of industrial applications and software; (4) OEMs and other firms enabling equipment to be connected to the cloud; and (5) end users who connect their devices to the cloud and make use of value-adding applications.

The first layer – cloud service providers such as Amazon Web Services – is currently investing billions in infrastructure and cloud platforms. They supply computer and storage services and constantly enrich their platform functionality to enable further innovation. The second layer consists of industrial cloud platforms such as MindSphere (developed by Siemens), Predix (GE) or the Bosch IoT Suite. A current priority for these companies is making it easy to connect to equipment in greenfield and brownfield applications. They also aim to make it as simple as possible for customers to use high-end-level services such as predictive maintenance. Since platforms are most valuable at scale, we expect to see concentration in this part of the market, ultimately leaving a small set of leading platforms in each vertical industry. The third layer comprises the providers of industrial apps and software. These businesses play an essential role in enabling innovations in services and business models. Companies operating here are transforming the way we interact with machines. The fourth layer is made up of OEMs and other companies who enable equipment to be connected to cloud platforms and use cloud-based industrial apps and services. Companies in this layer need to decide whether to build their own IoT platform or leverage existing platforms. Then they must decide which services and business models to develop to enhance their existing offering. The final layer consists of end users, who connect their devices to IIoT. These are the companies that leverage cloud-based services and business models to increase the efficiency of their operational equipment. → A

A: Industrial IoT ecosystems are currently developing along five business layers
Cloud ecosystem examples



Source: Roland Berger

Chapter 2:

How to navigate the new landscape, step by step

Our four-step approach will enable you to successfully navigate the process of adapting your business model.

STEP 1: DEFINE YOUR ROLE

The first step for companies as they embark upon their change journey is to decide on what role they wish to play within IIoT. A carefully defined starting position and business model will form the basis for all their future strategic decisions.

In chapter 1, we outlined the various roles for companies in the engineered products and high-tech industries. Businesses must make sure that they understand the different roles and options available to them. In many cases, this will depend on what sort of business they are and the sector they operate in.

For traditional industrial companies in particular, it can be difficult to define a future-oriented IIoT-based portfolio that enhances their current core offering. Most IIoT-related skills, such as developing digital services, do not yet form part of their core business. A key task for these companies is therefore to work out which capabilities will prove to be true differentiators in their future offering. These are the capabilities that they should start building up within their organizations. Then, an ecosystem of partners can provide the other components of a compelling offering.

A useful tool in deciding which capabilities to build up in-house and which to source is the matrix shown in Figure → B. The horizontals represent different possible roles and areas of activity for companies: IoT application, IoT platform, IoT gateway, devices, sensors/chip sets. The verticals represent the different sectors: Industry 4.0, connected buildings, smart grids, and so on. We show the matrix as it might appear for one company; other companies may have different verticals or even different horizontals. The color of the matrix boxes indicates whether the area is one where the company should compete with its own solution, form a partnership with a third party, or refrain from addressing it. Obviously, the coloring will look different for each company.

In the end, it's rather simple: focus on what you are good at and build a partner ecosystem for the skills you do not bring to a solution.

To help them decide whether they should build up a capability internally or partner with a third party, companies should ask themselves the following questions:

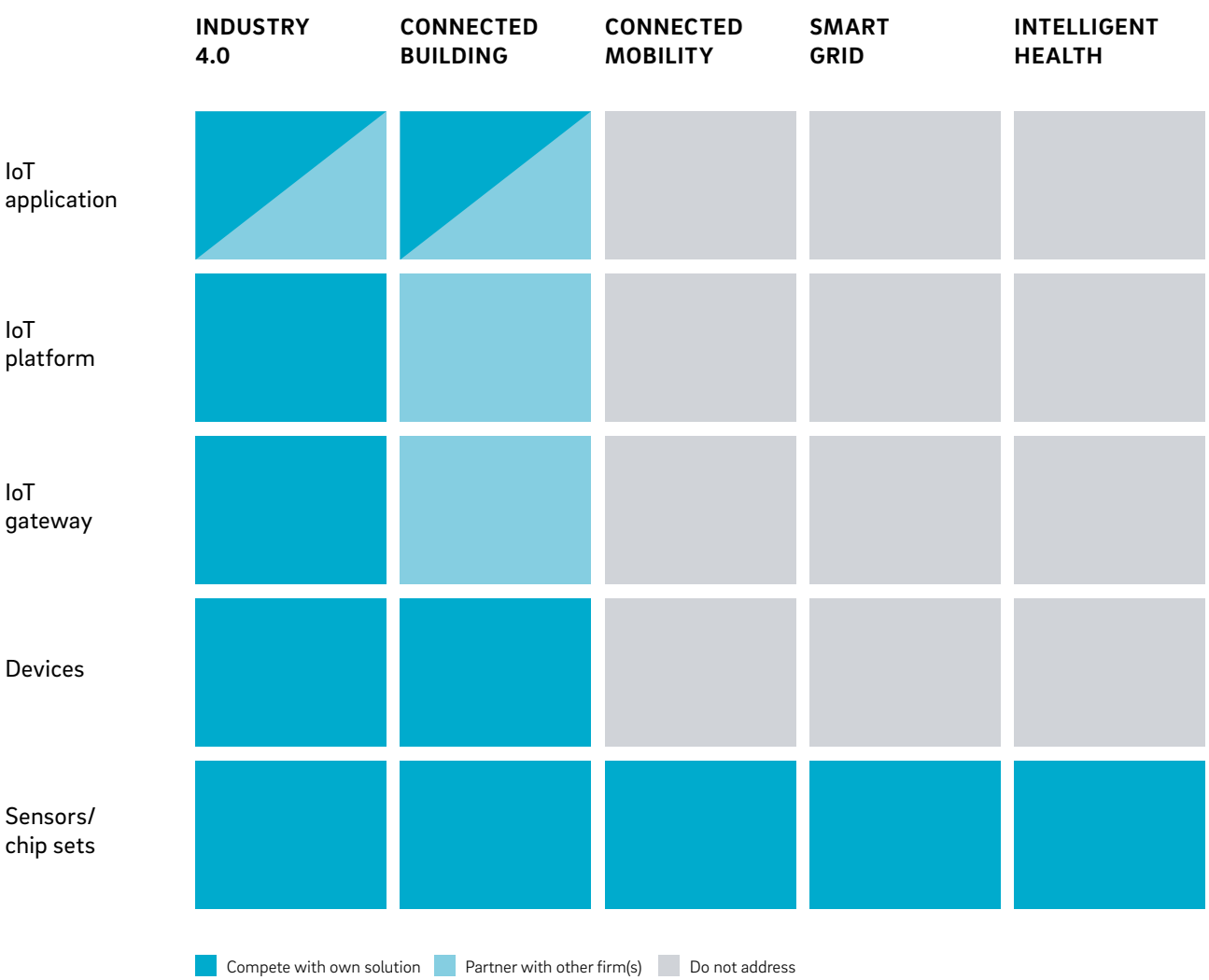
- Does the capability in question add specific value to my offering?
- Will I need this capability for a number of future offerings?
- Is this capability difficult to source from a third party?

If the answer to any one of the above questions is yes, the company should consider building up the capability itself. If the answer to any of the questions is no, it may be better to search for partners who can provide the necessary capability at scale and with lower costs.

This approach has proven valuable in practice. One of our clients, a large vehicle manufacturer, used the matrix to reach an important strategic decision. They decided to invest in building up specific skills in predictive maintenance analytics for a specific part of their portfolio, with the goal of increasing the profitability of their long-term service contracts. This specific focus led the company to invest in a clear use case for their portfolio, which proved to be highly successful.

Traditionally, manufacturing companies tend to think in terms of their vertical. Part of the broader strategic question for such players is whether they should move away from this niche mindset and think across different sectors. GE, Siemens and Bosch, for example, now address vertical segments that were not previously a core part of their traditional offering – segments such as industrial manufacturing. Other companies, too, may find it useful to consider playing the game horizontally rather than just vertically as in the past.

B: In each ecosystem, players have to carefully choose their position in the IoT stack and actively form partnerships.
IIoT positioning of an industrial company (example).



Source: Roland Berger

STEP 2: DEFINE YOUR OFFERING

An immediate task for companies is to decide on their IIoT offering. Companies have two options.

The first is for companies to strive to increase the competitive advantage of their own products and services. A number of industrial companies are currently pursuing this strategy, seeking out ways to differentiate or improve their offering by launching IIoT services. German filtration specialist Mann+Hummel, for instance, has introduced an air filter connected to IoT that is able to share information about air quality and to trigger events as necessary.

The second option is for companies to sell their own digital services. If they decide to develop digital services such as predictive maintenance, they can often leverage the new software and successfully sell the application to a wider audience. Alternatively, they can develop specific digital services that are designed for mass use, thereby creating a new revenue stream. For example, Bosch is actively developing microservices on its IIoT platform to provide a feature-rich ecosystem, aiming to generate revenue streams for digital services. Trumpf follows a similar strategy, introducing digital services on its AXOOM platform that can also be purchased for use in third-party machines.

STEP 3: CHOOSE YOUR PLATFORM

Having decided their offering, companies must then chose whether to create their own IIoT platform or use one provided by a third party (this refers to the second layer of IIoT → A). This decision will depend partly on which ecosystem offers the largest addressable market and how easily the company can monetize its own IIoT offerings. Alternatively, can the company develop its own ecosystem, one that is unlike those currently on offer? GE Predix, for example, was the first major player to enter the market and so has been able to build up a strong presence in some vertical markets. Siemens has taken a different approach, establishing a presence from its strong position in discrete automation and expanding from this to other vertical industries. Trumpf created its IIoT platform AXOOM largely on its core strength in manufacturing and focusses the platform on optimizing the manufacturing process.

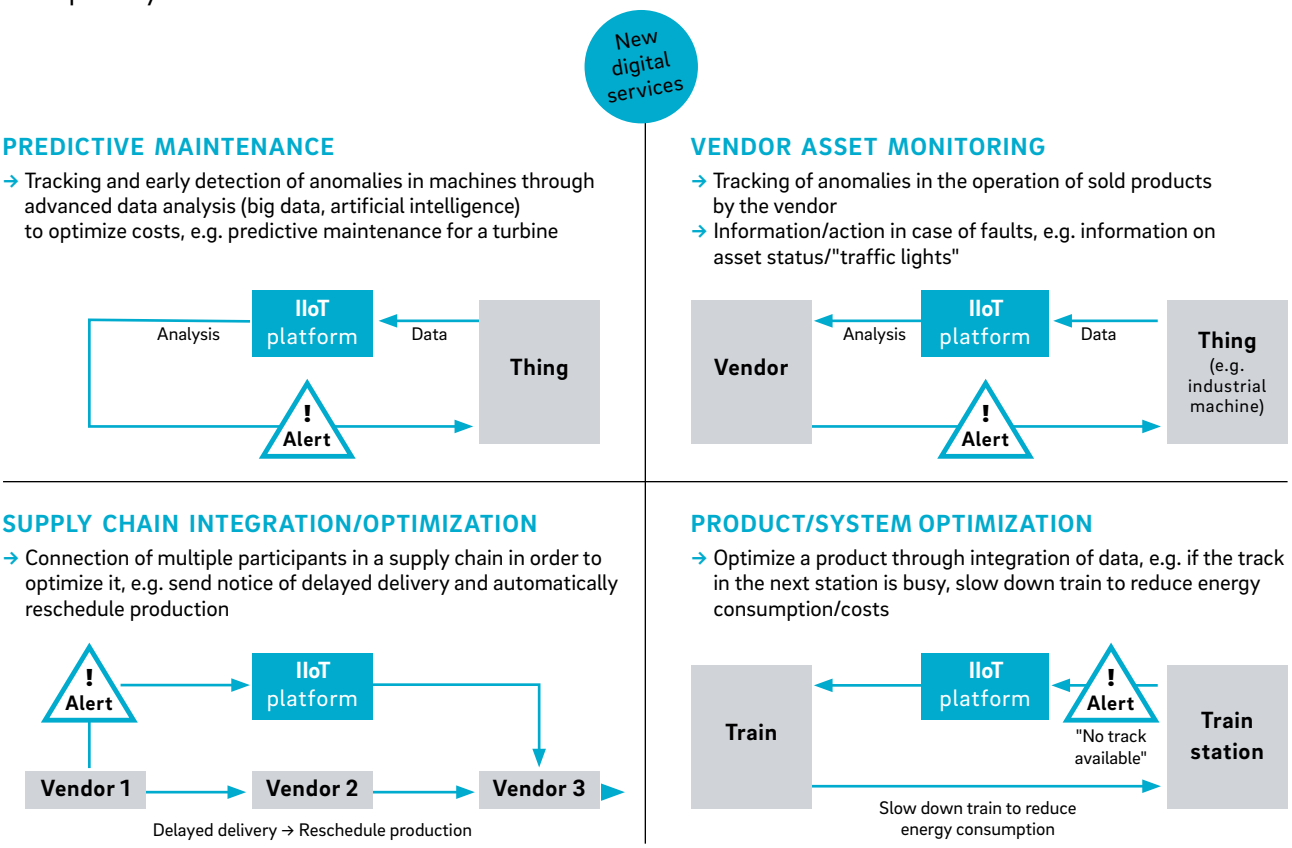
Another important factor in the decision will be the technical investment. Does the IIoT platform – Predix, MindSphere, Bosch IoT Suite, or an alternative solution – offer additional functionality that justifies the price? It may in the case of industry-specific predictive maintenance services, or where the platform offers plug-and-play connectivity to a broad set of proprietary assets, such as the MindConnect functionality from Siemens.

The bigger the platform and the broader its reach, the greater the economies of scale and the more valuable the platform for a company. For this reason, we expect to see concentration within each vertical industry, with a limited number of platforms ultimately emerging as the leading solutions. This is similar to what we saw with mobile operating systems, where a process of consolidation has left only two major players competing for leadership: Google with Android and Apple with iOS.

What happens in each vertical depends on many factors. Take the energy equipment industry, for example, with its consolidated structure consisting of a small number of large players, especially in the area of energy generation. Here, we are likely to see companies such as GE leveraging their strong installed base to create a leading IoT platform. Other industries, such as building technology, are more fragmented and so we will probably see new players such as Google entering the market. In these industries, it is far more difficult to predict who will eventually win, although the logic of economies of scale and the value of concentration apply here, as in all other industries.

Choosing to build their own IIoT platform could be an option for some players in the engineered products and

C: IIoT enables companies to establish new types of digital services.
Example: key IIoT use cases



Source: Roland Berger

high-tech industries. But this avenue is open only to those companies who are willing to make the substantial investments necessary. They will need to build-up an internal software business. Small or medium-sized enterprises, even those in the famous German Mittelstand, are unlikely to have the necessary resources to develop and maintain their own platforms. The platform business is always a scale game. After all, it makes no sense for individual companies to build their own platforms unless they can gain scale at least within their own vertical – and across several verticals is better still.

STEP 4: IDENTIFY THE ADDED VALUE

Step 4 for companies is to identify where they can lever-

age IIoT to create additional value for their core offering. This involves answering the question: How can IIoT be of use to you and your business?

A number of possibilities exist. Perhaps the most radical is to adopt an entirely new revenue model, such as pay per use. For example, instead of selling its newest Velaro trains to the Spanish national railroad operator Renfe, Siemens is selling the effective use of the train, bearing the risk of defects itself.

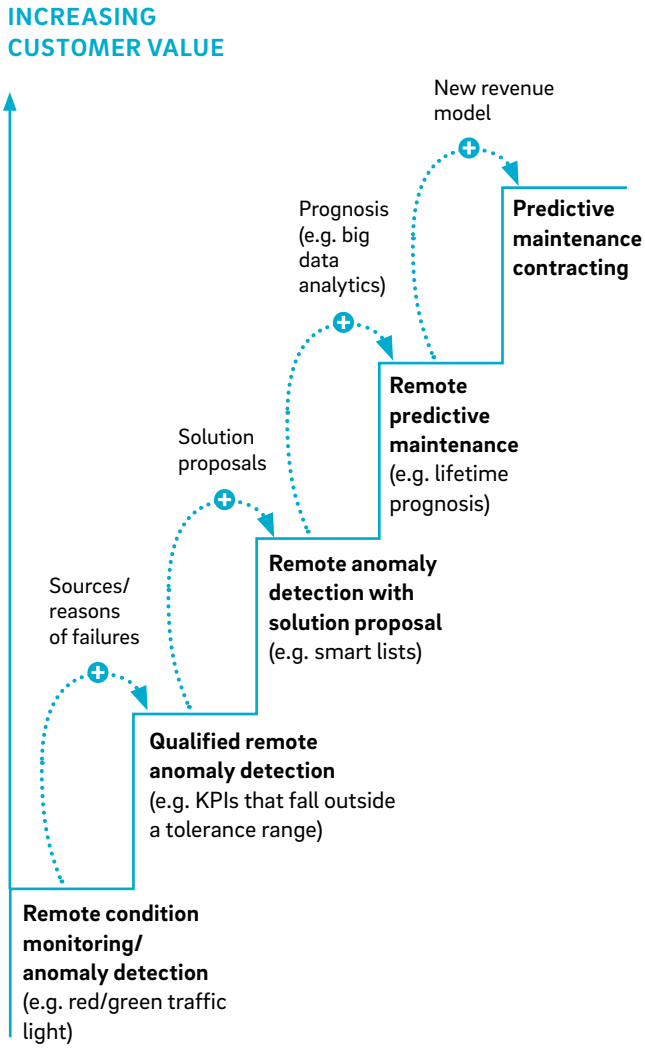
In fact, IIoT enables a whole range of new digital services that can have a major impact on industrial companies. Predictive maintenance, vendor asset monitoring, supply chain integration and optimization, product/system optimization – all of these services are now possible as a result of the technological transformation. Many of them have been around for some years already, but their easy integration into cloud services provides a new efficiency lever, especially if integrated with analytics that make effective use of all available data sources. → C

In the area of predictive maintenance, for example, Daimler is using an IBM solution to optimize its internal production by collecting and analyzing machine data. This has delivered productivity improvements of around 25 percent. Volvo has also implemented cloud-based IoT technology to optimize its inbound and outbound supply chain by means of increased integration with its partners. In the area of product/system optimization, Caterpillar is partnering with Uptake to offer customers the opportunity to track their operational efficiency, monitor their fleets and optimize fleet performance.

But it's not just about picking the digital service that suits you and sticking to it. Companies can also combine digital services and new revenue models to create new forms of offerings. Figure D presents an example from a real-life study for a major industrial automation company. As you move up the steps, the value added by IIoT increases, each area of added value building on the layers lower down. → D

D: How to increase the value added by the IIoT at each step of the way

The case of digital services for industrial assets



Source: Roland Berger

Chapter 3:

Three success factors

By analyzing companies that set out early on the path to transformation, we can identify three key success factors for shaping a future-oriented and profitable IIoT offering.

#1 INCREASE YOUR SPEED

Companies that can effectively speed up the progress of their transformation achieve greater and longer-lasting success. The first and most obvious way to do this is to ensure that IIoT is a matter of priority within the organization. The CEO must become its "chief storyteller" – a role effectively modeled by former GE CEO Jeff Immelt, or Bosch CEO Volkmar Denner, for example.

In practice, we find that companies benefit from setting up an independent external unit (or new company) focusing on IIoT, reporting directly to the CEO. The idea is to create a healthy digital service business that is separate from your core activities and so not at risk of getting bogged down by them, and later integrate back into the business.

Another important point is that companies should prioritize talent over location. In other words, they should identify where the best talent is located – the IIOT hotspots for their specific vertical – and set up development teams in those locations. Ensuring speed also means choosing your battles. Identify the areas where you can really add value for your customers. Write only the code that really matters. The rest – parts that are more generic or that add less value – can be sourced from third parties. If you try to do everything yourself, reinventing the wheel each time, you risk ending up with a product that is no more than a lower-quality copy of something that already exists on the market.

#2 EXPAND YOUR MARKET

A second key success factor for companies seeking to master IIoT is to expand the market that you target with your product, service or platform. Pursue a blue ocean strategy, aiming for differentiation and low cost simultaneously. This can open up a new market space and at the same time stimulate new demand. One successful strategy can be to introduce a usage-based revenue model. This lowers the entrance barrier for companies and enables small- and mid-cap businesses to buy your product. The result is a larger addressable market than with traditional revenue models.

An example of one company that has successfully followed this approach is US-based 3D design company Autodesk. It decided to offer its Fusion 360 model on a subscription basis, drastically reducing the entry barrier for users. This has allowed the company to address new markets, such as home-based 3D printing.

#3 LEVERAGE YOUR CUSTOMERS

The third key success factor is to leverage your customers. Companies need to speak to their customers early on and get them involved in the service generation process. Our experience with successful clients and partners shows that as much as 90 percent of innovation in companies can come from customer requests.

A useful approach here is to actually co-develop projects with customers. Pilot projects that are run with existing customers result in pragmatic, customer-oriented products rather than products that look great on paper (or on the screen) but are of little real use to anyone.

Companies will want to focus on their most progressive customers. Traditional customers are important, of course, but they are less likely to come up with fresh ideas that lead to real innovation. Instead, companies should look for inspiration and input from exciting new players, whose mindset is more likely to be shaped by the possibilities of the latest technology and digital transformation. On a practical level, it is a good idea to start with a basic offering and extend functionality over time. This way you can ensure that there is customer demand for your products before expanding them. Again, close co-development with customers will be extremely helpful. Indeed, successful companies often find that their customers in many ways turn out to be the best product managers.

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