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Advanced Industries

Clearing the air on cloud

How industrial companies can capture cloud technology's full business value

The industrial application of cloud technology is widely seen as very promising, so we went to the front lines and conducted a large-scale survey to find out what really works.

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At the height of the COVID-19 pandemic, many industrial companies turned to cloud technology to increase their productivity, agility, and resilience, and praised it as a turnkey cure-all for just about everything from sagging sales to flagging profits. Other industrial players are already a few years into their cloud journeys – enough time for many of them to have awakened to a somewhat sobering reality: it is really easy for cloud transitions to run over budget and behind schedule.

This raises the following question: **If there is significant value in cloud enablement, and adoption continues to increase among industrial companies, why aren't we seeing widespread transformational results?** To answer this question and better understand the different approaches being taken and how progress differs across geographies and industrial sectors, McKinsey conducted the Cloud in Discrete Manufacturing Industries survey.

First, we draw upon the survey's results to reveal the current state of cloud adoption by industrial companies and describe what has been limiting the success of cloud initiatives. We will investigate the common roadblocks to cloud implementation and identify the proven tools that some companies have used to overcome the challenges. **Second,** we build on these insights – along with two specific case studies and our own experience from client work – to lay out how industrial companies can best manage cloud transformations in today's uncertain environment. **Last,** we will discuss our overarching view on how to start and structure a successful cloud transformation.

Key insights from McKinsey's 2021 Cloud in Discrete Manufacturing Industries survey

In the following, we examine the results from the first global management survey on the cloud specifically for industrial sectors, which was conducted in 2020/21. (For further details on the survey and an executive summary of the key findings, see Text Box 1.)

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Text Box 1: Survey respondent profile and key results

Highlights of the respondent profile:

— We conducted a survey of over 800 executives of discrete manufacturing companies, from both the IT (e.g., CIOs, CDOs, product managers) and business (e.g., CEOs, CFOs, CTOs, CMOs) functions.

— The survey respondents represent a diverse set of manufacturers – from automotive, machinery, and semiconductors to aerospace and defense – in half a dozen countries in Europe and North America .

— Additionally, we conducted more than 50 interviews with industrial sector experts as well as experts from cloud hyperscalers and software providers.

The survey's key findings are:

— Nearly two-thirds of industrial companies are actively using cloud solutions, but far fewer reap the cloud's full rewards.

— Companies pin their hopes on the cloud's value in IT, but the real value is the cloud's application on the business side.

— Cloud success is most often rooted in a well-scoped goal, a clearly articulated path, and investment in a business translator who ensures coordination across a diverse set of stakeholders.

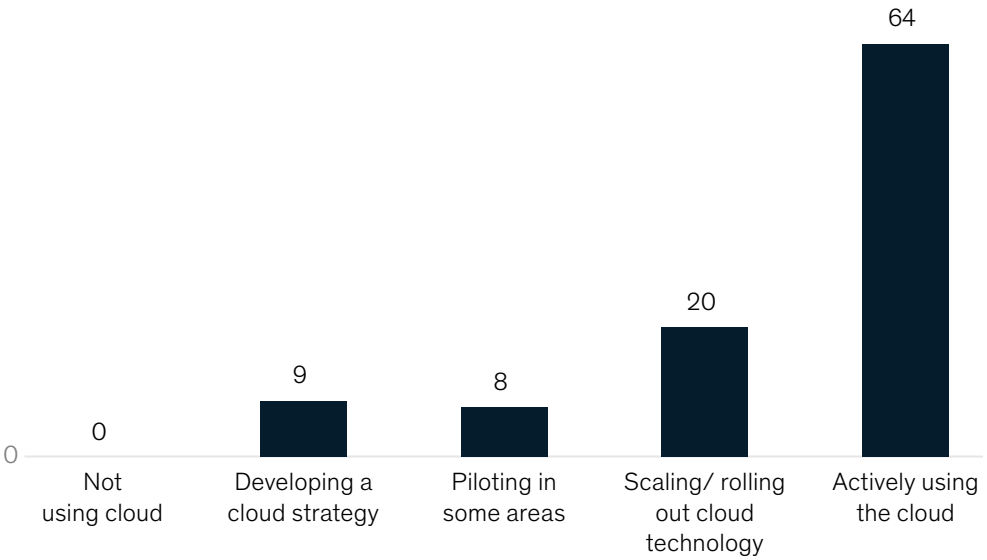
Cloud adoption is on the rise and getting more complex

Industrial companies have started to adopt cloud solutions, and industry leaders continue to elevate them on their agendas.

Exhibit 1

Nearly two-thirds of industrial companies report actively using cloud solutions

Cloud adoption within AI, percent of responses



Source: McKinsey's 2021 Cloud in Discrete Manufacturing Industries survey, sample size n=837

As Exhibit 1 indicates, most industrial companies are adopting and adapting cloud technology – often starting in certain areas or with specific, high-value cases. We expect this rise to continue or even to accelerate, as companies are increasingly looking for large-scale adoptions across entire functions.

Specific demands – like fail-safe requirements in manufacturing environments requiring hybrid solutions – force companies to distribute workloads across a number of solutions, including on-premises computing, private clouds (sometimes externally managed), and public cloud environments.

Of these options, public cloud services represent the largest (and still growing) share of the workload. This trend aligns with recently improved cybersecurity capabilities, leading-edge tools, and improved investment flexibility that public cloud service providers (CSPs) can offer.

At the same time, our research indicates that public cloud usage also requires companies to have the highest level of new skills in order to successfully manage the ecosystem and its costs (see deep dive on organizations using public CSPs in Text Box 2).

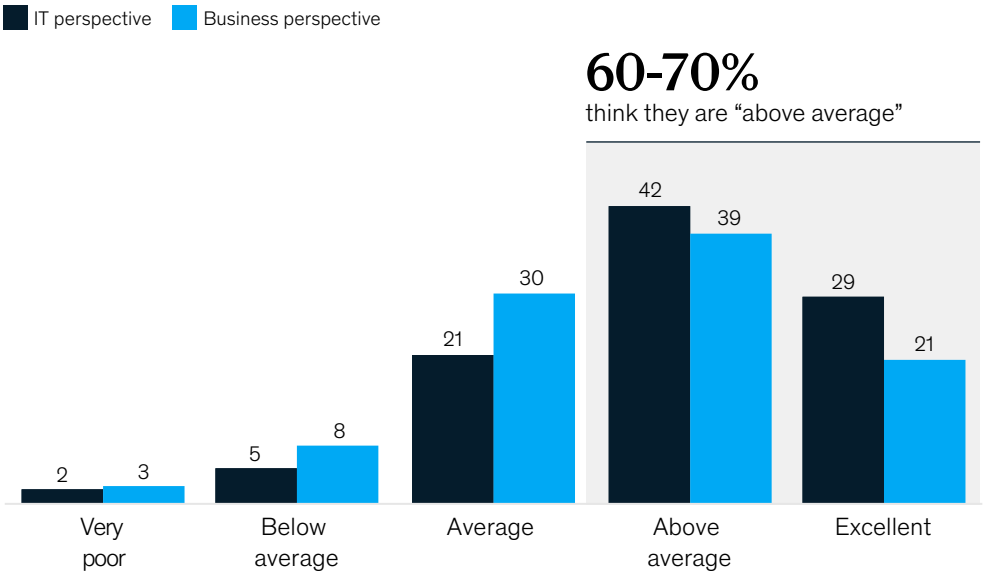
When assessing the success of a cloud adoption, many companies are prone to self-delusion

The high level of adoption would suggest high success rates when it comes to implementing and running cloud technology. However, our survey indicates quite the opposite to be the case (see Exhibit 2): 74 percent of cloud-related transformations fail to capture expected savings or business value. Similarly, almost half of all respondents experienced cloud technology as more (or much more) complex than they initially expected, while 40 percent overran their cloud budgets – some to a significant degree.

Exhibit 2

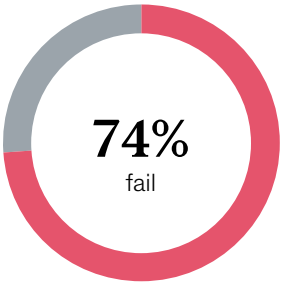
Overconfidence and underestimating complexity led to failure

Cloud maturity level, percent of responses



but

Failure to capture full value



~50%

of respondents view cloud technology as more or much more complex than initially expected

~40%

of respondents overrun their cloud budget

Source: McKinsey's 2021 Cloud in Discrete Manufacturing Industries survey, sample size n=837

Still, companies are confident with regard to their own cloud maturity. To be specific, they are overly confident, with two-thirds of respondents considering themselves above average when it comes to how advanced they are vis-à-vis cloud implementation – a mathematical impossibility.

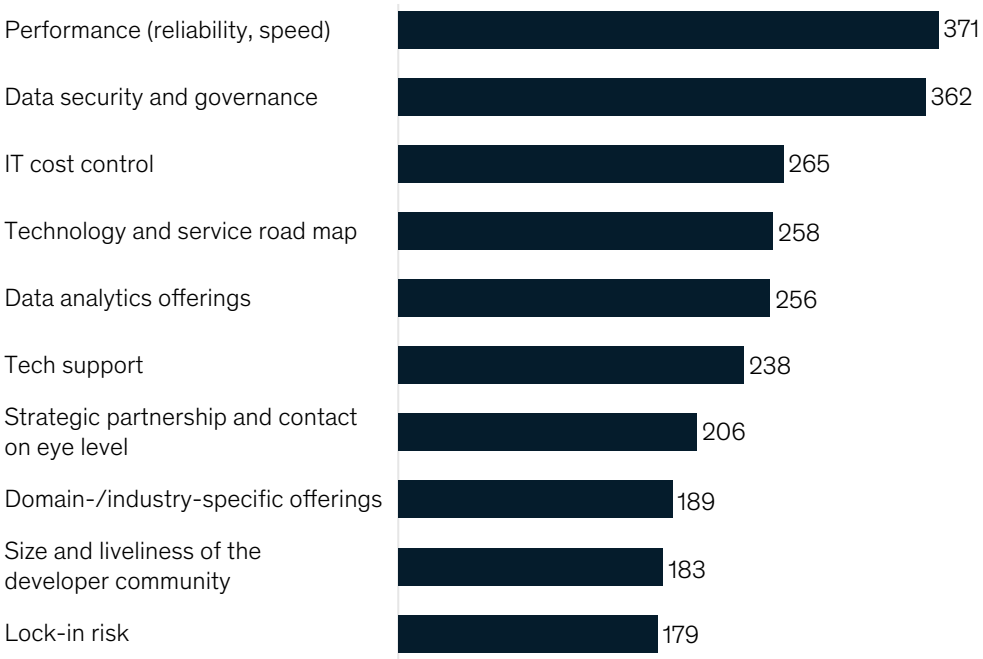
Misplaced focus is the reason many companies are missing out on the cloud's real value

In our view, one key driver of the dire state of many cloud programs is their sole focus on the value of IT (cost) optimization rather than on the potential business value as well. This issue turns up time and again in our data. Asked directly, most companies (about 59 percent) expect the cloud to deliver more value in the area of IT than in business. In addition, when we asked respondents to describe individual use cases they were familiar with, many immediately mentioned the IT function (roughly 40 percent of use cases; likely reflecting, in part, the higher cloud maturity of the IT function). Even companies' CSP selection mainly focused on tech performance and data security, rather than looking at a CSP's capabilities in increasing business value as well (see Exhibit 3).

Exhibit 3

Companies' CSP selection relies heavily on a provider's IT-related capabilities

CSP selection criteria, number of responses ranking the criteria as most, 2nd-most, or 3rd-most important



Source: McKinsey's 2021 Cloud in Discrete Manufacturing Industries survey, sample size n=837

Last but not least, many industrial players decide to implement and run cloud technology based only on a set of very operational and technological dimensions (see Exhibit 4), instead of a clear value-back focus. They prioritize **operational efficiency** (IT and IT infrastructure upgrades to speed up slow-moving internal processes), **quality and reliability of services** (offering the best and most reliable services and products to grow or maintain a competitive advantage), and **security and risk reduction** (data security improvements to mitigate increasing cybersecurity attacks).

Exhibit 4

Rationale behind pursuing cloud technology implementation

Decision criteria to adopt the cloud within an organization, number of responses ranking the criteria as most, 2nd-most, or 3rd-most important

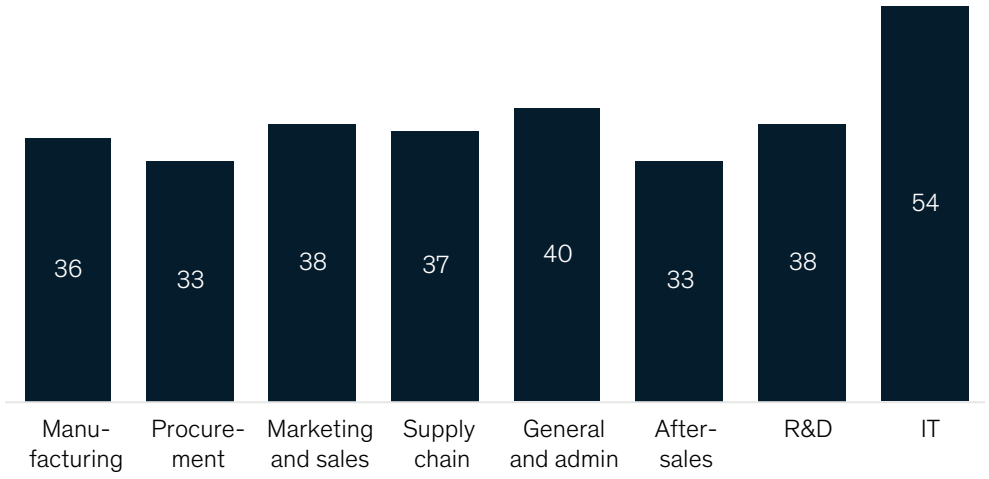
Source: McKinsey's 2021 Cloud in Discrete Manufacturing Industries survey, sample size n=837

Despite companies' focus on IT (see Exhibit 5), our research indicates that the cloud's value in IT amounts to only about 5 percent of the cloud's total potential value. In other words, around 95 percent of the cloud's USD 600 billion value potential lies in business-related functions (e.g., manufacturing, supply chain) and procurement (2 to 3 percentage points of EBIT margin; see Exhibit 6). The value in manufacturing typically results from Industry 4.0 and Industrial Internet of Things use cases that are strongly enabled by and scaled through cloud technology. For B2C companies (e.g., automotive OEMs), another great source of value lies in cloud-enabled applications within marketing and sales, such as incentive spend optimization or customer data analysis.

Exhibit 5

Self-assessment of cloud maturity across functional domains

How would you rate your organization's cloud maturity within the following functional domains? Respondents that gave high scores, percent[1]

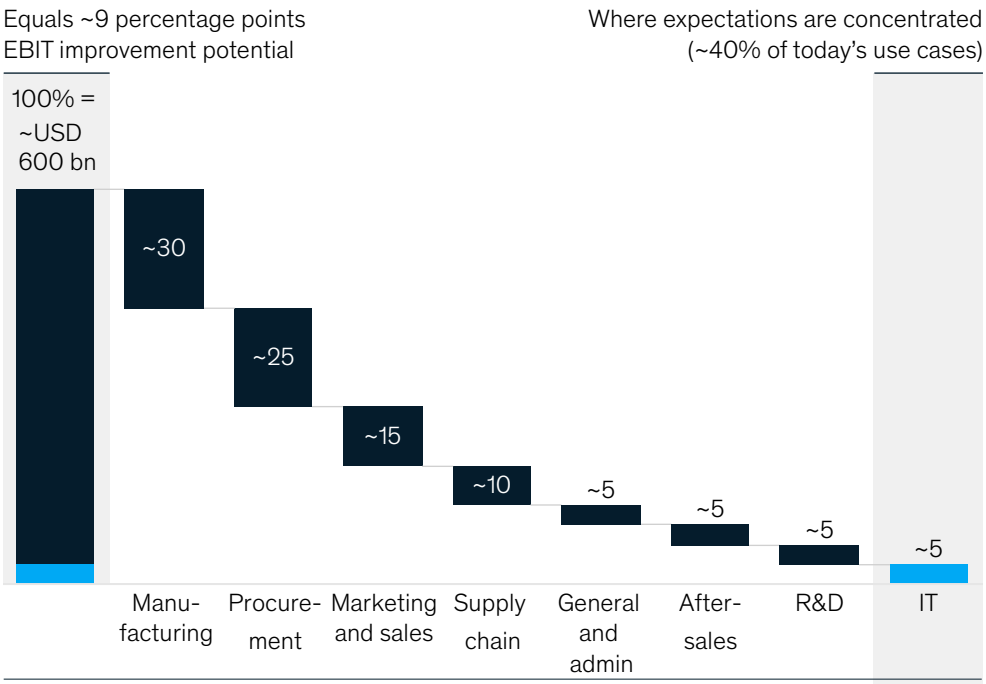


1 "I don't know" answers excluded
Source: McKinsey's 2021 Cloud in Discrete Manufacturing Industries survey, sample size n=837

Exhibit 6

Majority of value potential in business-related functions

Global tech-enabled value at stake for discrete manufacturing industries until 2025, percent



	Manu-facturing	Procure-ment	Marketing and sales	Supply chain	General and admin	After-sales	R&D	IT
Cloud-enabled value, percent of cost baseline based on OEM average, bottom-line effects (top-line effects)								
	10-20	2-5	10-15 (0-1)	10-15	15-20	2-5 (0-1)	5-10	0-10
Impact on EBIT margin, percentage points based on automotive OEM average, bottom-line effects (top-line effects)								
	2-3	2-3	<1 (~1)	~1	<1	<1 (<1)	<1	<1

Source: McKinsey's 2021 Cloud in Discrete Manufacturing Industries survey, sample size n=837

Text Box 2: Deep dive – organizations using public CSPs are more likely to capture the full potential business value of the cloud

In our client work, the question often comes up as to whether to use public CSPs or in-house computing. At the heart of the question are both the matter of trust and security that comes with giving away data and the risk of being locked in and dependent on a cloud provider. These concerns are especially prevalent in Europe due to the strict data security requirements, and with companies that have a strong procurement function and mindset (e.g., automotive).

While this is, in part, a strategic question, and every company has to weigh the risks for themselves, our study indicates that organizations using public CSPs across multiple dimensions are more likely to capture the full potential value of the cloud. Not only are they more likely to capture the expected IT cost savings from a cloud migration, but the likelihood of capturing the full business value increases by about 50 percent. Finally, public cloud users also display a higher speed of adoption compared to their initial expectations.

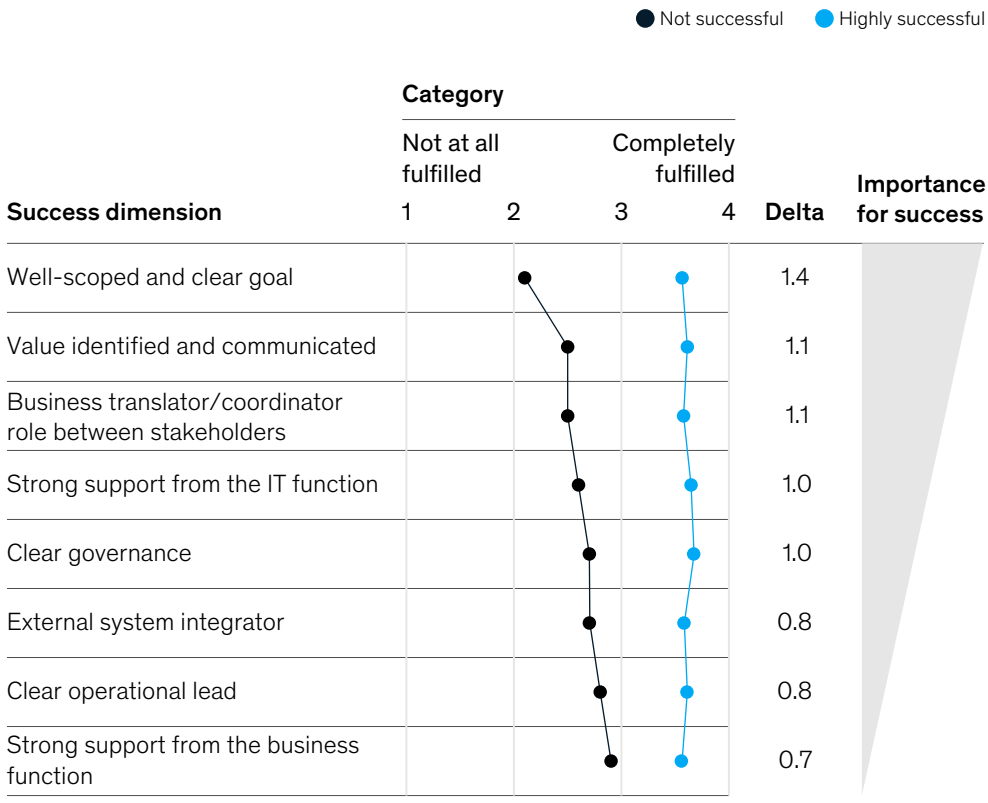
Three success factors for cloud transformations can be identified from leaders' approaches

Challenges certainly exist, yet not all cloud efforts have been failures. To understand what differentiated the companies that are succeeding from the majority that are not, we compared elements of successful and unsuccessful cloud use cases in the context of our survey. Industrial companies that have successfully deployed cloud efforts tend to pursue best practices across three key success factors (see Exhibit 7):

Exhibit 7

Success factors for cloud transformations

Assessment of implemented use cases along success dimensions



Source: McKinsey's 2021 Cloud in Discrete Manufacturing Industries survey, sample size n=837

We will discuss these three success factors in more detail in the next chapter – complemented by two additional ones that we have identified in our own work on cloud transformations.

Five principles for capturing cloud technology's full business value

Developing a successful cloud transformation with scalable impact takes commitment, a well-thought-out plan, and execution excellence. In the following, we share lessons from "winners in the cloud" (i.e., what we have seen work best in the field) and two use cases (see Text Boxes 3 and 4) to make these lessons more tangible.

I Prioritize each initiative based on its unique monetary value

A quick diagnostic enables the team to evaluate the value potential of a full cloud migration and identifies potential maturity gaps or bottlenecks. To make a compelling business case, companies need to unlock and capture both the IT and the business value potential.

As one VP of cloud operations noted in our research, "Cloud adoption [...] was a joint effort between IT and business – but with clear business objectives. The value of [the] cloud lies in the business but requires the business to change accordingly."

To achieve lock-step alignment between IT and business, a business translator role should be established from the outset to identify the most attractive pools of value and establish the link between IT enabler projects and business value realization projects. The business translator role ensures ongoing alignment between the two types of projects as the transformation evolves. Each project initiative needs to have specific business value attached to it and be split into smaller pieces that each contribute to a "value" initiative. "Strategic initiatives" or "IT foundations" projects should be avoided by all means.

Text Box 3: Case study of a value-creating cloud transformation in automotive

Player and approach: European OEM building cars in the cloud

Business value captured: Building the company's first digital production and logistics cloud platform delivered over EUR 1 billion in savings and an expected 30 percent improvement in production efficiency by 2025.

The OEM could only achieve this five-year transformation by following a clearly defined four-step process:

1. Conducted a diagnostic to evaluate its level of cloud maturity and show capability gaps.
2. Scoped the situation and created clear goals, developed a cloud strategy, and defined a vision and key success factors. In the process, the OEM prioritized the domains with the greatest business value, building a solid business case and designing an operating model that addressed both the business and IT sides, together with an implementation road map and tooling requirements.
3. Articulated a clear path to capturing value and set up the transformation program together with ecosystem partners. These included a CSP and a technology integration company to build internal capabilities and coordinate the organizational road map. The CSP created a cloud innovation center and the technology integration partner contributed 220 specialists. The OEM also launched several minimum viable products to show initial success.
4. Scaled the cloud migration throughout the organization and took care of enterprise-wide upskilling to ensure the OEM had sufficient internal technical capabilities.

II Plan and implement change by business domain

The value from cloud technology comes from business benefits such as operational efficiency, reduced time to market, or cloud-enabled products and services. Capturing these business benefits requires transformational changes in business processes, organization, product development, or sourcing. As the value of cloud transformations does not come from individual improvements but often from the seamless digitization of entire chunks of processes and interface-free connection between systems, it is imperative to take a business-domain-focused approach to planning, sequencing, and executing cloud initiatives. Accordingly, organizations should first determine and design their future operating model for each business domain. Second, they must design the future-state IT architecture supporting the operating model. Third, they should build an implementation road map prioritized by the potential value associated with the business value of the entire respective domain.

III Transfer generated insights and skills between the CSP and the organization

Companies should prepare and accompany the cloud migration with a dedicated capability-building program to ensure that the organization effectively cascades competence in cloud technology and the associated benefits. In this context, the IT department needs the required skills and sufficient capacity to execute a large implementation program, while the business transformation office requires the respective transformational capabilities to capture the value potential committed in the business case.

Text Box 4: Case study of a value-creating cloud transformation in manufacturing for telecommunications

Player and approach: telecommunications company building its first greenfield 5G factory

Business value captured: Overall, the transformation project delivered a productivity increase of over 125 percent.

A multinational networking and telecommunications company leveraged a four-step process for building its first greenfield 5G factory in the US, partnering with a CSP to access its Internet of Things network:

1. Conducted an initial diagnosis that result in plans to showcase its capabilities in 5G and Industry 4.0
2. Pursued its first 5G use cases, which included augmented-reality video calling using a dynamic remote assistance platform, to set up the foundations.
3. Quickly built minimum viable products.
4. Coached over 30 team members on the CSP's technology development to speed up capability building within the organization and ensure availability of internal technical capabilities.

The global CIO of an automotive supplier commented: "Often, the IT department does not have the skills to calculate a large-scale business case and lead a large implementation. Furthermore, they require new skills and often the acquisition of cloud-savvy talent."

While CSPs have the cutting-edge tools and methods to migrate and manage cloud environments, they often lack the industry- and domain-specific know-how. Building up joint project teams that enable the transfer of cloud knowledge in exchange for company- and industry-specific knowledge is thus a major success factor.

What should also be noted here is that the project team engaged in a cloud migration will often act as the nucleus of the future cloud operating model. Companies should therefore boldly invest in assembling a team of high-caliber talent and keep the number of external contractors in this team to a minimum. The investments in this team will build the foundation for the future success of the cloud operating model.

IV First plan the legacy application shutdown, then adjust the cloud implementation plan accordingly

Manufacturing companies have significant numbers of legacy systems for a variety of reasons. For example, many factories connected some or most of their systems several decades ago, adding proprietary interfaces and introducing local customization updates ad hoc.

The head of digital production at one OEM said, "Some factories or sites are over 100 years old and therefore have a very traditional structure – and this is reflected in our IT systems. In the last [few] years or decades, we really have grown huge systems – very monolithic structures with thousands of interfaces. Sometimes the interfaces are driven manually, so faults are possible."

Companies should build a transition road map based on items they can duplicate, migrate, or delete. They need to clearly communicate the transition timing and efforts with the organization and create a timeline for the replacement process that reduces the "double-bubble" costs of running legacy and cloud applications and infrastructures in parallel. As the legacy-replacement plan is usually the "long pole in the tent," companies should first fix their legacy retirement road map and then build their cloud migration plan around it.

V Develop an enterprise mindset of creating and scaling new digital solutions

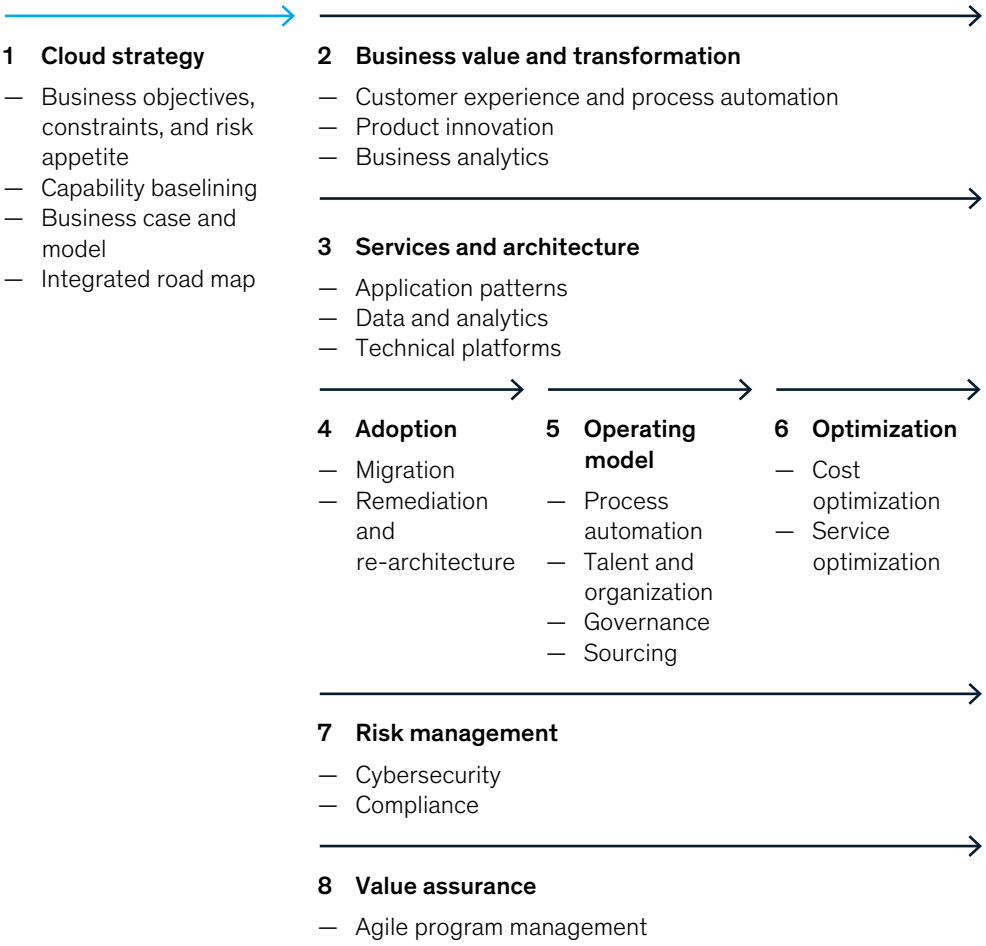
Following the realization of the first success cases, companies should codify and scale up the lessons learned to drive business change consistently and accelerate cloud migration. They should use the "influence model" from change management to drive the adoption of deployed solutions and create processes that incentivize and inspire other business units and domains to learn from the initial cases.

How to embark on a value-generating cloud transformation journey

Value-focused and value-generating cloud transformations in discrete manufacturing organizations are ambitious endeavors, heavily leaning on the full engagement of the entire organization. Although the implementation of initial use cases or pilots can typically be done quite quickly, sometimes in a matter of months, one to three years is a common timeline for completing a holistic transformation and delivering its value (depending on the scope and company size). Two phases and eight key sets of actions are critical to making such transformations successful (see Exhibit 8):

Exhibit 8

8 key aspects of a cloud transformation



Source: McKinsey

Phase 1: Cloud strategy development. Laying the strategic foundation for a cloud transformation includes defining business objectives (including constraints and risk appetite), building a capability baseline, setting up the business case and model, and creating an integrated transformation road map.

Phase 2: Agile implementation. Putting the cloud strategy into operation requires seven more sets of steps across multiple dimensions. Many of the actions will be launched at the same time and carried out in parallel, while others will follow a more sequential rollout. No matter what, they will require the full commitment and backing of executive management if manufacturing companies want to avoid the dreaded "pilot trap" and enable value generation at scale.

After having gone through these two phases and eight corresponding sets of actions, industrial companies should find themselves in a position to tap into the full potential of cloud technology and start reaping its financial and strategic benefits.

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With a name like "cloud," it's no wonder organizations lose sight of what it means and how it can deliver tremendous amounts of business value. We hope the insights here, culled from significant research and investigation, help clear the air on the cloud and reassure industrial companies of its outstanding value.

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