Digital reinvention: Unlocking the 'how'

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Introduction

At many companies, the debate about whether to pursue a digital transformation has ended in favor of profound change. Now a new C-suite discussion is under way: how to make the digital transformation happen before it's too late. Time is running out. Our research and experience show that businesses that are slow to digitize struggle to remain competitive.

Throwing money at the problem isn't likely to help; some digital initiatives generate attractive returns, others don't. So, companies must target their efforts and investments carefully. That calls for CEOs to make tough decisions about how to transform their companies. It also calls for them to lead the transformation while other C-suite executives manage day-to-day efforts.

In practice, this means overhauling how the business works to create a new operating model that runs on digital technologies and capabilities. Modernizing IT is one particularly critical, and oftentimes misunderstood, part of digital transformation because it enables enterprises to accelerate innovation and performance improvement. Other essential transformation tasks include building a digital culture and developing capabilities that allow for deeper integration with both internal and external systems.

The articles in this volume present a selection of our latest thinking on how companies can carry out successful digital reinventions. We hope you find them useful, and we look forward to hearing about your achievements during the year to come.

Michael Bender
Global co-leader,
Chicago

Paul Willmott
Global co-leader,
London

In this volume

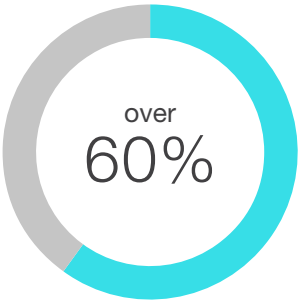
Three ways in which API programs create value for companies

Simplify back-end IT systems

Enable delivery of personalized products and services

Allow for participation in digital ecosystem

% of companies' highest-value technology projects requiring collaboration and delivery across digital and IT teams



The case for digital reinvention

Jacques Bughin, Laura LaBerge and Anette Mellbye

Digital technology, despite its seeming ubiquity, has only begun to penetrate industries. As it continues its advance, the implications for revenues, profits, and opportunities will be dramatic.

As new markets emerge, profit pools shift, and digital technologies pervade more of everyday life, it's easy to assume that the economy's digitization is already far advanced. According to our latest research, however, the forces of digital have yet to become fully mainstream. On average, industries are less than 40 percent digitized, despite the relatively deep penetration of these technologies in media, retail, and high tech.

As digitization penetrates more fully, it will dampen revenue and profit growth for some, particularly the bottom quartile of companies, according to our research, while the top quartile captures disproportionate gains. Bold, tightly integrated digital strategies will be the biggest differentiator between companies that win and companies that don't, and the biggest payouts will go to those that initiate digital disruptions. Fast-followers with operational excellence and superior organizational health won't be far behind.

These findings emerged from a research effort to understand the nature, extent, and top-management implications of the progress of digitization. We tailored our efforts to examine its effects along multiple dimensions: products and services, marketing and distribution channels,

business processes, supply chains, and new entrants at the ecosystem level (for details, see sidebar "About the research"). We sought to understand how economic performance will change as digitization continues its advance along these different dimensions. What are the best-performing companies doing in the face of rising pressure? Which approach is more important as digitization progresses: a great strategy with average execution or an average strategy with great execution?

The research-survey findings, taken together, amount to a clear mandate to act decisively, whether through the creation of new digital businesses or by reinventing the core of today's strategic, operational, and organizational approaches.

About the research

To go beyond the descriptive statistics that limit the relevance of so much survey research, we built a causal model of digital performance. The model's first input, from the survey itself, conveyed the current level of digitization (as reported by companies) in each of five dimensions: products and services, marketing and distribution channels, business processes, supply chains, and new entrants at the ecosystem level. The second input from the survey was the level of response companies had taken, and planned to take, on those dimensions, as well as their core enabling strategic and organizational capabilities.

We then modeled average growth in revenue and earnings before interest and taxes (EBIT) for all companies in the sample at current and full digitization, based on survey respondents' perceptions of their companies' responses to digitization, postulating causal links, and calculating their magnitude through both linear- and probit-regression techniques, controlling for industry, company size, geography, and type of customer segment (B2B or B2C).

More digitization—and performance pressure—ahead

According to our research, digitization has only begun to transform many industries (Exhibit 1). Its impact on the economic performance of companies, while already significant, is far from complete.

This finding confirms what many executives may already suspect: by reducing economic friction, digitization enables competition that pressures revenue and profit growth. Current levels of digitization have already taken out, on average, up to six points of annual revenue and 4.5 points of growth in earnings before interest and taxes (EBIT). And there's more pressure ahead, our research suggests, as digital penetration deepens (Exhibit 2).

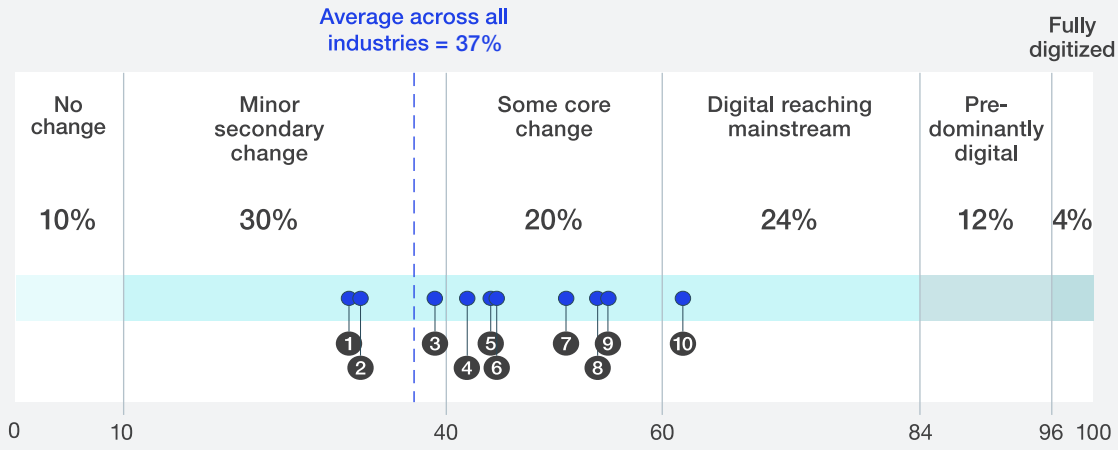
While the prospect of declining growth rates is hardly encouraging, executives should bear in mind that these are *average* declines across *all* industries. Beyond the averages, we find that performance is distributed unequally, as digital further separates the high performers from the also-rans.

This finding is consistent with a separate McKinsey research stream, which also shows that economic performance is extremely unequal. Strongly performing industries, according to that research, are three times more likely than others to generate market-beating economic profit. Poorly performing companies probably won't thrive no matter which industry they compete in.

Exhibit 1

Digital is penetrating all sectors, but to varying degrees.

Perception of digital penetration by industry,[1] % of respondents



Selected industries[2]

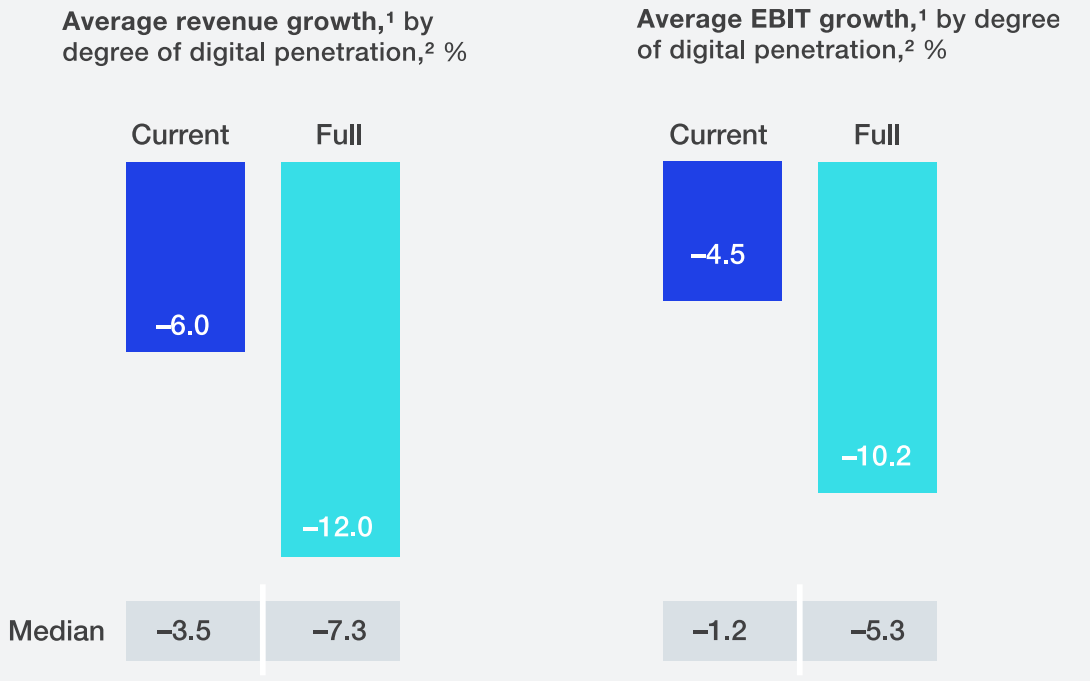
1. Consumer packaged goods (31%)
2. Automotive and assembly (32%)
3. Financial services (39%)
4. Professional services (42%)
5. Telecom (44%)
6. Travel, transport, and logistics (44%)
7. Healthcare systems and services (51%)
8. High tech (54%)
9. Retail (55%)
10. Media and entertainment (62%)

[1] Data reflect average of respondents' ratings on degree of change in the past three years within each industry across 5 dimensions (products, marketing and distribution, processes, supply chains, and new entrants at the ecosystem level).

[2] For consumer packaged goods, n = 85; automotive and assembly, n = 112; financial services, n = 310; professional services, n = 307; telecom, n = 55; travel, transport, and logistics, n = 103; healthcare systems and services, n = 78; high tech, n = 348; retail, n = 89; and media and entertainment, n = 86.

Exhibit 2

Digitization is putting pressure on revenue and profit growth.



[1] We based our model of average growth in revenues and earnings before interest and taxes (EBIT) at current and full digitization on survey respondents' perceptions of their companies' responses to digitization, postulating causal links, and calculating their magnitude through both linear- and probit-regression techniques.
[2] Digital penetration estimated using survey responses; average digital penetration across industries currently = 37%.

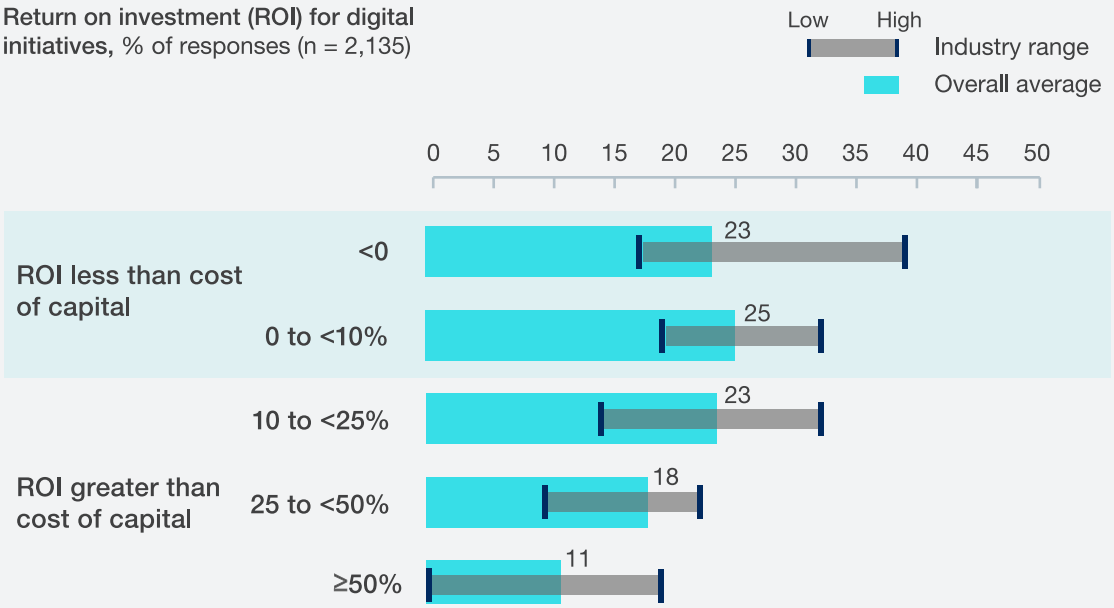
At the current level of digitization, median companies, which secure three additional points of revenue and EBIT growth, do better than average ones, presumably because the long tail of companies hit hard by digitization pulls down the mean. But our survey results suggest that as digital increases economic pressure, all companies, no matter what their position on the performance curve may be, will be affected.

Uneven returns on investment

That economic pressure will make it increasingly critical for executives to pay careful heed to where—and not just how—they compete and to monitor closely the return on their digital investments. So far, the results are uneven. Exhibit 3 shows returns distributed unequally: some players in every industry are earning outsized returns, while many others in the same industries are experiencing returns below the cost of capital.

Exhibit 3

Some digital initiatives generate attractive returns, while others don't return their cost of capital.



These findings suggest that some companies are investing in the wrong places or investing too much (or too little) in the right ones—or simply that their returns on digital investments are being competed away or transferred to consumers. On the other hand, the fact that high performers exist in every industry (as we'll discuss further in a moment) indicates that some companies are getting it right—benefiting, for example, from cross-industry transfers, as when technology companies capture value in the media sector.

Where to make your digital investments

Improving the ROI of digital investments requires precise targeting along the dimensions where digitization is proceeding. Digital has widely expanded the number of available investment options, and simply spreading the same amount of resources across them is a losing proposition. In our research, we measured five separate dimensions of digitization's advance into industries: products and services, marketing and distribution channels, business processes, supply chains, and new entrants acting in ecosystems.

How fully each of these dimensions has advanced, and the actions companies are taking in response, differ according to the dimension in question. And there appear to be mismatches between opportunities and investments. Those mismatches reflect advancing digitization's

uneven effect on revenue and profit growth, because of differences among dimensions as well as among industries. Exhibit 4 describes the rate of change in revenue and EBIT growth that appears to be occurring as industries progress toward full digitization. This picture, combining the data for all of the industries we studied, reveals that today's average level of digitization, shown by the dotted vertical line, differs for each dimension. Products and services are more digitized, supply chains less so.

To model the potential effects of full digitization on economic performance, we linked the revenue and EBIT growth of companies to a given dimension's digitization rate, leaving everything else equal. The results confirm that digitization's effects depend on where you look. Some dimensions take a bigger bite out of revenue and profit growth, while others are digitizing faster. This makes intuitive sense. As platforms transform industry ecosystems, for example, revenues grow—even as platform-based competitors put pressure on profits. As companies digitize business processes, profits increase, even though little momentum in top-line growth accompanies them.

The biggest future impact on revenue and EBIT growth, as Exhibit 4 shows, is set to occur through the digitization of supply chains. In this dimension, full digitization contributes two-thirds (6.8 percentage points of 10.2 percent) of the total projected hit to annual revenue growth and more than 75 percent (9.4 out of 12 percent) to annual EBIT growth.

Despite the supply chain's potential impact on the growth of revenues and profits, survey respondents say that their companies aren't yet investing heavily in this dimension. Only 2 percent, in fact, report that supply chains are the focus of their forward-looking digital strategies (Exhibit 5), though headlining examples such as Airbnb and Uber demonstrate the power of tapping previously inaccessible sources of supply (sharing rides or rooms, respectively) and bringing them to market. Similarly, there is little investment in the ecosystems dimension, where hyperscale businesses such as Alibaba, Amazon, Google, and Tencent are pushing digitization most radically, often entering one industry and leveraging platforms to create collateral damage in others.[1]

Instead, the survey indicates that distribution channels and marketing are the primary focus of digital strategies (and thus investments) at 49 percent of companies. That focus is sensible, given the extraordinary impact digitization has already had on customer interactions and the power of digital tools to target marketing investments precisely. By now, in fact, this critical dimension has become "table stakes" for staying in the game. Standing pat is not an option.

The question, it seems, looking at Exhibits 4 and 5 in combination, is whether companies are overlooking emerging opportunities, such as those in supply chains, that are likely to have a major influence on future revenues and profits. That may call for resource reallocation. In general, companies that strategically shift resources create more value and deliver higher returns to shareholders. This general finding could be even more true as digitization progresses.

1 For more about the supply-and-demand vectors through which disruptive threats and opportunities emerge, see Angus Dawson, Martin Hirt, and Jay Scanlan, "The economic essentials of digital strategy," *McKinsey Quarterly*, March 2016.

Exhibit 4

Products are more digitized, while supply chains are less so.

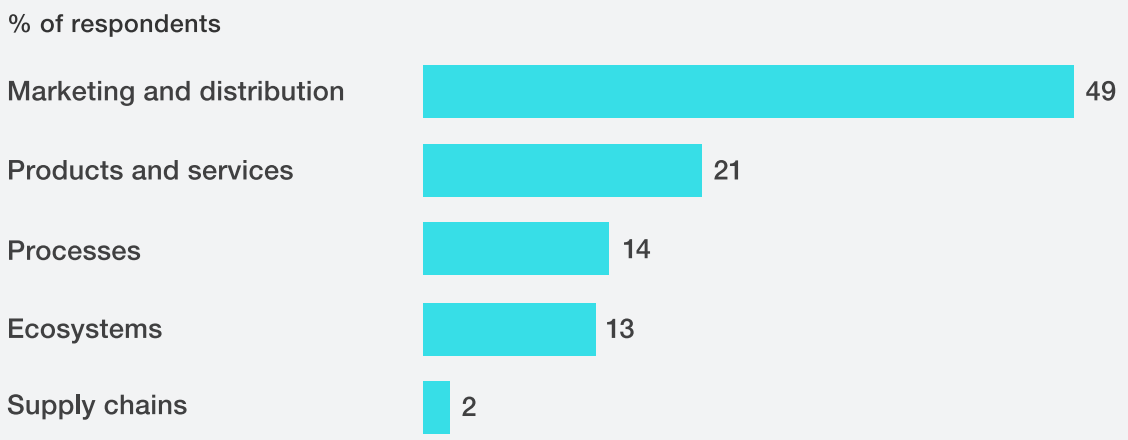
Effect of digitization on EBIT[1] and revenue relative to current growth trajectory (represented as 0),[2] % difference

Note: y axes scale to different values

[1] EBIT = earnings before interest and taxes.
[2] We based our model of average growth in revenue and EBIT at current and full digitization on survey respondents' perceptions of their companies' responses to digitization, postulating causal links, and calculating their magnitude through both linear- and probit-regression techniques.
[3] Weighted average for industries whose respondents replied on each of the 5 dimensions, reflecting a subset of total respondents surveyed. Unweighted average level of digitization across industries for all respondents = 37%.

Exhibit 5

Where are companies focusing their forward-looking digital strategies?



On the front foot

Our survey results also suggest companies are not sufficiently bold in the magnitude and scope of their investments (see sidebar "Structuring your digital reinvention"). Our research (Exhibit 6) suggests that the more aggressively they respond to the digitization of their industries—up to and including initiating digital disruption—the better the effect on their projected revenue and profit growth. The one exception is the ecosystem dimension: an overactive response to new hyperscale competitors actually lowers projected growth, perhaps because many incumbents lack the assets and capabilities necessary for platform strategies.

As executives assess the scope of their investments, they should ask themselves if they have taken only a few steps forward in a given dimension—by digitizing their existing customer touchpoints, say. Others might find that they have acted more significantly by digitizing nearly all of their business processes and introducing new ones, where needed, to connect suppliers and users.

To that end, it may be useful to take a closer look at Exhibit 6, which comprises six smaller charts. The last of them totals up actions companies take in each dimension of digitization. Here we can see that the most assertive players will be able to restore more than 11 percent of the 12 percent loss in projected revenue growth, as well as 7.3 percent of the 10.4 percent reduction in profit growth.

Such results will require action across all dimensions, not just one or two—a tall order for any management team, even those at today's digital leaders.

Exhibit 6

When companies respond to digitization assertively and across multiple dimensions, they improve their performance.

Effect of company response to digitization on EBIT[1] and revenue relative to current growth trajectory (represented as 0),[2] % difference

Note: y axes scale to different values

[1] EBIT = earnings before interest and taxes.
[2] We based our model of average growth in revenue and EBIT at current and full digitization on survey respondents' perceptions of their companies' responses to digitization, postulating causal links, and calculating their magnitude through both linear- and probit-regression techniques.
[3] Overactive response to new competitors in ecosystems can actually lower projected growth.
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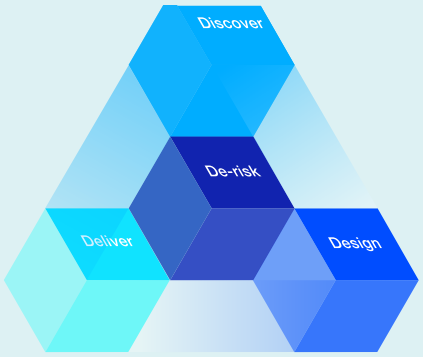

Discover:
Shape digital ambition, strategy, and business case based on industry-level insights

Deliver:
Activate an ecosystem of external partners to rapidly deliver at scale

Design:
Reinvent and prototype new capabilities and breakthrough journeys as part of a program

De-risk:
Structure the change program, resources, and commercial model to reduce operational and financial risk

Structuring your digital reinvention

Leading companies invest more boldly in digital than their less-well-performing counterparts do, according to McKinsey's 2016 digital survey. They also invest more **broadly** by targeting each dimension in which digitization is rapidly advancing: products and distribution, business processes, supply chains, and ecosystems. As executives look to deepen and broaden the digital reinvention of their own companies, they may benefit from a structured process grouped around discovering, designing, delivering, and de-risking their digital investments. Let's look at each of these in turn.

Since industry effects account for two-thirds of a company's variation from average economic profit, according to McKinsey analysis, executives must **discover** the industry-level insights needed to identify sources of disruption as markets evolve. By grounding their insights in supply-and-demand shifts, they can more clearly recognize the vectors where disruption originates.[1] This reinvention phase also requires companies to assess the capabilities they must have to realize their strategic aspirations so that they can identify critical needs: cloud-based solutions, personalization and analytics, agile techniques, performance optimization, or something else.

Given the broad scope of the investment required, digital reinventions mandate an end-to-end **design** of business processes, with close attention to customer use cases, IT requirements, and organizational elements (such as structure, talent, incentives, and culture). The output of this work is a digital blueprint to address capability gaps and to recruit, develop, provide incentives for, and retain the necessary talent. The resulting implementation plan prioritizes the initiatives that generate the greatest economic value.

With these essentials in place, a digital reinvention must now **deliver** the capabilities needed to meet a company's strategic goals. No organization will have all the capabilities it needs within its own walls. Executives must therefore develop an ecosystem of external teams, partners, suppliers, and customers, including a mix of platform players, delivery specialists, and niche outfits with specific industry expertise and capabilities. The reinvention team must not only play "air traffic controller" for the project's numerous moving parts but also have the credibility and skill to solve problems along the many facets of the business.

Across all of these stages, executives can structure the process to minimize risk. Cybersecurity is one obvious area of focus. Companies can further **de-risk** their reinventions by embracing DevOps, in which teams learn to automate tests for software, establish systems that roll back failures in seconds, and make fixes without putting significant parts of the business at risk.

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1. Angus Dawson, Martin Hirt, and Jay Scanlan, "The economic essentials of digital strategy," *McKinsey Quarterly,* March 2016.

Looking at the digital winners

To understand what today's leaders are doing, we identified the companies in our survey that achieved top-quartile rankings in each of three measures: revenue growth, EBIT growth, and return on digital investment.

We found that more than twice as many leading companies closely tie their digital and corporate strategies than don't. What's more, winners tend to respond to digitization by changing their corporate strategies significantly. This makes intuitive sense: many digital disruptions require fundamental changes to business models. Further, 49 percent of leading companies are investing in digital more than their counterparts do, compared with only 5 percent of the laggards, 90 percent of which invest less than their counterparts. It's unclear which way the causation runs, of course, but it does appear that heavy digital investment is a differentiator.

Leading companies not only invested more but also did so across *all* of the dimensions we studied. In other words, winners exceed laggards in both the *magnitude* and the *scope* of their digital investments (Exhibit 7). This is a critical element of success, given the different rates at which these dimensions are digitizing and their varying effect on economic performance.

Strengths in organizational culture underpin these bolder actions. Winners were less likely to be hindered by siloed mind-sets and behavior or by a fragmented view of their customers. A strong organizational culture is important for several reasons: it enhances the ability to perceive digital threats and opportunities, bolsters the scope of actions companies can take in response to digitization, and supports the coordinated execution of those actions across functions, departments, and business units.

Bold strategies win

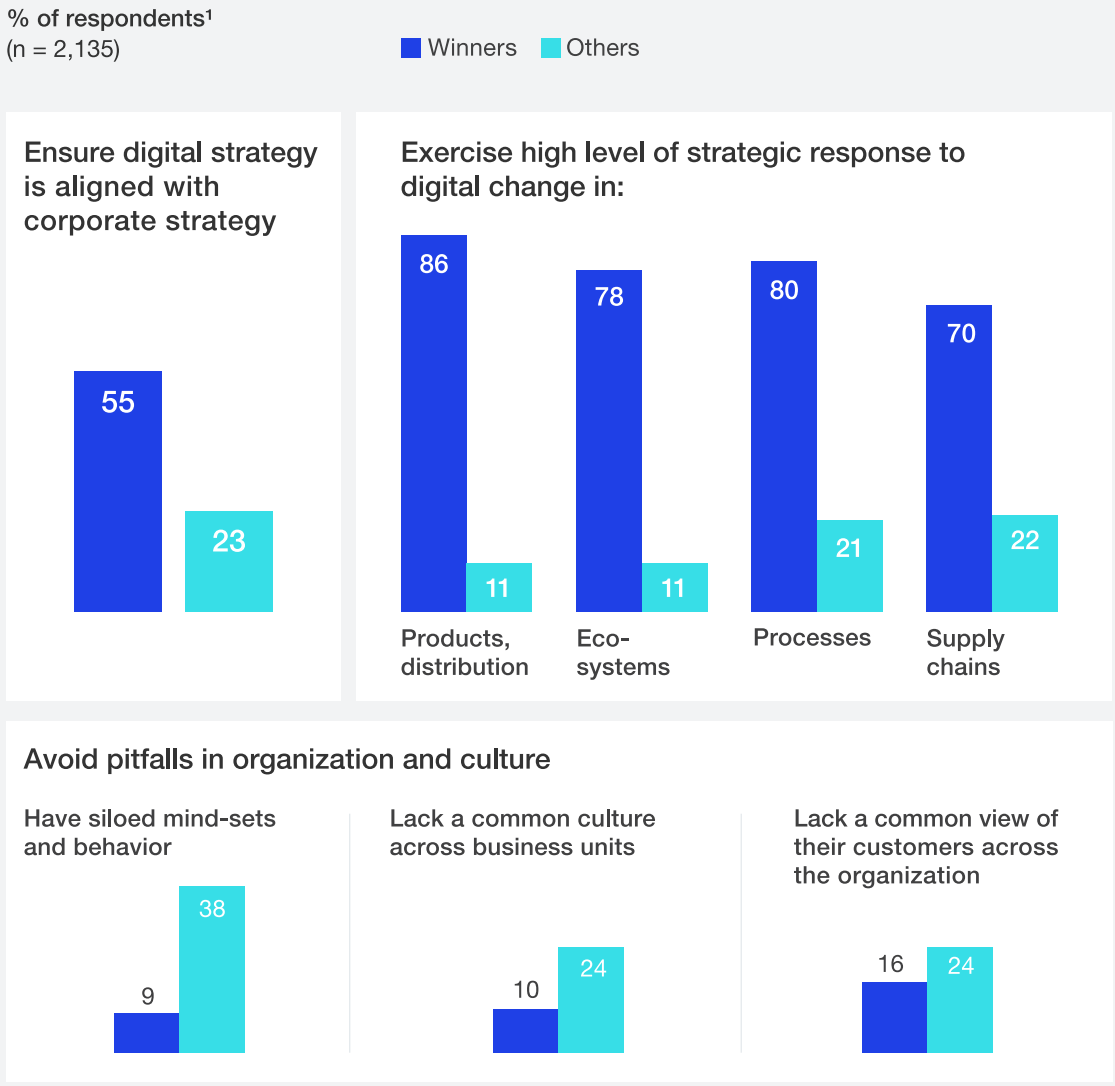
So we found a mismatch between today's digital investments and the dimensions in which digitization is most significantly affecting revenue and profit growth. We also confirmed that winners invest more, and more broadly and boldly, than other companies do. Then we tested two paths to growth as industries reach full digitization.

The first path emphasizes strategies that change a business's scope, including the kind of pure-play disruptions the hyperscale businesses discussed earlier generate. As Exhibit 8 shows, a great strategy can by itself retrieve all of the revenue growth lost, on average, to full digitization—at least in the aggregate industry view. Combining this kind of superior strategy with median performance in the nonstrategy dimensions of McKinsey's digital-quotient framework—including agile operations, organization, culture, and talent—yields total projected growth of 4.3 percent in annual revenues. (For more about how we arrived at these conclusions, see sidebar "About the research.")

Most executives would fancy the kind of ecosystem play that Alibaba, Amazon, Google, and Tencent have made on their respective platforms. Yet many recognize that few companies can mount

Exhibit 7

What leading companies do differently from the rest.



disruptive strategies, at least at the ecosystem level. With that in mind, we tested a second path to revenue growth (Exhibit 9).

Companies in this profile lack a disruptive strategic posture but compensate by being in the top 25 percent for all the other elements of digital maturity.[2] This fast-follower profile allows more room for strategic error—you don't have to place your bets quite so precisely. It also increases

2 For more about digital maturity, see Tanguy Catlin, Jay Scanlan, and Paul Willmott, "Raising your Digital Quotient," *McKinsey Quarterly*, June 2015.

Exhibit 8

Disruptive strategies are a powerful response to intense digitization.

Revenue-growth profile, %

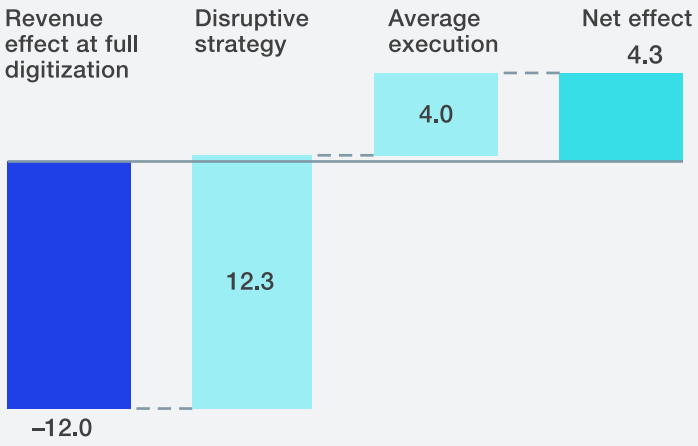
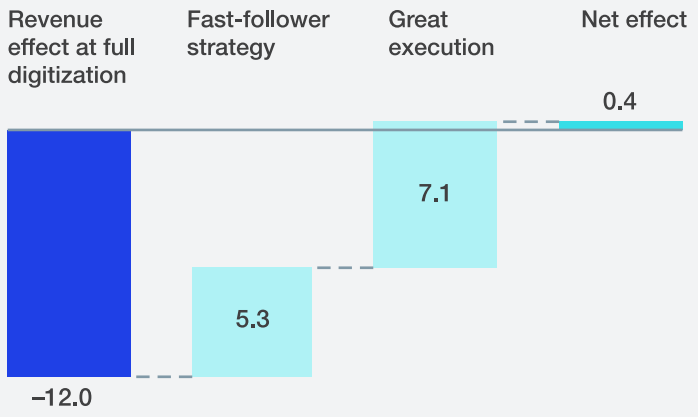


Exhibit 9

Fast-following and great execution are the next best thing to disruption.

Revenue-growth profile, %



the premium on how well you execute. The size of the win is just slightly positive at 0.4 percent in annual revenue growth: 5.3 percent from good (but not best-in-class disruptive) strategy and an additional 7.1 percent through top-quartile digital maturity. This is probably good news for incumbents, since many of them are carefully watching tech start-ups (such as those in fintech) to identify the winning plays and then imitating them at their own bigger scale. That approach, to be sure, demands cutting-edge agility to excel on all the operational and organizational aspects of digital maturity.

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In the quest for coherent responses to a digitizing world, companies must assess how far digitization has progressed along multiple dimensions in their industries and the impact that this evolution is having—and will have—on economic performance. And they must act on each of these dimensions with bold, tightly integrated strategies. Only then will their investments match the context in which they compete.

Jacques Bughin is a director of the McKinsey Global Institute and a senior partner in McKinsey's Brussels office; **Laura LaBerge** is a senior practice manager of Digital McKinsey and is based in the Sta mford office; and **Anette Mellbye** is an associate partner in the London office.

The authors wish to thank Dan Lovallo, Soyoko Umeno, and Nicolas van Zeebroeck for their contributions to this article.

The seven decisions that matter in a digital transformation: A CEO's guide to reinvention

Peter Dahlström, Driek Desmet, and Marc Singer

A successful digital transformation requires making trade-off decisions. Here's how successful CEOs guide their business's reinvention.

Being the CEO of a large company facing digital disruption can seem like being a gambler at a roulette table. You know you need to place bets to win, but you have no idea where to put your chips.

Of course, digital transformations aren't games of chance. But they do require big and bold commitments in the midst of uncertainty to reinvent the business rather than just improve it.

Many of the digital initiatives large incumbents have already tried to date have tended to operate at the margins of the business. Innovation labs or apps can be useful for learning and can even provide a boost to the company. Meanwhile, the legacy business remains in place, largely unperturbed.

Without a transformation of the core—the value proposition, people, processes, and technologies that are the lifeblood of the business—any digital initiative is likely to be a short-term fix. The legacy organization will inevitably exert a gravitational pull that drives a reversion to established practices. Reinvention of a business is, by its nature, bold. But it's one thing to be bold; it's another to be thoughtfully bold. A digital reinvention requires the CEO to make tough decisions, which involve hard trade-offs that it is tempting to ignore, defer, or rush into. Yet knowing which decisions to prioritize and how to implement them can make the difference between a successful transformation effort and one that struggles.

- These decisions occur in the four phases of a successful digital transformation program:

- Discovering the ambition for the business based on where value is migrating

- Designing a transformation program that targets profitable customer journeys

- Delivering the change through an ecosystem of partners

- De-risking the transformation process to maximize the chances of success

In each of these areas, the CEO has a lot of things to do, from modeling new behavior to driving a change in culture to executing strategy.[3] But this article focuses on some of the big decisions CEOs need to make, and how they can go about making them. Based on our experience with dozens of digital transformations, we believe these seven decisions are the most important ones.

DISCOVER—Set the ambition for the business.

Decision 1: Where the business should go

Few decisions are more momentous than choosing the business direction. While the almost existential nature of this decision can seem overwhelming, most incumbents don't have a choice, since they are already facing disruptions that can threaten their long-term viability.

Data and analysis, as well as a disciplined framework for thinking through options, provide a helpful structure for making the decision. As a starting point, we recommend a thoughtful review of the market and business based on those stalwarts of economic analysis, supply and demand.[4] It's important that any analysis be dynamic and forward-looking, based on an understanding of how digital technology could lead to changes in the future.

3 Carolyn B. Aiken and Scott P. Keller, "The CEO's role in leading transformation," McKinsey & Company, February 2007, is a seminal piece on transformations. The points made in it remain true in the digital age.

4 Angus Dawson, Martin Hirt, and Jay Scanlan, "Economic essentials of digital strategy," *McKinsey Quarterly*, March 2016.

Almost every notable digital innovation we've seen has been based on using connectivity and data to transform the customer experience or to reshape products and services by allowing customers to interact with them in new ways. So that's a good basis for thinking through the possibilities. Incumbents can also look to approaches used by digital innovators—both within and outside their sectors—to spur fresh thinking.[5]

While analysis is crucial, it is no substitute for imagination. C.S. Lewis called imagination "the organ of meaning," and CEOs need to tap into it. One approach might be to imagine how the industry would work if it were completely digitized.[6] Often, a creative leap is needed to identify how the firm might serve customers in new ways across their entire journey. We have found 24-hour hackathons with senior leaders to be a very effective way to break through old thinking and encourage executives to adopt completely new ways of doing things.[7]

GE is an example of an incumbent that envisioned how its industry would evolve and acted in response. CEO Jeff Immelt noted that "15 percent or 20 percent of the S&P 500 valuation is consumer Internet stocks that didn't exist 15 or 20 years ago. The consumer companies got none of that ... If you look out 10 or 15 years ... that same value is going to be created in the industrial Internet."[8] Based on this insight, GE launched GE Digital, a software and analytics group that works closely with all the company's business units, and Predix, a branded digital platform that invites developers to build new applications using GE data.

DESIGN—Create a plan for the digital transformation.

Decision 2: Who will lead the effort

A program that will deliver the needed degree of transformation is not something CEOs can delegate; they must lead the charge themselves.

Some CEOS, like Daniel Gilbert, cofounder of Quicken Loans, serve as the public face of the company's digital-transformation program. Gilbert was the primary evangelist for Quicken's Rocket Mortgage initiative, touting it as the "mortgage industry's iPhone moment."[9]

CEOs, however, can't do this on their own. Like the conductor of an orchestra, the CEO provides vision and ongoing direction. But a group of other senior leaders needs to drive the effort day-to-

5 Ibid. Innovators have used a range of approaches, including rethinking the nature of customer demand, tapping into previously underutilized sources of supply, launching wholly new value propositions based on reimagined business systems, or leveraging new digital platforms.

6 Chris Bradley and Clayton O'Toole, "An incumbent's guide to digital disruption," *McKinsey Quarterly*, May 2016, offers a structured framework for analyzing the potential impact of digital technologies on an industry.

7 Ferry Grijpink, Alan Lau, and Javier Vara, "Demystifying the hackathon," McKinsey & Company, October 2015.

8 Interview: "GE's Jeff Immelt on digitizing in the industrial space," McKinsey & Company, October 2015.

9 CNBC, "Get a mortgage 'Rocket' fast: Quicken Loans chairman," January 2016; Matt Burns, "This could be the mortgage industry's iPhone moment," Techcrunch, November 2015.

day. Thus a key decision for the CEO is selection of the members of the orchestra, based on the skills needed to be harmonious and effective.

One criterion for inclusion, naturally, has to be skill in and knowledge of digital. That's why some CEOs turn to a chief digital officer (CDO). Appointing a CDO is the right answer for many companies, but it's only part of the solution.

This decision needs to extend to putting in place the right team of people to drive the change. Since digital affects almost every aspect of the business and requires an unprecedented level of coordination across the entire organization, any leadership group has to include executives from multiple functions. While it can be important to have people who are visionary and inspiring, the team will also need respected executives with a deep understanding of the mechanics of the business, as well as expertise in change management. In addition, the CEO should select leaders who embody and will forward the key values of a digital culture: customer-centricity, a collaborative mind-set, and a tolerance for risk.

This leadership team doesn't need to be large. In fact, it can be quite small, as long as its members, and the people working with them, have the requisite skills. At Starbucks, for example, Howard Schultz had the CIO and CDO guide a decade-long digitization effort that has driven widespread adoption of mobile payments at North American stores, tightly coupled with the company's customer-loyalty program.[10] At a European energy company, it was a COO, CMO, and CSO (chief sales officer) who led the charge.

Decision 3: How to "sell" the vision to key stakeholders

Any change effort requires active communication of the vision and an explanation of why it's necessary. For this reason, the CEO needs to decide not only what to say but also how—and how long—to communicate.

One approach is to think of the change program as a product and brand it. When Angela Ahrendts took over as CEO of Burberry, she launched a bold Art of the Trench campaign and an aggressive move into digital, which signaled her high level of ambition and rejuvenated the organization. In early 2014, Ralph Hamers, CEO of ING Group, announced his vision for the company, called Think Forward, Act Now. Its goal was to deliver a differentiating customer experience through faster innovation and better use of analytics. Late in 2016, Hamers updated the vision with Accelerating Think Forward, which focused on mobile banking.[11]

It's crucial to decide when to communicate and with whom. The CEO should focus first on winning over influencers both inside and outside the company, then on propagating the change to their networks. CEOs also need to adopt a campaign mentality. This means delivering crisp and clear

10 "How Starbucks Has Gone Digital," *Sloan Management Review*, April 2013.

11 "ING strategy update: Accelerating Think Forward," *ING Newsroom*, October 3, 2016, 7:30 CET.

messages, in a steady cadence, using all relevant formats and channels. It's an influencing program, so messages need to be tailored to each audience—from employees to the board to shareholders.

A bold, long-term orientation, well communicated to all key stakeholders, can be a crucial counterbalance against pressures to hit short-term financial targets once the transformation program begins.

Decision 4: Where to position the firm within the digital ecosystem

New companies are able to challenge established businesses because an ecosystem of relatively cheap and plentiful resources—from technologies to platforms to vendors—is in place. This has been a boon to disruptive attackers, but the same resources can be used by incumbents, too.

CEOs need to figure out which capabilities, skills, and technologies available in the ecosystem complement and support their business's strategic ambitions. How much to rely on these relationships and how to structure them are also crucial decisions. Making them requires a clear sense of how to secure the company's most valuable assets, such as relationships with customers or data.

Michael Busch, the CEO of Thalia, Germany's leading bookstore, systematically evaluated the entire supply chain before launching his company's digital book offering. He created a network of alliances with other book retailers and partnered with Deutsche Telekom, which provided the technology and digital distribution backbone. He did not, however, make any agreements that separated Thalia from its customers, which it saw as its core value.

Over the past decade, BBVA Compass, a Spanish bank with a growing global presence, has aggressively remade itself into a digital organization.12 In 2016, it launched an API marketplace, which allows fintech start-ups to build apps that interface with BBVA's back-end systems. This arrangement channels the energy and creativity of entrepreneurs while ensuring that BBVA retains a leadership position within the ecosystem.

Decision 5: How to decide during the transformation

As boxer Mike Tyson once said, echoing Joe Louis, "Everyone has a plan 'til they get punched in the mouth."[13] No matter how well a transformation effort is designed, there will be surprises and unforeseen developments. To deal with this reality, the CEO and top team need to decide on governance and escalation rules to allow for inevitable course corrections.

Frequent check-ins—at least weekly—with senior leaders should be planned to gauge whether the digitization effort is on course and institute changes if it is not. That sounds like a lot, but devoting even one hour a week to a program that transforms the company is just 1 to 2 percent of a CEO's time.

12 "Francisco González on reinventing finance in the digital age," *Wired UK*, July 2015.

13 "Top 30 greatest Mike Tyson quotes," mightyfighter.com.

The challenge is to book this time and stick to it.

To support this approach, the CEO needs a dashboard developed to track progress on key initiatives that reflect the ambitions of the transformation. A digital transformation is a long-term effort, and as a result, yardsticks that focus on the short term, like ROI, can be misleading. Nontraditional metrics that evaluate digital adoption, such as new registrations on digital channels or digital-engagement levels, are better gauges of the progress of a digital transformation.[14]

DELIVER—Execute the transformation plan, allowing for ongoing adaptation and adjustment.

Decision 6: How to allocate funds rapidly and dynamically

The key lever CEOs and senior teams have to drive a digital transformation is resource allocation. This isn't just about making sure resources get to the right places, a decision CEOs already make as part of their everyday work. With a digital transformation, the CEO needs to decide what the allocation process should be and at what tempo it should operate.

Our research shows that raising a company's Digital Quotient, or DQ®, requires targeted allocation of both capital and operating expenditures.[15] The CEO and top team should act like venture capitalists by following a digital initiative's progress closely, pulling the plug for projects that lag expectations, and investing more in those that do well.

This requires speeding up budgeting processes, which at large companies tend to follow annual cycles. During a digital transformation, budgeting should shift from annual to quarterly or even monthly cycles.

Succeeding with a digital transformation often requires cutting budgets for legacy operations. In the midst of its transformation effort, a large bank realized that even after making massive investments in digital, branches still accounted for 90 percent of its operating expenses—and that 70 to 80 percent of the transactions done in branches could be executed digitally. In response, they shifted almost all future capital spending to digital, closed a number of branches, and launched a program to migrate customers who relied on branches for routine services to ATMs or web/mobile channels.

DE-RISK—Increase the transformation's prospects for success.

Decision 7: What to do when

More than 70 percent of transformation programs fail.[16] While the decisions covered in this article go a long way toward improving the odds, loss of momentum can undo even the best

14 Karel Dörner and Jürgen Meffert, "Nine questions to help you get your digital transformation right," October 2015, McKinsey.com.

15 Tanguy Catlin, Jay Scanlan, and Paul Willmott, "Raising your digital quotient," *McKinsey Quarterly*, June 2015.

16 "Survey: How to beat the transformation odds," April 2015, McKinsey.com

transformation efforts. To forestall that possibility, CEOs should carefully decide how to sequence the transformation for quick wins that yield revenue payoffs and reduce costs, gains that can then be reinvested. One e-tailer, for example, unlocked $300 million in just five months by prioritizing initiatives with the fastest payback. That turned into more than $800 million within a year, thanks to momentum from the early windfall.

Effective sequencing requires clear criteria to evaluate the potential payoff of various parts of the transformation initiative. These should include a hard-nosed assessment of projected benefits, the time needed to capture them, dependencies, investments required, and impact on the overall transformation journey. Sequencing with an eye toward cumulative effect is also necessary, so the business builds towards a cohesive digital whole rather than a jumble of loosely affiliated programs, which can undermine the ultimate benefits of scale.

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Digital is the defining challenge for today's generation of CEOs. And the decisions they make will determine whether their businesses thrive or fade.

Peter Dahlström and **Driek Desmet,** both based in London, and **Marc Singer,** based in San Francisco, are all senior partners and leaders of Digital McKinsey.

The next-generation operating model for the digital world

Albert Bollard, Elixabete Larrea, Alex Singla, and Rohit Sood

Companies need to increase revenues, lower costs, and delight customers. Doing that requires reinventing the operating model.

Companies know where they want to go. They want to be more agile, quicker to react, and more effective. They want to deliver great customer experiences, take advantage of new technologies to cut costs, improve quality and transparency, and build value.

The problem is that while most companies are trying to get better, the results tend to fall short: one-off initiatives in separate units that don't have a big enterprise-wide impact; adoption of the improvement method of the day, which almost invariably yields disappointing results; and programs that provide temporary gains but aren't sustainable.

We have found that for companies to build value and provide compelling customer experiences at lower cost, they need to commit to a next-generation operating model. This operating model is a new way of running the organization that combines digital technologies and operations capabilities in an integrated, well-sequenced way to achieve step-change improvements in revenue, customer experience, and cost.

A simple way to visualize this operating model is to think of it as having two parts, each requiring companies to adopt major changes in the way they work:

The first part involves a shift from running uncoordinated efforts within siloes to launching an integrated operational-improvement program organized around customer journeys (the set of interactions a customer has with a company when making a purchase or receiving services) as well as the internal journeys (end-to-end processes inside the company). Examples of customer journeys include a homeowner filing an insurance claim, a cable-TV subscriber signing up for a premium channel, or a shopper looking to buy a gift online. Examples of internal-process journeys include Order-to-Cash or Record-to-Report.

The second part is a shift from using individual technologies, operations capabilities, and approaches in a piecemeal manner inside siloes to applying them to journeys in combination and in the right sequence to achieve compound impact.

Let's look at each element of the model and the necessary shifts in more detail:

Shift #1: From running uncoordinated efforts within siloes to launching an integrated operational-improvement program organized around journeys

Many organizations have multiple independent initiatives underway to improve performance, usually housed within separate organizational groups (e.g. front and back office). This can make it easier to deliver incremental gains within individual units, but the overall impact is most often underwhelming and hard to sustain. Tangible benefits to customers—in the form of faster turnaround or better service—can get lost due to hand-offs between units. These become black holes in the process, often involving multiple back-and-forth steps and long lag times. As a result, it's common to see individual functions reporting that they've achieved notable operational improvements, but customer satisfaction and overall costs remain unchanged.

Instead of working on separate initiatives inside organizational units, companies have to think holistically about how their operations can contribute to delivering a distinctive customer experience. The best way to do this is to focus on customer journeys and the internal processes that support them. These naturally cut across organizational siloes—for example, you need marketing, operations, credit, and IT to support a customer opening a bank account. Journeys—both customer-facing and end-to-end internal processes—are therefore the preferred organizing principle.

Transitioning to the next-generation operating model starts with classifying and mapping key journeys. At a bank, for example, customer-facing journeys can typically be divided into seven categories: signing up for a new account; setting up the account and getting it running; adding a new product or account; using the account; receiving and managing statements; making changes to accounts; and resolving problems. Journeys can vary by product/service line and customer segment. In our experience, targeting about 15–20 top journeys can unlock the most value in the shortest possible time.

We often find that companies fall into the trap of simply trying to improve existing processes. Instead, they should focus on entirely reimagining the customer experience, which often reveals opportunities to simplify and streamline journeys and processes that unlock massive value. Concepts from behavioral economics can inform the redesign process in ingenious ways. Examples include astute use of default settings on forms, limiting choice to keep customers from feeling overwhelmed, and paying special attention to the final touchpoint in a series, since that's the one that will be remembered the most.

In 2014, a major European bank announced a multiyear plan to revamp its operating model to improve customer satisfaction and reduce overall costs by up to 35 percent. The bank targeted the ten most important journeys, including the mortgage process, onboarding of new business and personal customers, and retirement planning. Eighteen months in, operating costs are lower, the number of online customers is up nearly 20 percent, and the number using its mobile app has risen more than 50 percent. (For more on reinventing customer journeys, see "Putting customer experience at the heart of next-generation operating models" on McKinsey.com).

Shift #2: From applying individual approaches or capabilities in a piecemeal manner to adopting multiple levers in sequence to achieve compound impact

Organizations typically use five key capabilities or approaches (we'll call them "levers" from now on) to improve operations that underlie journeys (see Exhibit 1):

Digitization is the process of using tools and technology to improve journeys. Digital tools have the capacity to transform customer-facing journeys in powerful ways, often by creating the potential for self-service. Digital can also reshape time-consuming transactional and manual tasks that are part of internal journeys, especially when multiple systems are involved.[17]

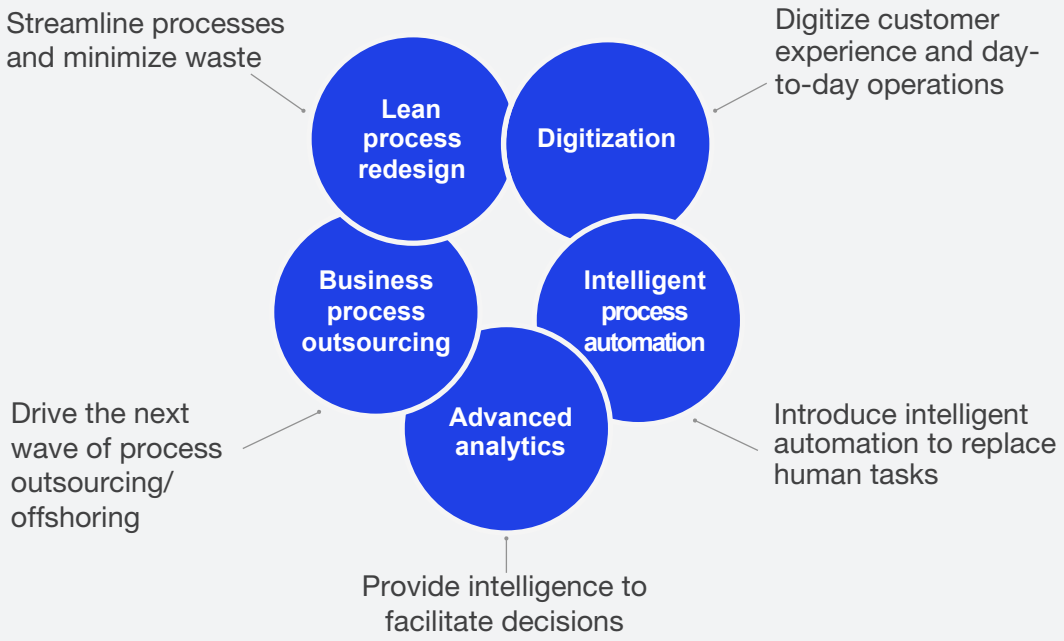
Advanced analytics is the autonomous processing of data using sophisticated tools to discover insights and make recommendations. It provides intelligence to improve decision making and can especially enhance journeys where nonlinear thinking is required. For example, insurers with the right data and capabilities in place are massively accelerating processes in areas such as smart claims triage, fraud management, and pricing.

Intelligent process automation (IPA) is an emerging set of new technologies that combines fundamental process redesign with robotic process automation and machine learning. IPA can replace human effort in processes that involve aggregating data from multiple systems or taking a piece of information from a written document and entering it as a standardized data input. There are also automation approaches that can take on higher-level tasks. Examples include smart workflows (to track the status of the end-to-end process in real time, manage handoffs between different groups, and provide statistical data on bottlenecks), machine learning (to make predictions on their own based on inputs and provide insights on recognized patterns), and

17 Jacques Bughin, Laura LaBerge, and Anette Mellbye, "The case for digital reinvention," *McKinsey Quarterly*, January 2017.

Exhibit 1

Five approaches and capabilities to drive the next-generation operating model.



cognitive agents (technologies that combine machine learning and natural-language generation to build a virtual workforce capable of executing more sophisticated tasks). To learn more about this, see "Intelligent Process Automation: The engine at the core of the next generation operating model" on McKinsey.com.

Business process outsourcing (BPO) uses resources outside of the main business to complete specific tasks or functions. It often uses labor arbitrage to improve cost efficiency. This approach typically works best for processes that are manual, are not primarily customer facing, and do not influence or reflect key strategic choices or value propositions. The most common example is back-office processing of documents and correspondence.

Lean process redesign helps companies streamline processes, eliminate waste, and foster a culture of continuous improvement. This versatile methodology applies well to short-cycle as well as long-cycle processes, transactional as well as judgment-based processes, client-facing as well as internal processes.

Guidelines for implementing these levers

In considering which levers to use and how to apply them, it's important to think in a holistic way, keeping the entire journey in mind. Three design guidelines are crucial:

1. Organizations need to ensure that each lever is used to maximum effect. Many companies believe they're applying the capabilities to the fullest, but they're actually not getting as much out of them as they could. Some companies, for example, apply a few predictive models and think they're really pushing the envelope with analytics—but in fact, they're only capturing a small fraction of the potential value. This often breeds a false complacency, insulating the organizations from the learnings that would otherwise drive them to higher performance because it is "already under way" or "has been tried." Having something already under way is a truism: everyone has something under way in these kinds of domains, but it is the companies that press to the limit that reap the rewards. Executives need to be vigilant, challenge their people, and resist the easy answer.

In the case of analytics, for example, maxing out the potential requires using sophisticated modeling techniques and data sources in a concerted, cross-functional effort, while also ensuring that front-line employees then execute in a top-flight way on the insights generated by the models.

2. Implementing each lever in the right sequence. There is no universal recipe on sequencing these levers because so many variables are involved, such as an organization's legacy state and the existing interconnections between customer-facing and internal processes. However, the best results come when the levers can build on each other. That means, in practice, figuring out which one depends on the successful implementation of another.

Systematic analysis is necessary to guide decision making. Some institutions have started by outlining an in-house versus outsource strategy rooted in a fundamental question: "What is core to our value proposition?" Key considerations include whether the activities involved are strategic or confer competitive advantage or whether sensitive data or regulatory constraints are present.

The next step is to use a structured set of questions to evaluate how much opportunity there is to apply each of the remaining levers and then to estimate the potential impact of each lever on costs and customer experience. This exercise results in each lever being assigned an overall score to help develop a preliminary point of view on which sequence to use in implementing the levers.

There's also a need to vet the envisioned sequences in the context of the overall enterprise. For example, even if the optimal sequence for a particular customer journey may be "IPA, then lean, then digital," if the company's strategic aspiration is to become "digital first," it may make more sense to digitize processes first.

This systematic approach allows executives to consider various sequencing scenarios, evaluate the implications of each, and make decisions that benefit the entire business.

3. Finally, the levers should interact with each other to provide a multiplier effect. For example, one bank only saw significant impact from its lean and digitization efforts in the mortgage-application journey after both efforts were working in tandem. A lean initiative for branch offices included a new scorecard that measured customer adoption of online banking, forums for associates to problem solve how to overcome roadblocks to adoption, and scripts they could use with customers to encourage them to begin mortgage applications online. This, in turn, drove up usage of online banking solutions. Software developers were then able to incorporate feedback from branch associates, which made future digital releases easier for customers to use. This in turn drove increased adoption of digital banking, thereby reducing the number of transactions done in branches.

Some companies have developed end-to-end journey "heat maps" that provide a company-wide perspective on the potential impact and scale of opportunity of each lever on each journey (see Exhibit 2). These maps include estimates for each journey of how much costs can be reduced (measured in terms of both head count and financial metrics) and how much the customer experience can be improved.

Companies find heat maps a valuable way to engage the leadership team in strategic discussions about which approaches and capabilities to use and how to prioritize them.

Case example: The "first notice of loss" journey in insurance

In insurance, a key journey is when a customer files a claim, known in the industry as first notice of loss (FNOL). FNOL is particularly challenging for insurers because they must balance multiple objectives at the same time: providing a user-friendly experience (for example, by offering web or mobile interfaces that enable self-service), managing expectations in real time through alerts or updates, and creating an emotional connection with customers who are going through a potentially traumatic situation—all while collecting the most accurate information possible and keeping costs in line.

Many companies have relied on Lean to improve FNOL call-center performance. One leading North American insurer, however, discovered it could unlock even more value by sequencing the buildout of three additional capabilities, based on the progress it had already made with Lean:

Digitization. This company improved response times by using digital technologies to access third-party data sources and connect with mobile devices. With these new tools, the insurer can now track claimant locations and automatically dispatch emergency services. Customers can also upload pictures of damages and both file and track claims online. The insurer also allows some customers to complete the entire claims process without a single interaction with a company representative.

Advanced analytics. Digitization of the FNOL journey provided the insurer with more and better data faster, which in turn allowed its analytics initiative to be more effective. Now able to apply the

Exhibit 2

The heat map provides a company-wide integrated perspective of the potential for impact for each end-to-end journey.

latest modeling capabilities to better data, the company is using advanced analytics to improve decision making in the FNOL journey. For example, intelligent triage is used to close simple claims more quickly, and smart segmentation identifies claims likely to be total losses and those liable to require the special investigative unit (SIU) far earlier than before. Analytics are even being used to predict future staffing needs and inform scheduling and hiring, thereby allowing both complex and simple claims to be handled more efficiently.

Intelligent process automation (IPA). Once digital and analytics were in place, IPA was implemented. Automation tools were deployed to take over manual and time-consuming tasks formerly done by customer-service agents, such as looking up policy numbers or data from driving records. In addition to reducing costs, IPA sped up the process and reduced errors.

IPA came last because the streamlining achieved by digitization and more effective use of analytics had eliminated some manual processes, so the IPA effort could focus only on those that remained.

By combining four levers—lean plus digital, analytics and IPA—this insurer drove a significant uplift in customer satisfaction while at the same time improving efficiency by 40 percent. (For more approaches to improving claims, see "Next-generation claims operating model: From evolution to revolution.")[18]

Bringing it all together: Avoid creating new silos by thinking holistically

Senior leaders have a crucial role in making this all happen. They must first convince their peers that the next-generation operating model can break through organizational inertia and trigger step-change improvements. With broad buy-in, the CEO or senior executive should align the business on a few key journeys to tackle first. These can serve as beacons to demonstrate the model's potential. After that comes evaluation of the company's capabilities to determine which levers can be implemented using internal resources and which will require bringing in resources from outside. Finally, there is the work of actually implementing the model. (For more on the last topic, see "How to build out your next-generation operating model" in this collection.)

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Transformation cannot be a siloed effort. The full impact of the next-generation operating model comes from combining operational-improvement efforts around customer-facing and internal journeys with the integrated use of approaches and capabilities.

Albert Bollard is a partner in McKinsey's New York office, **Elixabete Larrea** is an associate partner in the Boston office, **Alex Singla** is a senior partner in the Chicago office, and **Rohit Sood** is a partner in the Toronto office.

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18 Chief Claims Officer Roundtable, McKinsey, 2017.

How to start building your next-generation operating model

Joao Dias, David Hamilton, Somesh Khanna, Christopher Paquette, and Rohit Sood

Each company's path to a new operating model is unique. But successful transformations are all constructed with the same set of building blocks.

A North American bank took less than two years to shift 30 percent of its in-branch customer traffic to digital channels and dramatically reduce its brick-and-mortar footprint. A European cruise line redesigned and relaunched five core products in nine months to increase digital conversions by three to five times and sales by 150 percent.

These companies have been able to transform because they have developed next-generation operating models that provide the speed, precision, and flexibility to quickly unlock new sources of value and radically reduce costs. The operating model of the future combines digital technologies and process-improvement capabilities in an integrated, sequenced way to drastically improve customer journeys and internal processes.

Lean management has already played a significant role in putting in place processes, capabilities, and tools to improve how businesses operate. But the digital age has increased both the opportunities for businesses who know how to react and the difficulty of getting it right. For one thing, tasks performed by humans are more complex, whether it's accessing information in multiple

formats from multiple sources or responding to changing market and customer dynamics at ever-increasing speeds. And as an increasing number of tasks become automated or are taken over by cognitive-intelligence capabilities, companies will need to take many of the lessons learned from lean management and update them. Like a sprinter who needs all her muscles to be finely tuned and working in concert to reach top speeds, fast-moving institutions must have a system to continually synchronize their strategies, activities, performance, and health.

But how? Many institutions understand the need to change how they work and have embarked on numerous initiatives, yet few have been able to get beyond isolated success cases or marginal benefits.

We have found that companies that successfully build next-generation operating models do two things well. They focus on putting in place the building blocks that drive change across the organization, and they select a transformation path that suits their situation. These practices don't apply only to companies that have yet to start their digital transformation. In our experience, even companies that are well along in their transformation journey can pivot to putting in place a next-generation model that delivers massive value while significantly reducing costs.

Building blocks of the next-generation operating model

Whatever the path companies choose to develop their next-generation operating model (a subject we return to later), we have found there is a set of building blocks of change that successful leaders put in place. Think of them as the mechanics of change—elements needed to underpin the development of the operating model. Given the dynamic nature of digitization and the fast pace of change, it's important not to think about perfecting the implementation of each building block before the operating model can function. The process is highly iterative, with elements of each building block tested and adapted to grow along with the model through a constant evolutionary cycle.

Building Block #1: Autonomous and cross-functional teams anchored in customer journeys, products, and services

Successful companies constantly rethink how to bring together the right combination of skills to build products and serve customers. That means reconfiguring organizational boundaries and revisiting the nature of teams themselves, such as creating more fluid structures in which day-to-day work is organized into smaller teams that often cut across business lines and market segments. This approach includes empowering teams to own products, services, or journeys, as well as to run experiments. These organizations are also becoming nimble in how they build skills across their teams by making "anchor hires" for key roles, setting up rotational and "train the trainer" programs, and committing to ongoing (often weekly) capability building and training for key roles.

Many insurers, for example, are dismantling traditional claims and underwriting units and reconstructing them to embed subject-matter experts such as lawyers and nurses into service

groups. In the best companies, these teams also work side by side every day with technologists to design the tools and technology to improve efficiency and effectiveness.

Iteration is crucial to making this approach work. Leaders test various team configurations and allow flexibility in response to changing customer needs. One credit-card company, for example, shifted its operating model in IT from alignment around systems to alignment with value streams within the business. Cross-functional teams were pulled together to work on priority journeys and initiatives to deliver on the value stream. These changes dramatically simplified the operating model, lowered direct leadership expenses, and contributed to a 200 percent increase in software-development productivity within three months.

Building Block #2: Flexible and modular architecture, infrastructure, and software delivery

Technology is a core element of any next-generation operating model, and it needs to support a much faster and more flexible deployment of products and services. However, companies often have trouble understanding how to implement these new technologies alongside legacy systems or are hampered by outdated systems that move far too slowly.

To address these issues, leaders are building modular architecture that supports flexible and reusable technologies. Business-process management (BPM) tools and externally facing channels, for example, can be shared across many if not all customer journeys. Leading technology teams collaborate with business leaders to assess which systems need to move faster. This understanding helps institutions decide how to architect their technology—for example, by identifying which systems should be migrated to the cloud to speed up builds and reduce maintenance.

This approach both accelerates development and prioritizes the use of common components, which in turn leads to development efficiency and consistency. Another important reason for building more flexible architecture is that it enables businesses to partner with an external ecosystem of suppliers and partners.

Similarly, leaders are investing heavily in DevOps and combining people, process, and technology changes to automate software testing, security, and delivery processes as well as infrastructure changes.

Building Block #3: A management system that cascades clear strategies and goals through the organization, with tight feedback loops

The best management systems for next-generation operating models are based on principles, tools, and associated behaviors that drive a culture of continuous improvement focused on customer needs. Leading companies embed performance management into the DNA of an organization from top to bottom, and translate top-line goals and priorities into specific metrics and KPIs for employees at all levels. They make visible the skills and processes needed for employees to be successful, put clear criteria in place, and promote the sharing of best practices.

The best institutions are evolving their management systems to create feedback mechanisms within and between the front line, back-office operations, and the product teams that deliver new assets. They are also using their management systems to harvest the surfeit of data generated by day-to-day activities to create user-friendly dashboards and reports, some of them in real time.

Performance management is becoming much more real time, with metrics and goals used daily and weekly to guide decision making. These metrics are supported by joint incentives—not just for individuals—that are tailored to each level of the organization and reinforce behaviors to support customers regardless of organizational boundaries.

One North American insurer struggled to make the predictive analytics models developed by central teams relevant to its front-line claims adjusters, who therefore failed to adopt the new capability. Knowing it was leaving significant value on the table, the company established daily feedback sessions between the central development team and the claims adjusters and embedded analytics specialists into customer-service teams to develop better insights into customer issues. The teams created shared goals based on customer value that were consistent with the organization's strategy and the daily work of adjusters. Under this new management system, the analytics specialists and claims adjusters shortened cycle times and dramatically improved the effectiveness of assignment. This freed up time for leaders to coach, problem solve, and iterate on the next opportunities for the teams to pursue.

Building Block #4: Agile, customer-centric culture demonstrated at all levels and role modeled from the top

Successful companies prioritize speed and execution over perfection. That requires agility in delivering products to customers and quickly learning from them, as well as willingness to take appropriate risks. The best organizations have already made agility a cornerstone of how they work beyond IT. One credit-card company brought together law and compliance personnel to sit in with marketing teams to intervene early in processes and have daily conversations to identify and resolve issues. Law and compliance functions have also begun to adopt agile methodologies to change their own work. As functions and teams collaborate, they are on track to reduce effective time to market by 90 percent for some core processes while also reducing operational risk.

Critical to success is leading the change from the top and building a new way of working across organizational boundaries. Senior leaders support this transformation as vocal champions, demonstrating agility through their own choices. They reinforce and promote rapid iteration and share success stories. Importantly, they hold themselves accountable for delivering on value quickly, and establish transparency and rigor in their operations. Many manage the change aggressively, often changing performance incentives, mothballing outdated processes, assembling communication campaigns to reinforce culture, and writing informal blogs. At one asset-management company, the top team jettisoned its legacy budgeting process and asked leaders to be aggressive about capturing more value. They established an ongoing process for redistributing funding to the highest-value experiments that were working.

Defining the path for your organization

There is no one way to develop a next-generation operating model. It depends on a company's existing capabilities, desired speed of transformation, level of executive commitment, and economic pressure. We have seen four paths that leading companies take to drive their transformation, though organizations often move to a different path as their capabilities mature. These paths offer a guide for the first 12 months of a transformation journey.

An innovation outpost is a dedicated unit set up to be entirely separate from the historical culture, decision-making bureaucracy, and technical infrastructure of the main business. It creates inspiring products that illuminate the digital art of the possible (sometimes with questionable economic impact), and hatches new business models in informal settings such as over foosball tables. This path has traditionally been popular as a first move, but is now less common.

One retailer with an ineffective online business chose to open such an outpost. It introduced next-gen analytics, focused on customer experience rather than technology, and drove the mobile interface. Staying largely separate from the main business, the outpost created a buzz around innovation, attracted better talent, and repatriated many of its creations into the broader organization.

This path works well when there is limited alignment among executives on the importance and value of transformation, a need to move very quickly in response to market pressures, and significant legacy culture challenges to overcome. However, it is less effective as the "tip of the spear" for changing the culture or building sustainable capabilities, and often yields a low return on investment.

A fenced-off digital factory is a group of groundbreakers that works in partnership with businesses and functions (such as IT infrastructure and security, legal, compliance, and product development) while enjoying a high degree of autonomy. It typically houses specialized capability groups in technologies such as robotics or analytics, and deploys them to support the development of specific journeys in concert with business and functional partners. It both models a new way of working and integrates developed capabilities into the main business. As such, it focuses internally on integrating with and shifting the culture of the organization.

This is the most common starting point, as it balances the need for incubation with that of broader transformation. One European bank built a digital factory in a building on a campus. Each of the lower floors is dedicated to a separate journey, while the top floor is dedicated to creating reusable components and utilities—such as customer identification and verification or esignature—that the other journeys can deploy in a modular way.

Business and functional colleagues come together to work with teams in the factory. Each of these teams develops products and services, moves them quickly from prototype to deployment, and then transfers them into the main business. As part of the management system, the team continues to monitor and iterate the product or service based on economic performance and customer feedback.

This path works well when there is a broad-based belief in and commitment to transformation, and a need to incubate a critical mass in internal capabilities. Many organizations have used this approach to attract digital talent, combat large-project inertia within IT groups, and speed transformation. Culture change is slower within the rest of the organization, but it happens over time as business and functional specialists partner with the factory for each journey. It can, however, also create a "have and have not" split within the business if not managed appropriately, and can require significant initial C-suite support and funding. (For more on the digital factory, see "Scaling a transformation culture through a digital factory.")

A business-unit accelerator is a scaled-down digital factory that incubates a transformation inside a business unit to tackle local customer journeys and business functions. The business unit builds its own skills, such as process-redesign and robotics capabilities, and has control over specific capabilities and investments. This means it doesn't need central funding or organization-wide agreement on a host of issues to get going.

One North American bank shifted to a business-unit accelerator model after the first few years of its transformation. It found that this move gave it more control and a closer connection to business strategy and the customer—benefits that outweighed centralized scale and capability building. The bank invested heavily in talent and tools with the aim of building a reputation among customers as a digital business that happens to produce banking products and experiences.

This path works well for organizations with large business units that operate independently. It's also a good starting point when one business unit is particularly far ahead in its thinking and belief, or where digital services have disproportionate value-creation potential. However, companies that choose this model must mitigate several risks. When business units choose their own digital tools and processes, for instance, complexity and costs increase for IT teams managing maintenance, licensing, and enterprise architecture. This model can also make it harder to build and share capabilities across the organization since the skills developed are specific to the business unit.

A full-scale evolution is a comprehensive transformation in which the enterprise reorganizes itself almost entirely around major journeys. This is the natural operating model for many digital natives, as technology, digital services, and product delivery are basically inextricable. Companies focus on specific digital initiatives that deliver on business priorities, deploying specialized talent and cross-functional teams to support each one. The model is highly attuned to the customer and rapidly develops, tests, and iterates on new products or services. Team members may be managed through a center of excellence or by business-unit leaders. This path is the aspiration for many incumbents, especially those that deliver services rather than physical products.

In one European bank undergoing a full-scale evolution, agile has become the default way for people to work, with colleagues from multiple functions including IT sitting sit side by side. Results are measured by value streams—the sources of the value being generated—and journeys, flowing from the customer need back to the performance of the bank. Prioritization and resourcing take

the form of active daily and weekly conversations about the next most important thing to work on. This approach is initially almost like shock treatment, but it offers important benefits, allowing companies to shake up the traditional management system and achieve culture change quickly and at scale. The organization builds agile skills broadly, identifies high and low performers, and pinpoints valuable and missing skills.

This path works well when there is a broad and top-down organizational mandate for change. Given the time it takes to move the needle, there should be no pressing near-term economic imperative. Companies that choose this model need to mitigate several risks, such as ensuring that best practices are shared across the operating model rather than being confined to individual teams. In addition, organizations must share any scarce resources across business functions to drive impact, and ensure coordination with IT as it seeks to keep up with the technical architecture.

No-regret steps leaders should take

Every organization's transformation journey will be different. However, a simple set of immediate, no-regret steps can help leaders shape their first set of priority decisions and provide clarity on the way forward. These often include:

- Creating clarity on enterprise strategy and on where digital services can quickly enable sustainable value creation. (For more on this, see "The next-generation operating model for the digital world" in this collection.)

- Challenging the board to be explicit about the importance of the transformation and its support for investment; or, as a board, making this decision and challenging the executive team for a bold vision.

- Building top-team excitement and belief in change through visits to leading digital natives or incumbents pursuing their own transformation paths.

- Assessing the maturity of the management system by benchmarking against other organizations to identify strengths to build on and risks to mitigate.

- Investing in targeted capability building, especially for the top 50 leaders in the organization. Exploring core concepts such as digitization, agile, design thinking, and advanced analytics can create a shared vocabulary and spur action.

- Making an honest, objective assessment of talent and capabilities within the organization, benchmarked against peers and cross-sector leaders. Disruption often comes from outside an industry rather than within.

- Surveying the cross-sector landscape for ideas and inspiration. It's easier than ever to learn from others, and a rapid inventory of ideas can shed light on potential execution challenges to resolve.

- Assessing the level of change that the organization can realistically absorb in the near and long term, given its other priorities.

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Most companies recognize the need for a next-generation operating model to drive their business forward in the digital age. But how well they actually develop it makes all the difference between reinventing the business and just trying to do so.

Joao Dias is a partner in McKinsey's Cologne office; **David Hamilton** is a partner in the Detroit office; **Somesh Khanna** is a senior partner in the New York office; **Christopher Paquette** is a partner in the Chicago office, and **Rohit Sood** is a partner in the Toronto office.

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Culture for a digital age

Julie Goran, Laura LaBerge, and Ramesh Srinivasan

Risk aversion, weak customer focus, and siloed mind-sets have long bedeviled organizations. In a digital world, solving these cultural problems is no longer optional.

Shortcomings in organizational culture are one of the main barriers to company success in the digital age. That is a central finding from McKinsey's recent survey of global executives (see Exhibit 1), which highlighted three digital-culture deficiencies: functional and departmental silos, a fear of taking risks, and difficulty forming and acting on a single view of the customer.

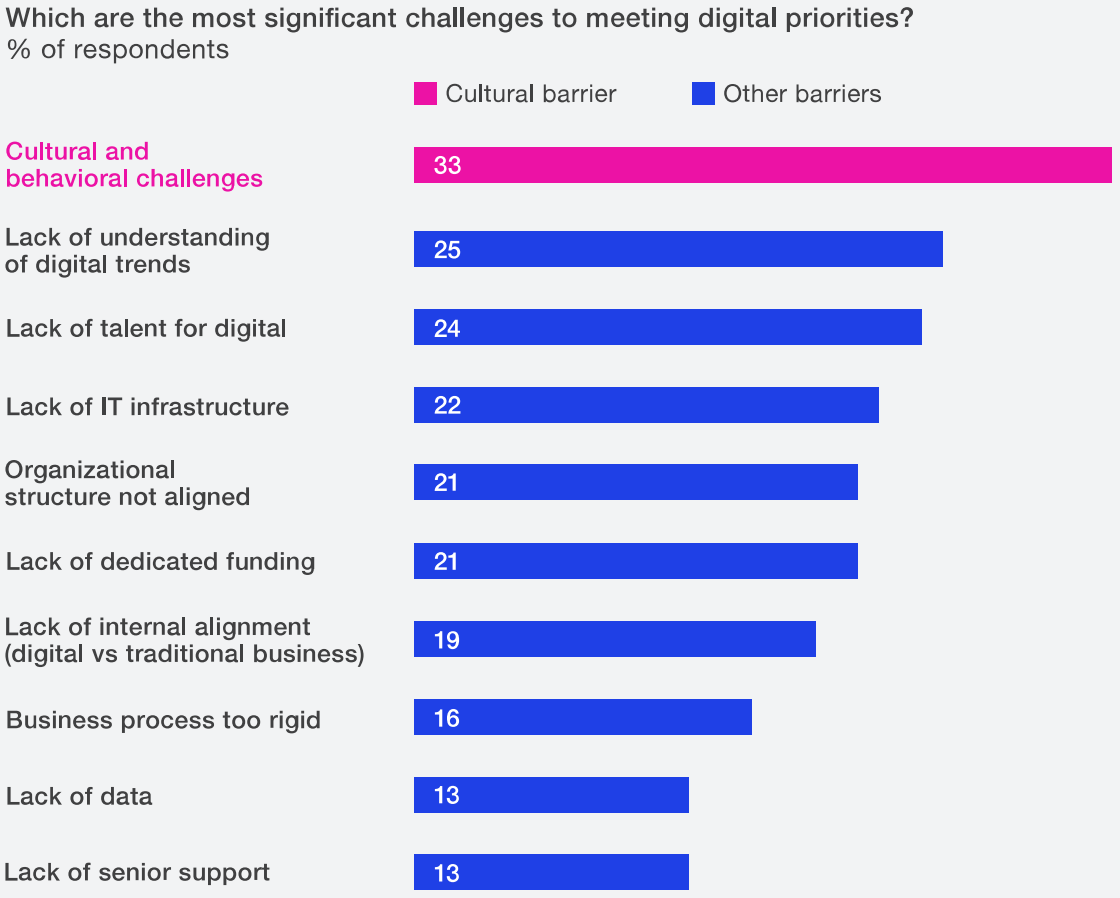
Each obstacle is a long-standing difficulty that has become more costly in the digital age. When risk aversion holds sway, underinvestment in strategic opportunities and sluggish responses to quick-changing customer needs and market dynamics can be the result. When a unified understanding of customers is lacking, companies struggle to mobilize employees around integrated touchpoints, journeys, and consistent experiences, while often failing to discern where to best place their bets as digital broadens customer choice and the actions companies can take in response. And when silos characterize the organization, responses to rapidly evolving customer needs are often too narrow, with key signals missed or acted upon too slowly, simply because they were seen by the wrong part of the company.

Can fixes to culture be made directly? Or does cultural change emerge as a matter of course as executives work to update strategy or improve processes?[19] In our experience, executives who wait

1. Jay W. Lorsch and Emily McTague argue for culture emerging indirectly in "Culture is not the culprit," *Harvard Business Review*, April 2016, Volume 94, Number 4, pp. 96–105, hbr.org.

Exhibit 1

Culture is the most significant self-reported barrier to digital effectiveness.



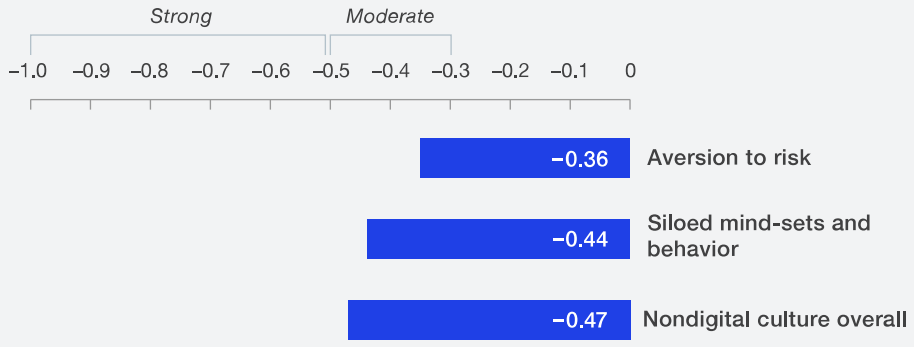
Source: 2016 Digital McKinsey survey of 2,135 respondents

for organizational cultures to change organically will move too slowly as digital penetration grows, blurs the boundaries between sectors, and boosts competitive intensity. Our research, which shows that cultural obstacles correlate clearly with negative economic performance (Exhibit 2), supports this view. So do the experiences of leading players such as BBVA, GE, and Nordstrom, which have shown what it looks like when companies support their digital strategies and investments with deliberate efforts to make their cultures more responsive to customers, more willing to take risks, and better connected across functions.

Executives must be proactive in shaping and measuring culture, approaching it with the same rigor and discipline with which they tackle operational transformations. This includes changing

Exhibit 2

Cultural obstacles correlate clearly with negative economic performance.



Source: 2016 Digital McKinsey survey of 2,135 respondents

structural and tactical elements in an organization that run counter to the culture change they are trying to achieve. The critical cultural intervention points identified by respondents to our 2016 digital survey—risk aversion, customer focus, and silos—are a valuable road map for leaders seeking to persevere in reshaping their organization's culture. The remainder of this article discusses each of these challenges in turn, spelling out a focused set of reinforcing practices to jump-start change.

Calculated risks

Too often, management writers talk about risk in broad-brush terms, suggesting that if executives simply encourage experimentation and don't punish failure, everything will take care of itself. But risk and failure profoundly challenge us as human beings. As Ed Catmull of Pixar said in a 2016 *McKinsey Quarterly* interview, "One of the things about failure is that it's asymmetrical with respect to time. When you look back and see failure, you say, 'It made me what I am!' But looking forward, you think, 'I don't know what is going to happen and I don't want to fail.' The difficulty is that when you're running an experiment, it's forward looking. We have to try extra hard to make it safe to fail."

The balancing act Catmull described applies to companies perhaps even more than to individuals. Capital markets have typically been averse to investments that are hard to understand, that underperform, or that take a long time to reach fruition. And the digital era has complicated matters. On the one hand, willingness to experiment, adapt, and to invest in new, potentially risky areas has become critically important. On the other, taking risks has become more frightening because transparency is greater, competitive advantage is less durable, and the cost of failure is high, given the prevalence of winner-take-all dynamics.

Leaders hoping to strike the right balance have two critical priorities that are mutually reinforcing at a time when fast-follower strategies have become less safe. One is to embed a mind-set of risk taking and innovation through all ranks of the enterprise. The second is for executives themselves to act boldly once they have decided on a specific digital play—which may well require changing mind-sets about risk and inspiring key executives and boards to think more like venture capitalists.

An appetite for risk

Building a culture where people feel comfortable trying things that might fail starts with senior leaders' attitudes and role modeling. They must break the status quo of hierarchical decision making, overcome a focus on optimizing rather than innovating, and celebrate learning from failure. It helps considerably when executives make it clear through actions that they trust the front lines to make meaningful decisions. ING and several other companies have tackled this imperative head-on, providing agile coaches to help management learn how to get out of the way after setting overall direction for objectives, budgets, and timing.

However, delegating authority only works if the employees have the skills, mind-sets, and information access to make good on it. Outside hires from start-ups or established digital natives can help inject disruptive thinking that is a source of innovative energy and empowerment. Starbucks, for example, has launched a digital-ventures team, hiring vice presidents from Google, Microsoft, and Razorfish to help drive outside thinking.

Also empowering for front-line workers (and risk dampening for organizations) is information itself. For example, equipping call-center employees with real-time analysis on account profiles, or data on usage and profitability, helps them take small-scale risks as they modify offers and adjust targeting in real time. In the retail and hospitality industries, companies are giving front-line employees both the information (such as segment and purchase history) and the decision authority they need to resolve customer issues on the spot, without having to escalate to management. Such information helps connect the front line to the company's strategic vision, which provides a compass for decision making on things such as what sort of discount or incentive to offer in resolving a conflict or what "next product to buy" to tee up. Benefits include improvements in the customer experiences (due to faster resolution) and greater consistency across the business in spotting and resolving problems. This lowers cost at the same time it improves customer satisfaction. In addition, front-line risk taking enables more rapid innovation by speeding up iterations and decision making to support nimbler, test-and-learn approaches. These same dynamics prevail in manufacturing, with new algorithms enabling predictive maintenance that no longer requires sign-off from higher-level managers.

Regardless of industry, the critical question for executives concerned with their organization's risk appetite is whether they are trusting their employees, at all levels, to make big enough bets without subjecting them to red tape. Many CFOs have decided to shift all but the largest investment decisions into the business units to speed up the process. The CFO at one global 500 consumer-goods company now signs off only on expenditures above $250,000. Until recently, any spend decision over $1,000 required the CFO's approval.

Making bold bets

At the same time they are letting go of some decisions, senior leaders also are responsible for driving bold, decisive actions that enable the business to pivot rapidly, sometimes at very large scale. Such moves require risk taking, including aggressive goal setting and nimble resource reallocation.

A culture of digital aspirations. Goals should reflect the pace of disruption in a company's industry. The New York Times set the aspiration to double its digital revenues within five years, enabled in part by the launch of T Brand Studio as a new business model. In the face of Amazon, Nordstrom committed more than $1.4 billion in technology capital investments to enable rich cross-channel experiences. The Irish bank AIB decided customers should be able to open an account in under ten minutes (90 percent faster than the norm prevailing at the time). AIB invested to achieve this goal and saw a 25 percent lift in accounts opened, along with a 20 percent drop in costs. In many industries facing digital disruption, this is the pace and scale at which executives need to be willing to play.

Embracing resource reallocation. Nimble resource reallocation is typically needed to back up such goals. In many incumbents, though, M&A and capital-expenditure decisions are too slow, with too many roadblocks in the way. They need to be retooled to take on more of a venture-capitalist approach to rapid sizing, testing, investing, and disinvesting. The top teams at a large global financial-services player and an IT-services company have been reevaluating all of their businesses with a five- to ten-year time horizon, determining which ones they will need to exit, where they need to invest, and where they can stay the course. Such moves tax the risk capacity of executives; but when the moves are made, they also shake things up and move the needle on a company's risk culture.

Customers, customers, customers

Although companies have long declared their intention to get close to their customers, the digital age is forcing them to actually do it, as well as providing them with better means to do so. Accustomed to best-in-class user experiences both on- and off-line with companies such as Amazon and Apple, customers increasingly expect companies to respond swiftly to inquiries, to customize products and services seamlessly, and to provide easy access to the information customers need, when they need it.

A customer-centric organizational culture, in other words, is more than merely a good thing—it's becoming a matter of survival. The good news is that getting closer to your customers can help reduce the risk of experimentation (as customers help cocreate products through open innovation) and support fast-paced change. Rather than having to guess what's working in a given product or service before launching it—and then waiting to see if your guess is right after the launch takes place—companies can now make adjustments nearly real-time by developing product and service features with direct input from end users. This is already taking place in products from Legos to aircraft engines. The process not only helps derisk product development, it tightens the relationship between companies and their customers, often providing valuable proprietary data and insights about how customers think about and use the products or services being created.

Data and tools

Underlying the new customer-centricity are diverse tools and data. Connecting the right data to the right decisions can help build a common understanding of customer needs into an organizational culture, fostering a virtuous cycle that reinforces customer-centricity. Amazon's ability to use customers' previous purchases to offer them additional items in which they might be interested is a significant element in its success. The virtuous circle they've created includes customer reviews (to reassure and reinforce other shoppers), along with the algorithms that share "what customers who looked at this item also bought." Of course, Amazon has also invested heavily in automated warehouses and a sophisticated distribution model. But even those were tied to the customer desire to receive merchandise faster.

A unifying force

At its best, customer-centricity extends far beyond marketing and product design to become a unifying cultural element that drives all core decisions across all areas of the business. That includes operations, where in many organizations it's often the furthest from view, and strategy, which must be regularly refreshed if it is to serve as a reliable guide in today's rapidly changing environment. Customer-centric cultures anticipate emerging patterns in the behavior of customers and tailor relevant interactions with them by dynamically integrating structured data, such as demographics and purchase history, with unstructured data, such as social media and voice analytics.

The insurance company Progressive illustrates the unifying role played by strong customer focus. Progressive's ability to persuade customers to install the company's Snapshot device to monitor driving behavior is revolutionizing the insurance space, and not just as a marketing tool. Snapshot helps attract the good drivers who are the most profitable customers, since those individuals are the ones most likely to be attracted by the offer of better discounts based on driving behavior. It also gives the company's underwriters actual data in place of models and guesswork. This new technology is one that Progressive can monetize into a business unit to serve other insurers as well.

Busting silos

Some observers might consider organizational silos—so named for parallel parts of the org chart that don't intersect—a structural issue rather than a cultural one. But silos are more than just lines and boxes. The narrow, parochial mentality of workers who hesitate to share information or collaborate across functions and departments can be corrosive to organizational culture.

Silos are a perennial problem that has become more costly because, in the words of Cognizant CEO Francisco D'Souza, "the interdisciplinary requirement of digital continues to grow. The possibilities created by combining data science, design, and human science underscore the importance both of working cross-functionally and of driving customer-centricity into the everyday operations of the business. Many organizations have yet to unlock that potential."[2] The executives we surveyed appeared to agree, ranking siloed thinking and behavior number one among obstacles to a healthy digital culture.

How can you tell if your own organization is too siloed? Discussions with CEOs who have led old-line companies through successful digital transformations indicate two primary symptoms: inadequate information, and insufficient accountability or coordination on enterprise-wide initiatives.

Getting informed

Digital information breakdowns echo the familiar story of the blind men and the elephant. When employees lack insight into the broader context in which a business competes, they are less likely to recognize the threat of disruption or digital opportunity when they see it and to know when the rest of the organization should be alerted. They can only interpret what they encounter through the lens of their own narrow area of endeavor.

The corollary to this is that every part of the organization reaches different conclusions about their digital priorities, based on incomplete or simply different information. This contributes to breaks in strategic and operating consistency that consumers are fast to spot. There isn't the luxury of time in today's digital world for each division to discover the same insight; a digital attacker or more agile incumbent is likely to swoop in before the siloed organization even knows it should be mounting a response. So the first imperative for companies looking to break out of a siloed mentality is to inspire within employees a common sense of the overall direction and purpose of the company. Data and thoughtful management rotation often play a role.

Data-driven transparency. Data can help solve the blind-men-and-the-elephant problem. A social-services company, for instance, created a customer-engagement group to better understand how customers interact with the company's products and brands across silos—and where customers were running into difficulty. Among other things, this required close examination of how the company collected, analyzed, and distributed data across silos. The team discovered, for example, that some customers were cancelling their memberships because of the deluge of marketing outreaches they were receiving from the company. To address this, the team combined customer databases and propensity models across silos to create visibility and centralized access rights with regard to who could reach out to members and when. Among other achievements, this team:

- created segment-specific trainings that offered an integrated view of each segment's suite of needs and the offerings that would meet them
- drew on information from different parts of the organization to give a more developed picture on engagement, retention, and the total number of touches associated with various segments and customers
- showed the net effect of the entire organization's activities through the customer's eyes
- embedded this information into key processes to ensure information was accessible in a cross-disciplinary way—breaking siloed viewpoints and narrow understandings of the overall business model

Management rotation. Another way to achieve better alignment on the company's direction is to rotate executives between siloed functions and business units. At the luxury retailer Nordstrom, for example, two key executives exchanged roles in 2014: Erik Nordstrom, formerly president of the company's brick-and-mortar stores, became president of Nordstrom Direct, the company's online store, while Jamie Nordstrom, formerly president of Nordstrom Direct, became president of the brick-and-mortar stores. This type of rotation can be done at different levels in an organization and helps create a more consistent understanding between different business units regarding the company's aspirations and capabilities, as well as helping create informal networks as employees build relationships in different departments.

Instilling accountability

The second distinctive symptom of a siloed culture is the tendency for employees to believe a given problem or issue is someone else's responsibility, not their own. Companies can counter this by institutionalizing mechanisms to help support cross-functional collaboration through flexibly deployed teams. That was the case at ING, which, because it identifies more as a technology company than a financial-services company, has turned to tech firms for inspiration, not banks. Spotify, in particular, has provided a much-talked-about model of multidisciplinary teams, or squads, made up of a mix of employees from diverse functions, including marketers, engineers, product developers, and commercial specialists. All are united by a shared view of the customer and a common definition of success. These squads roll up into bigger groups called tribes, which focus on end-to-end business outcomes, forcing a broader picture on all team members. The team members are also held mutually accountable for the outcome, eliminating the "not my job" mind-set in which so many other organizations find themselves trapped. While this model works best in IT functions, it is slowly making its way into other areas of the business. Key elements of the model (such as end-to-end outcome ownership) are also being mapped into more traditional teams to try to bring at least pieces of this mind-set into more traditional companies.

Start by finding mechanisms, whether digital, structural, or process, that help build a shared understanding of business priorities and why they matter. Change happens fast and from unpredictable places, and the more context you give your employees, the better they will be able to make the right decisions when it does. To achieve this, organizations must remove the barriers that keep people from collaborating, and build new mechanisms for cutting through (or eliminating altogether) the red tape and bureaucracy that many incumbents have built up over time.

Cultural changes within corporate institutions will always be slower and more complex than the technological changes that necessitate them. That makes it even more critical for executives to take a proactive stance on culture. Leaders won't achieve the speed and agility they need unless they build organizational cultures that perform well across functions and business units, embrace risk, and focus obsessively on customers.

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Julie Goran is a partner in McKinsey's New York office, where **Ramesh Srinivasan** is a senior partner; **Laura LaBerge** is a senior practice manager of Digital McKinsey and is based in the Stamford office.

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The heartbeat of modern marketing: Data activation & personalization

Julien Boudet, Brian Gregg, Jason Heller, and Caroline Tufft

Technology has finally advanced to the point where marketers can use real-time data in a way that is both meaningful to customers and profitable for companies.

We've come a long way from "People who bought this, also bought that."

Consider the experience of a representative customer we'll call Jane. An affluent, married mom and homeowner, Jane shops at a national clothing retailer online, in the store, and occasionally via the app. When visiting the retailer's website in search of yoga pants, she finds style choices based on previous purchases, the purchases of customers with profiles similar to hers, and the styles of yoga pants most frequently purchased on weekends. She adds one of the offered yoga pants to her shopping cart and checks out.

With the exception of a follow-up email, most interactions with the customer stop there. But here's what this example looks like when we activate Jane's data. Three days after her online purchase, the retailer sends Jane a health-themed email. Intrigued, she clicks the link and watches a video about raising healthy kids. One week later, she receives an iPhone message nudging her to use the store's mobile app to unlock a 15 percent one-day discount on workout equipment. Though she has never

bought such items at this retailer, Jane takes advantage of the offer and purchases a new sports bag. What began as a simple task of buying yoga pants ended up being a much more engaged experience.

Such data-activated marketing based on a person's real-time needs, interests, and behaviors represents an important part of the new horizon of growth. It can boost total sales by 15 to 20 percent, and digital sales even more while significantly improving the ROI on marketing spend across marketing channels: from websites and mobile apps to—in the not-too-distant future—VR headsets and connected cars.

Customer data platform: Solving the ongoing challenge of true personalization

Companies regularly experiment with testing the impact of varied customer experiences, but they do it in isolation. When they do try to scale, they smack against the challenge of understanding what to prioritize. Going back to Jane, do marketers target her as a mom, a yoga enthusiast, or a homeowner? What happens when tests are running against all three segments? Is she part of a new microsegment that combines attributes and signals across all three segments?

This is a challenge that has continued to plague marketers, despite the promise of solutions such as customer-relationship management (CRM), master-data management (MDM), and marketing-resource management (MRM). These solutions can help companies consolidate and streamline data, manage segmentation, organize workflow, and improve customer relationships. But they don't take full advantage of digital signals customers provide. Instead, they rely on antiquated "list pulls," basic segmentation, and campaigns, all of which lack the automated decision making, adaptive modeling, and nimble data utilization to scale personalized interactions.

Enter the Customer Data Platform (CDP)—a data discovery and "decisioning" (i.e., automated decision making) platform. The CDP makes it possible for marketers to scale data-driven customer interactions in real time. And while CDP hasn't really broken into the Gartner Magic Quadrant or Forrester Wave, it is gradually becoming an industry-standard concept, with a small but growing cadre of third-party platforms emerging that will soon shape the category.

Four steps to effectively activate your data

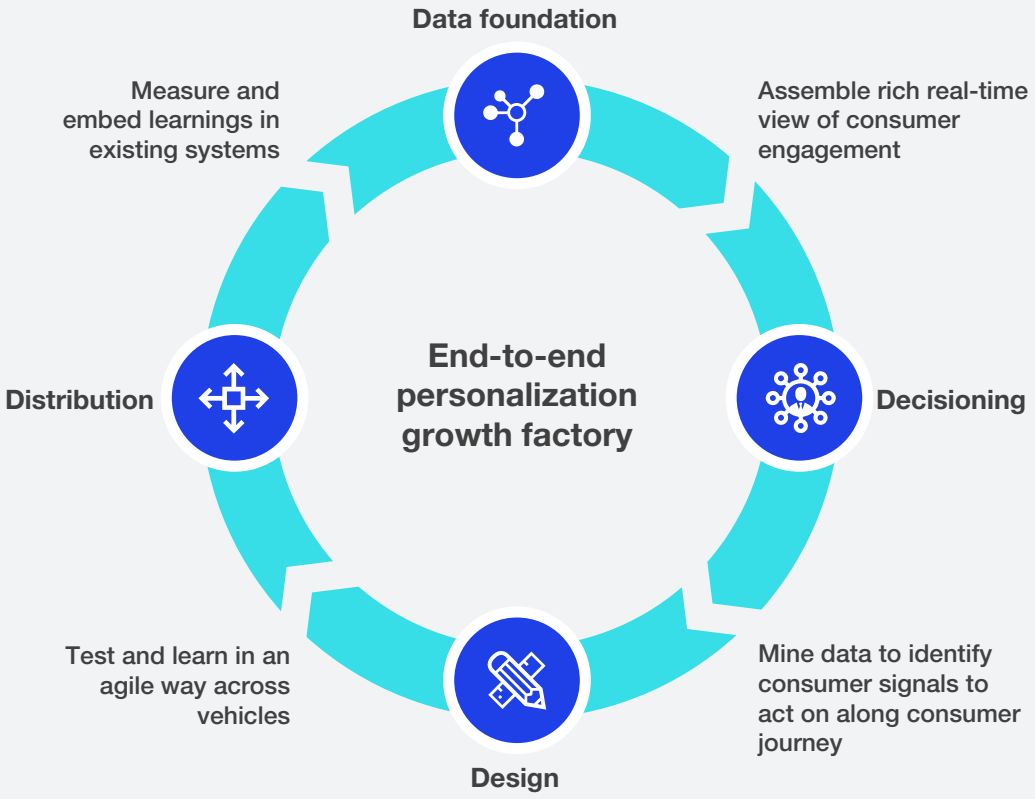
Incorporating a CDP into your organization—whether piggybacking on an existing master data-management or customer-relationship-management system or starting from scratch—requires mastery of four areas (see Exhibit):

1. Data foundation: Build a rich view of customer

Many companies have the elements of a relatively complete view of the customer already. But they reside in discrete pockets across the company. Just as a recipe does not come together until all the ingredients are combined, it is only when data is connected that it becomes ready to use. The CDP takes the data a company already has, combines it to create a meaningful customer profile, and makes it accessible across the organization.

Exhibit 2

Building deeper 1-to-1 relationships with consumers at scale.



"Feeding" the CDP starts by combining as much data as possible and building on it over time Creating models that cluster customer profiles that behave and create value in similar ways requires advanced analytics to process the data and machine learning to refine it. Over time, as the system "learns," this approach generates ever-more-granular customer subsegments. Signals that the consumer leaves behind (e.g., a site visit, a purchase on an app, interest expressed on social media) can then expand the data set, enabling the company to respond in real time and think of new ways to engage yet again. Furthermore, the insights gleaned extend beyond a customer's response to a specific campaign, for example by driving more targeted product development.

A number of companies we're familiar with, struggling to truly understand their customers who make infrequent purchases, combine their own CRM data with Facebook consumer data to build look-alike models. This helps identify the highest-value prospects most likely to buy in their category. Increased targeting through display ads on and off Facebook can yield 50 to 100 percent higher returns than from the average Facebook audience. Mapping third-party data (when it exists) to customer segments via a data-management platform (DMP) can enhance the experience for both

Data-activation self-assessment

This self-assessment can help company leaders develop a benchmark for measuring their progress on their data- activation journey.

Data foundation

How comprehensive is your view of the consumer across all your internal data sets, and how close to real time are those data feeds being updated?
Lagging: We do not use any data for personalization.
Basic: Data-driven personalization is mostly focused on transaction data, and/or anonymous third-party data. Data is manually updated daily or weekly.
Leading: Rich view of consumer across most touchpoints (e.g., transactions, media, clickstream, servicing/care). Data is actively used for personalization. Data is real time or refreshed multiple times per day.

Decisioning

What types of models are you activating across channels? Who manages your models?
Lagging: We are not using any propensity models to enhance targeting or to trigger personalized experiences.
Basic: We have basic propensity models that are used on a limited basis and not used widely in digital. We have limited or no dedicated data-science resources to manage models.
Leading: We have multiple propensity models to predict value creation or destruction for a given customer interaction, and most digital messaging is triggered by these propensity scores. Our models are managed by in-house data-science resources. We currently or soon will use machine learning to further fine-tune models.

Design

How often do you test offers and messages?
Lagging: We do limited tests and do not update our offers frequently.
Basic: Tests are set up and deployed manually. We analyze performance weekly or monthly and optimize periodically.
Leading: We run triggered A/B and/or multivariate tests daily.

Distribution

How are your marketing technology platforms integrated with your data systems?
Lagging: We have not optimized our martech stack and/or rely solely on the platforms our agency manages on our behalf.
Basic: We manually batch upload data to our martech systems, and we are able to deliver personalized experiences to broad customer segments in some channels. Response and transaction data is batch delivered back into the CDP.
Leading: We have API connections between our customer-data platform and our martech systems. All response and transaction data is fed back in a closed loop into our customer data platform.

known and anonymous digital consumers, leading to improvements in engagement and conversion, measured in net promoter score, acquisition, and lifetime value.

2. Decisioning: Mine the data to act on the signals

The decisioning function enables marketers to decide what is the best content to send to a given customer for a given time and channel. Customers are scored based on their potential value. A set of business rules and regression models (increasingly done through machine learning) then matches specific messages, offers, and experiences to those customer scores, and prioritizes what gets delivered and when. This allows companies to make major improvements in how they engage with their customers by developing more relevant, personalized engagement, within a single channel or across channels, based on a customer's behavioral cues. Those signals can be basic, such as "cart abandoned" or "browsed but didn't buy," or more nuanced, such as activity by segment and time of day, gleaned from mining customer data. In effect, these signals become triggers that invoke an action. A decisioning engine develops a set of triggers and outcomes based on signals and actions the company takes in response.

For example, one multichannel retailer discovered that many consumers made a purchase on the website just once per year. Further analysis revealed those same customers tended to return to browse the site a few days after purchase. The company now takes advantage of this window of opportunity to send tailored, targeted messaging, rather than risk losing the customer for another year. This approach doubled the open rate of its emails—from 10 to 15 percent for generic targeted communications to 25 to 35 percent for real-time, "trigger-based" communications acting on consumer signals.

More sophisticated companies build up a decisioning model that works across all distribution channels. That requires advanced modeling and analytics techniques to identify the impact of one channel on another as a customer proceeds along his/her decision journey. A travel company took this approach recently and saw coordinating messages across channels drive a 10 to 20 percent incremental boost in conversion rates and customer lifetime value.

Effective decisioning is based on repeated testing that validates and refines hypotheses and outcomes. Over time, these can become increasingly sophisticated as models and algorithms build on each other. One telecommunications company has been testing different offers to different groups: millennials, customers in specific cities, previous owners of a specific device, groups of relatives, and people who viewed a specific web page in the last three days. As complex as this may seem, a semi-automated decisioning engine prioritizes the offers and experiences proven to have the highest rate of return. This allows the telco to scale the results of dozens of tests without fear of inconsistent customer experiences or conflicting offers.

3. Design: Crafting the right offers, messages, and experiences at speed

Understanding your customers and how to engage them counts for little without the content to actually deliver to them. Designing great offers, however, is hampered by the fact that functions and departments within companies tend to operate as mini fiefdoms. The owners of each channel

test and engage consumers exclusively within their own channel. Real benefits can occur only when companies shift to "war rooms" of people from relevant functions (marketing, digital, legal, merchandising, and IT/DevOps) who focus on specific consumer segments or journeys. These teams have clear ownership of consumer priorities and responsibility for delivering on them. The cross-functional team continually develops new ideas, designs hypotheses for how to engage customers, devises experiments, and creates offers and assets. Analytics help size opportunities, test impact, and derive insights from tests. That content is then tagged, so that it can be associated with a trigger and be ready to go when needed. Just three months after launching its war room, one large multichannel retailer saw its testing speed go from 15 to 20 weeks to two to three weeks, and testing volume increase from four to six per month to 20 to 30 per month.

4. Distribution: Deliver experiences across platforms

Distribution systems are simply the "pipes" that deliver the ad or content to the end user (e.g., ad server, DSP, or content management platform). Often they can be quite manual and just blast out communications to wide segments of people with little tailoring. But connect the CDP engine, with its predetermined triggers and tagged content, to these distribution systems, and a formerly blunt marketing instrument becomes a far more directed one sending specific messages to distinct customer subsegments across all addressable channels. Sophisticated businesses have developed a library of APIs to help tie the CDP into the "martech stack"—the marketing technologies that deliver and track experiences. Integrating the stack this way creates a feedback loop that sends customer response, engagement, and conversion data back into the CDP.

Implementing the data-activation framework

Not all data-activation efforts are created equal. We recommend using a case-driven approach, maintaining a backlog of tests ranked by opportunity, quantifying the impact of each potential use case, and balancing it with the level of effort required to implement it.

Unlike a wholesale IT transformation, deploying a CDP isn't a replacement of current customer-data systems, but rather an operational solution that can piggyback on existing systems. In our experience, many marketers already have a large part of the marketing-technology equation in house; they're just not using it properly.

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The promise of data-activated, one-to-one marketing is not only possible but is now increasingly expected by today's customers. It is now the key to transforming simple customer transactions into enduring relationships.

Julien Boudet is a partner in McKinsey's Seattle office, **Brian Gregg** is a senior partner in the San Francisco office, **Jason Heller** is a partner in the New York office, and **Caroline Tufft** is a partner in the London office.

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Using people analytics to drive business performance: A case study

Carla Arellano, Alexander DiLeonardo, and Ignacio Felix

A quick-service restaurant chain with thousands of outlets around the world is using data to drive a successful turnaround, increase customer satisfaction, and grow revenues.

People analytics—the application of advanced analytics and large data sets to talent management—is going mainstream. Five years ago, it was the provenance of a few leading companies, such as Google (whose former senior vice president of people operations wrote a book about it). Now a growing number of businesses are applying analytics to processes such as recruiting and retention, uncovering surprising sources of talent and counterintuitive insights about what drives employee performance.

Much of the work to date has focused on specialized talent (a natural by-product of the types of companies that pioneered people analytics) and on individual HR processes. That makes the recent experience of a global quick-service restaurant chain instructive. The company focused the power of people analytics on its frontline staff—with an eye toward improving overall business performance—and achieved dramatic improvements in customer satisfaction, service performance, and overall business results, including a 5 percent increase in group sales in its pilot market. Here is its story.

The challenge: Collecting data to map the talent value chain

The company had already exhausted most traditional strategic options and was looking for new opportunities to improve the customer experience. Operating a mix of franchised outlets, as well as corporate-owned restaurants, the company was suffering from annual employee turnover significantly above that of its peers. Business leaders believed closing this turnover gap could be a key to improving the customer experience and increasing revenues, and that their best chance at boosting retention lay in understanding their people better. The starting point was to define the goals for the effort and then translate the full range of frontline employee behavior and experience into data that the company could model against actual outcomes.

Define what matters. Agreeing in advance on the outcomes that matter is a critical step in any people-analytics project—one that's often overlooked and can involve a significant investment of time. In this case, it required rigorous data exploration and discussion among senior leaders to align on three target metrics: revenue growth per store, average customer satisfaction, and average speed of service (the last two measured by shift to ensure that the people driving those results were tracked). This exercise highlighted a few performance metrics that worked together and others that "pulled" in opposite directions in certain contexts.

Fill data gaps. Internal sources provided some relevant data, and it was possible to derive other variables, such as commute distance. The company needed to supplement its existing data, however, notably in three areas (Exhibit 1):

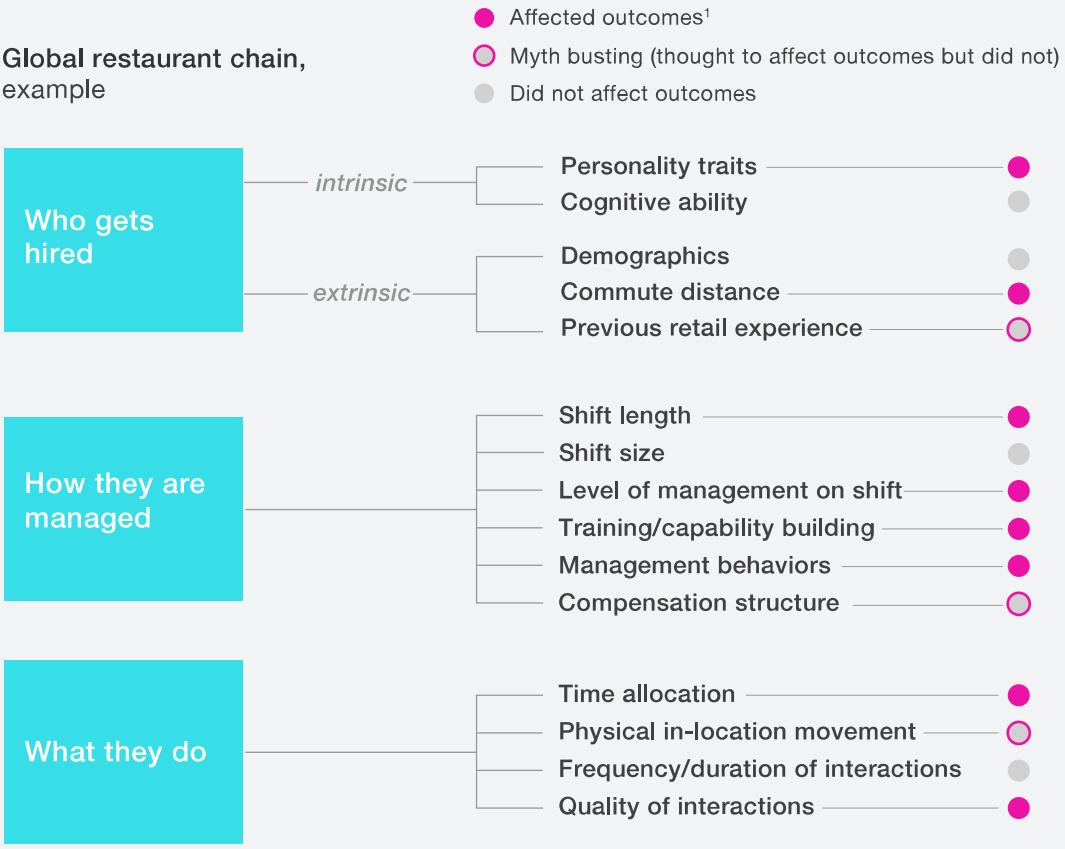
- First was selection and onboarding ("*who gets hired* and what their traits are"). There was little data on personality traits, which some leaders thought might be a significant factor in explaining differences in the performance of the various outlets and shifts. In association with a specialist in psychometric assessments, the company ran a series of online games allowing data scientists to build a picture of individual employees' personalities and cognitive skills.

- Second was day-to-day management ("*how we manage* our people and their environment"). Measuring management quality is never easy, and the company did not have a culture or engagement survey. To provide insight into management practices, the company deployed McKinsey's Organizational Health Index (OHI), an instrument through which we've pinpointed 37 management practices that contribute most to organizational health and long-term performance. With the OHI, the company sought improved understanding of such practices and the impact that leadership actions were having on the front line.

- Third was behavior and interactions ("*what employees do* in the restaurants"). Employee behavior and collaboration was monitored over time by sensors that tracked the intensity of physical interactions among colleagues. The sensors captured the extent to which employees physically moved around the restaurant, the tone of their conversations, and the amount of time spent talking versus listening to colleagues and customers.

Exhibit 1

Analysis identified which employee features correlated to the desired outcomes.



[1] Targeted outcomes were customer-satisfaction scores by shift, revenue growth by store, and speed of service by shift.

The insights: Challenging conventional wisdom

Armed with these new and existing data sources—six in all, beyond the traditional HR profile, and comprising more than 10,000 data points spanning individuals, shifts, and restaurants across four US markets, and including the financial and operational performance of each outlet—the company set out to find which variables corresponded most closely to store success. It used the data to build a series of logistic-regression and unsupervised-learning models that could help determine the relationship between drivers and desired outcomes (customer satisfaction and speed of service by shift, and revenue growth by store).

Then it began testing more than 100 hypotheses, many of which had been strongly championed by senior managers based on their observations and instincts from years of experience. This part of

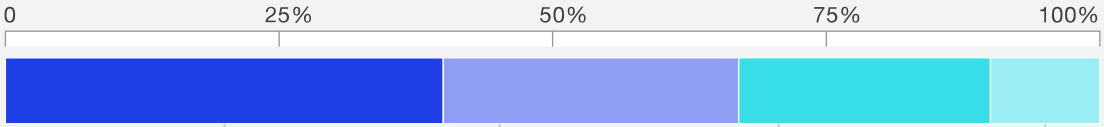
the exercise proved to be especially powerful, confronting senior individuals with evidence that in some cases contradicted deeply held and often conflicting instincts about what drives success. Four insights emerged from the analysis that have begun informing how the company manages its people day to day.

Personality counts. In the retail business at least, certain personality traits have higher impact on desired outcomes. Through the analysis, the company identified four clusters or archetypes of frontline employees who were working each day: one group, "potential leaders," exhibited many characteristics similar to store managers; another group, "socializers," were friendly and had high emotional intelligence; and there were two different groups of "taskmasters," who focused on job execution (Exhibit 2). Counterintuitively, though, the hypothesis that socializers—and hiring for friendliness—would maximize performance was not supported by the data. There was a closer correlation between performance and the ability of employees to focus on their work and minimize distractions, in essence getting things done.

Exhibit 1

Frontline employees fell into four personality archetypes.

Distribution of employees at a global restaurant chain



Socializers	Potential leaders	Entrepreneurial taskmasters	Conservative taskmasters
High EQ,[1] more altruistic and trusting Risk takers, highly spontaneous	High EQ Good at multitasking Follow up with others Most like high-performing general managers	Lower EQ, less altruistic Good at planning and executing Higher appetite for risk and innovation	Low EQ Good at planning and execution Very focused, not good at multitasking Conduct work within boundaries provided (not risk seeking)

[1]Emotional Quotient, a measure of self-awareness and sensitivity to others.

Careers are key. The company found that variable compensation, a lever the organization used frequently to motivate store managers and employees, had been largely ineffective: the data suggested that higher and more frequent variable financial incentives (awards that were material to the company but not significant at the individual level) were not strongly correlated with stronger

store or individual performance. Conversely, career development and cultural norms had a stronger impact on outcomes.

Management is a contact sport. One group of executives had been convinced that managerial tenure was a key variable, yet the data did not show that. There was no correlation to length of service or personality type. This insight encouraged the company to identify more precisely what its "good" store managers were doing, after which it was able to train their assistants and other local leaders to act and behave in the same way (through, for example, empowering and inspiring staff, recognizing achievement, and creating a stronger team environment).

Shifts differ. Performance was markedly weaker during shifts of eight to ten hours. Such shifts were inconsistent both with demand patterns and with the stamina of employees, whose energy fell significantly after six hours at work. Longer shifts, it seems, had become the norm in many restaurants to ease commutes and simplify scheduling (fewer days of work in the week, with more hours of work each day). Analysis of the data demonstrated to managers that while this policy simplified managerial responsibilities, it was actually hurting productivity.

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The results (so far)

Four months into a pilot in the first market in which the findings are being implemented, the results are encouraging. Customer satisfaction scores have increased by more than 100 percent, speed of service (as measured by the time between order and transaction completion) has improved by 30 seconds, attrition of new joiners has decreased substantially, and sales are up by 5 percent.

We'd caution, of course, against concluding that instinct has no role to play in the recruiting, development, management, and retention of employees—or in identifying the combination of people skills that drives great performance. Still, results like these, in an industry like retail—which in the United States alone employs more than 16 million people and, depending on the year and season, may hire three-quarters of a million seasonal employees—point to much broader potential for people analytics. It appears that executives who can complement experience-based wisdom with analytically driven insight stand a much better chance of linking their talent efforts to business value.

Carla Arellano is a vice president of People Analytics, a McKinsey Solution, where **Alexander DiLeonardo** is a senior expert. Both are based in New York.

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How a large, established company built a digital culture

Harrison Lung

Customer focus, agile work methods, and design thinking are the keys to successful transformation for this large Malaysian telecom.

Going digital is a big challenge for a large communications company, especially one that finds itself playing in newly deregulated and increasingly competitive markets. In 2015, Telekom Malaysia Berhad (TM) began a comprehensive effort to adapt to its customers' digital attitudes and behaviors. This company-wide transformation is led by Chief Digital Officer Ahmad Azhar Yahya. McKinsey's Harrison Lung sat down with Mr. Yahya and Hasniza Mohamed, the member of Mr. Yahya's team who is in charge of digital customer experience, to learn how even the most tradition-bound organization can shift to new modes of thinking and operating.

McKinsey: Where have you focused your digital transformation at TM so far?

Ahmad Azhar Yahya: We embarked on our digital transformation in 2015 with the goal of making life easier for our customers. We wanted to bring digital innovations and improvements to our consumer business, while also elevating digital to all our business groups. It's this idea that the entire organization should embrace the spirit of going digital. We still have a long way to go, but we've made tremendous progress. Many of the digital initiatives at TM have already produced results.

One success I'm particularly proud of is improvements we've made to our TM Group website (tm.com.my), which is now among the top 12 most-visited websites in Malaysia, according to comScore. This is an important achievement because it validates our efforts to move many of our customer-servicing functions online and generally makes it easier for our customers to find information about the TM Group and to engage with us.

From an employee point of view, we're seeing a big shift in the way we work through the implementation of tools that facilitate collaboration, innovation, and the entrepreneurial spirit. More than half of our workforce is now engaged on our enterprise social-media platform powered by Yammer, and Skype for Business is being used across the company for both day-to-day collaboration and large-scale events like quarterly town halls with group CEOs. During our last livestreamed town hall, more than 17,000 employees watched on Skype, which represents more than half the entire TM Group workforce!

Beyond that, our organization has started to embrace the agile way of working, which is a method of software and IT development we are now applying to other areas of the company's operations. In this setup, teams of people from different departments sit together in the same area, instead of on different floors. And instead of waiting months for approvals from different departments, they are empowered to make decisions quickly and come up with initial solutions that can be tested and improved with feedback from customers and other stakeholders.

Hasniza Mohamed: Scaling digital across the organization is so important. One of the first initiatives of the effort to spread the digital bug to employees was a large internal event called Digital Day, back in November 2015. This was a crucial signal to the entire company about how important going digital is. At the Digital Day event, we had internal leaders, such as from R&D and innovations, and digital experts from outside companies speak on various topics so that people could learn more about what a digital culture really means.

This year, we will be having an even larger event called Digital Summit, where digital natives from companies like Singapore-based ride-hailing company Grab will speak and give demonstrations of their latest offerings. Internal and external leaders will also facilitate workshops on digital capabilities, such as how to develop your own applications and how to leverage design thinking. There will also be open houses in our digital labs—facilities where we develop cutting-edge programs—that employees can attend.

McKinsey: Going digital is such a big, daunting idea. How did you manage it?

Hasniza Mohamed: We broke down the process into more-manageable pieces. Initially we focused on the customer sign-up process, or what we internally call iJoin. Using the principles of agile development, we set up a full-time, cross-functional team where IT, marketing, product development, fraud prevention, customer experience, and customer care sat together in a room.

The focus was not on the perfect solution but on producing a minimum viable product (MVP) that required minimal changes to the existing back end. The idea was to drive toward an initial implementation that would generate customer feedback and could be launched quickly. In this case, it took us just 18 weeks, many times faster than we'd ever developed a service before.

For us, being digital is about enabling an experimentation mind-set: testing, learning, and continuing to evolve according to what's best for our customers. Already, though, there's been a considerable financial impact. Our sales conversion has improved by three percentage points and our Net Promoter Score by 30. Across our social media platforms, we have close to two million followers and have earned an industry-leading 40 percent share of voice. And to think all that started in 2013 with a single Twitter account (@TMConnects) that was managed by three people in corporate communications.

McKinsey: What have been some of the biggest challenges you've faced during your digital transformation?

Ahmad Azhar Yahya: Going digital is not about one big idea—it's about solving 1,000 small problems together as one synchronized company. Initially, our main consideration in the digital transformation was moving from a traditional IT platform to a two-speed architecture where one part is customer-facing, fast, and flexible and the other is a stable back end for transactions and business support. The two are connected via software that acts as a bridge. This bifurcation enables the development team to preserve core systems while making frequent changes to the front end based on customer feedback.

A persistent challenge is identifying the right talent to drive these changes to the architecture and to our ingrained ways of working. In the beginning, we needed all kinds of new people, including user-interface and customer-experience specialists, coders, and scrum masters (agile development team coaches or facilitators). It was very hard to find this talent, so we organized events for local start-ups to identify people, and began investing in start-ups to gain access to them.

At the same time, the human resources department is working to ensure that these individuals are empowered and continuously motivated. The department is establishing a program to give additional responsibility and authority to talented technical employees who aren't necessarily on the manager career path. We are giving them expert or leader roles based on their deep knowledge.

McKinsey: What sort of organizational setup did you create around digital?

Ahmad Azhar Yahya: Our strength is our 28,000 employees, and we knew we had to get them on board with going digital to accelerate its implementation. We established the Group Digital Center, which I lead, to oversee the digital transformation and to work toward enabling mind-set changes. We are assisting HR in adding digital as part of the TM job family, along with finance, IT, marketing,

etc. For digital, some of these required competencies will be broad and everyone will need them, such as a test-and-learn mind-set and entrepreneurial spirit. Others will be role-specific, like network, open source, cybersecurity and mobility expertise.

Under the Group Digital Center, four centers of excellence (CoE) form the nucleus of digital change at the company. The first CoE is Digital Customer Experience, which reports to the executive vice president of our consumer and small-to-medium enterprise businesses. The second and third CoEs are internally focused on process optimization, providing digital tools for our frontline employees, and fostering digital mind-set change throughout the organization. These CoEs report to our chief technology information experience officer and chief human capital officer. The fourth CoE focuses on new businesses that go beyond connectivity solutions and into, for instance, smart services like data analytics that serve the B2B and B2B2C markets. This CoE reports to me.

The teams in these CoEs are cross-functional and represent a new organizational model for us. First, its members are made up of individuals from different departments throughout the organization. Second, these CoEs have been given a mandate to cut across siloed functions and hierarchical structures so that they can do everything—from forms processing and hardware approval to credit-check validation—more quickly and efficiently. Finally, the formation of our Digital Council, which we affectionately call the Jedi Council, further integrates digital throughout our organization, as it consists of leaders from HR, strategy, IT, and brand and communications.

McKinsey: You've talked a lot about mind-set change. Can you tell us more about that?

Hasniza Mohamed: In order to make our organization more customer-centric and digitally focused, we recently piloted the idea of using design thinking in my digital customer-experience group. For us, this way of working begins with a close observation of the needs and desires of customers and then the development of out-of-the-box solutions to address them.

We now have a community of about 300 customers, consisting of power users, friends and family of staff, who represent the different segments and profiles of our customer base. We actively engage them in cocreation, defining their key issues and priorities before moving to product or feature ideation. After this ideation, we invite them in to test the prototypes for new features or services, going through multiple iterations before we get to the right solution.

We have started to introduce this design thinking to the rest of the organization from C-level down and are embedding this method into all facets of our work, fundamentally changing the way we approach problems. We recently hosted the largest design-thinking event in our company's history, where 1,000 employees were divided into small teams of ten people and given the challenge of creating a prototype that would solve a pain point for a particular type of customer. At the end, real customers voted on the winners, and the winning ideas were actually implemented.

McKinsey: What is the one thing you wish you'd known before starting this journey?

Ahmad Azhar Yahya: People tend to think that digital is all about IT. But it's not, and I wish I'd known that from day one. Going digital is about having the right mind-set and behaviors rather than getting enough technology-savvy people on board. We need IT talent, but looking for people with a customer-centric mind-set and the willingness to take risks and learn from them, whether they are IT-savvy or not, is more important in this transformational journey.

Hasniza Mohamed: Digital is not about apps and portals. It's much bigger than that. When I started in this role, I did not expect that the shift to digital would represent the next revolution for the telco industry. Going digital is a must for every company. If we don't change, we'll be irrelevant in the not-so-distant future.

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Harrison Lung is a partner in McKinsey's Hong Kong office.

What it really takes to capture the value of APIs

Keerthi Iyengar, Somesh Khanna, Srinivas Ramadath, and Daniel Stephens

APIs are the connective tissue in today's ecosystems. For companies that know how to implement them, they can cut costs, improve efficiency, and help the bottom line.

Application programming interfaces (APIs) were once largely limited to technical domains but have now become a significant engine of business growth. As the connective tissue linking ecosystems of technologies and organizations (see *Sectors without borders* on McKinsey.com), APIs allow businesses to monetize data, forge profitable partnerships, and open new pathways for innovation and growth.

Early adopters across industries are already using APIs to create new products and channels and improve operational efficiency. Within the automotive industry, for instance, APIs are used to embed efficiency data, driving statistics, route information and real-time alerts into dashboards. Some retailers are using APIs to set up multi-brand shopping platforms, track inventory, and help consumers locate stores. And a handful of banks are partnering with fintechs and retailers, among others, to develop APIs that help customers integrate banking data into bookkeeping and investment software, and provide faster internal access to a range of account information.

The value at stake is significant. McKinsey analysis has estimated that as much as $1 trillion in total economic profit globally could be up for grabs through the redistribution of revenues across sectors

within ecosystems.[20] That makes APIs, which play a crucial role in linking organizations and technologies in ecosystems, a significant competitive battleground capability.

Furthermore, McKinsey estimates that the number of public APIs will triple over the next 12 months. As the functionality evolves, APIs will deliver more advanced services, such as powering the wider use of digital wallets and currencies, enabling machine learning to deliver more sophisticated operations, and supporting advanced conversational capabilities. In addition, API marketplaces and app stores will make it easier for users to access sophisticated business and consumer offerings.

How APIs create value

Being unclear about the value of APIs can lead to lost focus and missed opportunities. We see three primary sources of value in API programs:

Simplifying the back end. APIs can connect internal systems relatively simply, allowing access to data—even when it's buried deep within legacy IT systems—quickly and repeatedly. This allows IT to simplify and automate tasks and speed development.

Personalizing offers. Data aggregation and on-demand reporting through APIs can enable the delivery of personalized products and services, such as user authentication, fraud management, credit approvals, paying for services with cash or points, or finding and tracking subscriptions. For instance, S&P's Capital IQ API integrates key information, including investment research, companies' financials, credit ratings, global market data, and alpha and risk models, into personalized business applications for customers.

Ecosystem of innovation and engagement. The connective capability of APIs allows companies to access new value outside the business. API developers, for example, can create innovative products and services that tie into a company's systems. Advanced API capabilities allow developers to create a richer customer experience by pulling together a deeper array of data sets (rather than simply scraping data). Salesforce.com's partner ecosystem, for example, offers a developer-friendly toolbox that has spurred partners to build a huge number of employee and customer applications that rely on APIs. As a result, more traffic comes through the Salesforce APIs than through its website.

However, the number of firms with mature API programs remains small. Most organizations have just a dozen or so APIs instead of the hundreds needed for a robust portfolio. And apart from a few early movers, most do not have a formal API strategy, are unclear about the true value at stake, and are uncertain about how to implement a program that quickly maximizes consumer and business impact.

With the API market gaining momentum, institutions that move quickly to define a business-backed strategy and monetization model, institute the right governance, and drive adoption can create powerful new avenues for revenue growth and value.

20 Venkat Atluri, Miklós Dietz, and Nicolaus Henke, "Competing in a world of sectors without borders," *McKinsey Quarterly*, July 2017.

Driving successful execution of the API strategy

In our experience, the most successful companies implement an API strategy by following these steps:

1. Identify—and prioritize—the value

APIs can generate massive amounts of value, but institutions first need to understand where best to apply them. Leaders in the field analyze where value can be destroyed or created, then they size the potential impact in terms of revenue, customer experience, and productivity.

Analyzing customer journeys is often the best way to identify API opportunities. One bank pulled business and technology professionals into a joint team and tasked them with identifying where APIs could help resolve several longstanding customer pain points.

Their review revealed opportunities to develop advanced calculator APIs capable of pulling from multiple sets of data, know-your-customer APIs, and product-aggregation APIs that could help customers access needed information more quickly and cut down on form-filling requests. The team then prioritized those opportunities that would deliver the most near-term impact, given existing capabilities. That data-driven approach gave the bank greater mission clarity and built momentum for the API program.

Understanding what it takes to develop the APIs requires a deep knowledge of the data environment, especially back-end systems where the API work is often done. Once the best opportunities are identified, API developers can identify which and how many APIs are necessary to unlock that value. A prioritization matrix can help whittle down the list of APIs based on the answers to a specific set of questions about strategic value and implementation complexity, taking technical, privacy, security, and regulatory concerns into account (Exhibit 1).

2. Manage monetization actively

With a clear vision in place, companies then need to focus on what they need to implement in order to capture the value they've identified, a step many organizations surprisingly tend to shortchange. Determining what and how to charge, for example, requires quantifying how much the underlying data or service is worth (often based on how proprietary it is and its role in generating value), the revenue streams the APIs open up, and how much developers and users might be willing to pay to access them. Those answers, combined with the company's overarching strategy, will inform which monetization arrangements to pursue with different partners.

Options typically include "pay for use," where developers pay based on usage volume; revenue sharing models, where the API partner or developer gets paid for the incremental business they generate for the API provider; and "freemium," when it's strategically valuable to scale a product's or brand's reach.

In determining which monetization approach to use, providers should think about how their data and APIs can add distinctive value for different audiences. Those insights can help them put

Exhibit 1

A disciplined process to evaluate APIs

		Main criteria or question
Strategic attractive-ness	**Business impact**	• What is the quantitative impact of the capability on **business objectives and customer needs**? • What is the **differential impact of using APIs** versus status quo?
	Strategic alignment	• How much will the capability contribute to the company's **strategic goals**?
Readiness to execute	**Complexity to execute**	• What is the **technical difficulty** in building APIs for the capability (e.g. back-end systems and integration needs)?
	Business readiness	• What is the readiness, from a **business, legal, and policy** standpoint, to deliver APIs for this capability?

Source: McKinsey analysis

together thoughtful partnerships. The traffic app Waze, for instance, uses APIs to create a two-way exchange between municipalities and other partners to share data on road closures, accidents, construction delays, and potholes. Similarly, American Express uses its Pay with Points APIs to create mutually beneficial partnerships with merchants, arrangements that have increased retail sales, card spend, and brand loyalty.

That focus on monetization of APIs should extend to internal functions as well. Effectively using APIs can reduce operational or technology costs by simplifying and accelerating development. One bank, for instance, created a library of standardized APIs that software developers could use as needed for a wide variety of data-access tasks rather than having to figure out the process each time. Doing so reduced traditional product-development IT costs by 41 percent and led to a 12-fold increase in new releases. Seeing these kinds of tangible benefits makes it easier for business leaders to increase their expectations of their software engineers to develop better products more efficiently. Quantifying that potential value in potential savings, efficiencies, and FTE reassignment is crucial in building a business case to invest in developing APIs.

As teams implement APIs that break down barriers between systems and organizations, they can continually unlock new sources of value that weren't evident at the beginning of a project. One large financial institution, for example, used APIs to help connect systems with a wealth-management institution it had acquired. One set of APIs was used to connect the interface on the web to the wealth management company's back-end systems, while another set linked the master customer data so that customers could be immediately authenticated and didn't have to re-register. The APIs greatly simplified the integration process, eliminating the need to rewrite any applications and allowing each system to operate until it was time to merge them. The organization could then offer customers an integrated solution rather than a series of individual products. For this reason, the monetization process needs active and ongoing management to continually identify opportunities that APIs create.

3. Create a centralized governance and organizational model

Using APIs effectively requires a new way of thinking about partnerships, a new way of business and technology working together, and a new pace of development, funding, and coordination. It also comes with new challenges to data privacy and security (see "Opening up your APIs and keeping the cybercrooks out" on McKinsey.com).

Establishing a centralized body, such as an API Center of Excellence (CoE), is crucial for overseeing API design and development across the organization. With the help of visual dashboards and related tools, the CoE can manage all the APIs in the catalog to avoid duplication, enable reuse, and assist with developer access. Effective API leadership establishes clear decision rights (about what APIs to develop, for example, or how to resolve conflicts) and identifies both what API capabilities are needed and what new APIs the business needs to evolve. At one large business, the API CoE reported to the chief technology officer.

The CoE's role in establishing security standards and protocols is especially important. These include two-factor authentication, access-management controls, and appropriate network monitoring to detect bots and other unwanted cyberactivity. A clear set of data and security protocols provides the necessary standardization to ensure interface compatibility, simplify management, and more effectively manage risk.

CoE governance also extends to managing funding requests. The most advanced organizations dedicate specific funding to develop a set number of APIs while maintaining enough flexibility to seize on new ideas that emerge. They continually vet and reprioritize their portfolio to ensure resources support the highest-value opportunities.

Some CoEs launch specialized hubs to court crucial developer relationships. Success requires sustained commitment to ongoing platform support and API development to maintain the confidence of external developers and partners. For example, one bank located near a high-tech hotbed created an open banking platform that provides developers with access to data and payment operations that they can integrate into their own platforms and applications. The bank underlines this commitment by also providing a technical dashboard view of API usage and processing volumes, and the ability to manage API keys and access with bank-grade authentication within the digital platform.

Finally, the CoE needs to ensure that the API program is staffed effectively. Leaders with experience directing API portfolios are crucial to establishing the necessary governance and development approach. Software engineers and use-case specialists must be able to turn user stories into executable APIs and integrate those APIs into products and systems, and "translators" are needed to convert business needs into technical requirements and help the business understand any relevant technological constraints.

4. Drive usage and adoption to gain scale

Like any product or service, a successful API program requires a thoughtfully managed adoption campaign backed by rigorous performance management. The best approaches begin with the initial customer and developer pilots, advance to formal production requirements, then orchestrate and oversee the wider-adoption push to achieve critical mass.

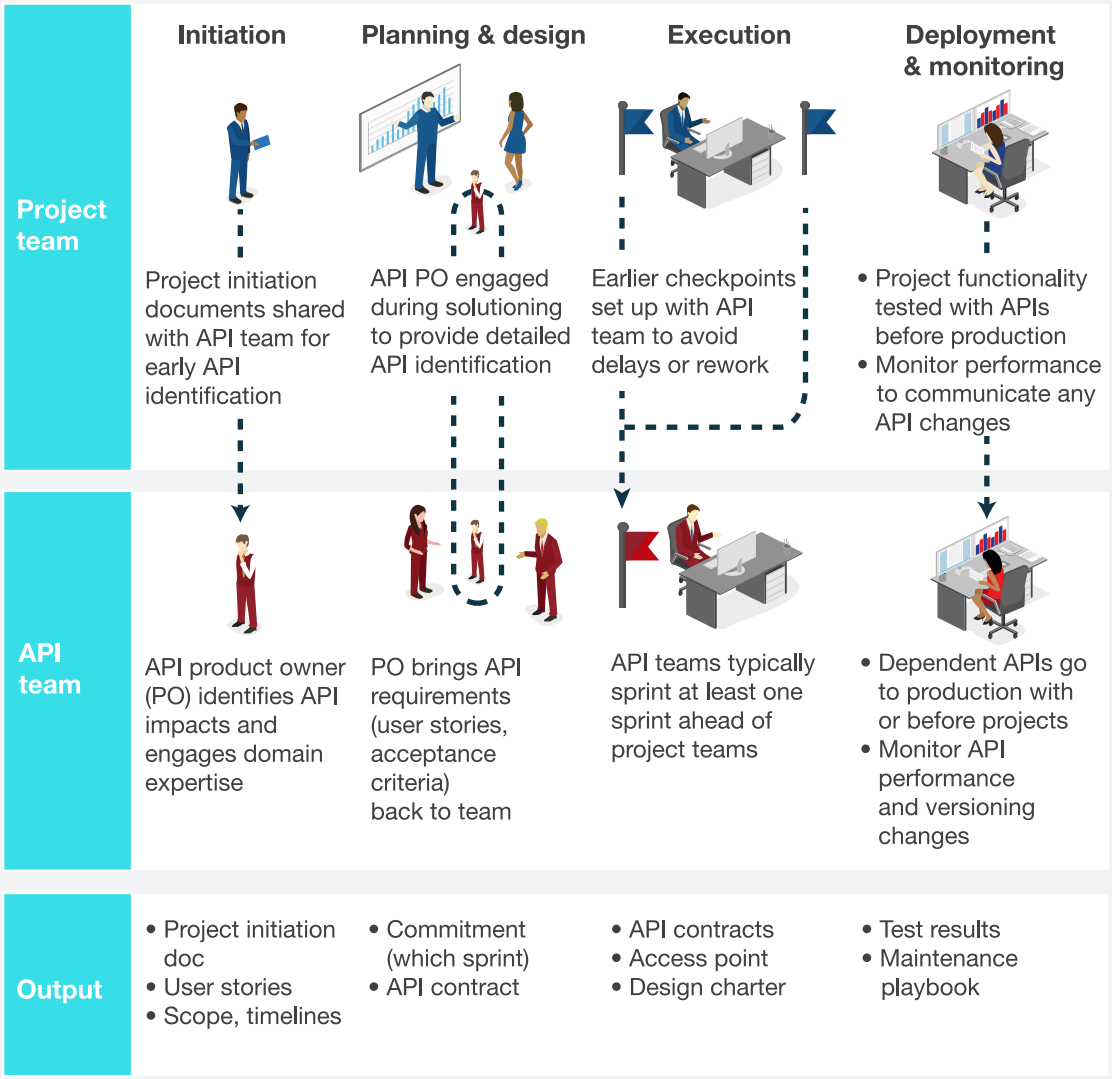
It's important to find pilot partners who have an appetite for innovation and are willing to invest the time. API teams work closely with project teams to continually refine and iterate the API prototype until it meets predefined performance targets (Exhibit 2).

Rigorous, ongoing performance measurement should focus on relevant usage and traffic metrics, such as the number of user registrations, the percentage of users by customer type, and the number of requests over time. This provides teams with the insight needed to make targeted improvements. Tracking data errors or API response times helps to test and validate desired strategic and customer outcomes. One institution prioritized tracking the processing time per API to ensure customer journey targets were being met.

Exhibit 1

Development and operations

Example: A bank's API development teams work with project teams across all phases



Source: McKinsey analysis

Historical trends and metrics that gauge product or service performance also allow teams to manage the API portfolio as a whole, letting them know which APIs to promote and which to retire. Such regular service-catalog grooming cuts down on bloat and ensures APIs are well organized and easily discoverable.

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API management is emerging as a crucial capability to navigate the digital age. But only those that master its implementation will be able to sustain the value.

Keerthi Iyengar is a digital manager in McKinsey's New York office, where **Somesh Khanna** is a senior partner; **Srinivas Ramadath** is a digital vice president in the Chicago office, and **Daniel Stephens** is a partner in the Washington office.

Toward an integrated technology operating model

Naufal Khan, Gautam Lunawat, and Amit Rahul

Companies may be able to get digital transformations off the ground by separating digital from conventional IT, but that approach is not sustainable. Here's a better way.

Technology organizations are now expected to play a central role in helping companies capitalize on new digital capabilities—connectivity, advanced analytics, and automation, for instance. These capabilities can help them build deeper relationships with customers, launch new business models, make processes more efficient, and make better decisions.

To a greater degree than before, technology groups must focus on integrating these new digital tools and approaches with existing legacy systems and methodologies—a task that isn't always as straightforward as it sounds. Companies have introduced costly, complicated initiatives designed to deploy digital tools and approaches organization-wide, only to see such programs fall short of their potential or stall completely. The evidence? Rich data sets are accessible only to a few groups of privileged users. Innovative processes used in one business unit are never shared across the company, and the impact of digitization remains small and isolated.

A critical factor in these shortfalls is the lack of a common operating model for digital and IT teams. The digital factory model that most businesses tend to use to launch their digital programs can undeniably speed up a company's pace of innovation in the short term. Skunkworks digital teams

working outside the purview of a conventional IT organization can quickly tackle pilot projects that they can then turn into innovative products or customer experiences. For their part, most senior business leaders often decide to stay the course with this approach, with separate digital and IT units adhering to different operating and service-delivery models. They recognize that a shift to the "pure play" model of digitization pioneered by the likes of Amazon and other Internet companies might be overly ambitious or disruptive in the near to midterm (Exhibit 1).

In our experience, however, at least 60 percent of the highest-value technology projects companies pursue require collaboration and delivery from multiple technology groups across both digital and IT teams. The lack of a common operating model can thwart such cooperation. What's more, fragmented technology stacks can put pressure on overall system stability, scalability, and resilience. The physical split between digital and IT groups can create confusion among business stakeholders about which team is handling which tasks. Even within technology groups themselves, the culture can become bifurcated as employees identify with either old or new ways of working.

Companies should instead consider shifting to an integrated digital IT operating model in which there is one operating model and one view of how technology capabilities are delivered by both digital and conventional IT groups (Exhibit 2). Under this model, teams organize around technology capabilities rather than specific technology assets and functions, and they often use agile methodologies to speed up the provision of IT services. According to our research, companies that pursue an integrated IT operating model can realize greater process efficiencies, often through the elimination of redundant roles and initiatives, and they can deliver products and services to customers more quickly.

A plan for integration

The journey toward an integrated model is neither easy nor quick. It can take years to complete, depending on a company's starting point and digital aspirations. It therefore requires a commitment from the business and technology groups (both digital and conventional IT teams) to reconsider existing ways of working and collaborate on devising a new path. Business leaders must show a willingness to "test and learn," and technology leaders will need to become active thought partners to the business units.

Organizations will, of course, need to address issues relating to core technology. For instance, they will need to design flexible, perpetually evolving enterprise architectures with lightweight connections that can support the development and deployment of new business capabilities. They will also need to develop agile data-management practices—that is, centralize the collection and storage of data and allow employees across the company to access critical business information from multiple systems.

Perhaps the most critical changes associated with making a successful shift to an integrated digital IT operating model, however, are those relating to processes and people—that is, rethinking

the composition of the technology organization, the methods for providing IT services, and the management of technology talent. Let's take a closer look at these three factors.

Rethinking the technology organization

To successfully pursue an integrated digital IT operating model, companies should reconsider how digital and conventional technology groups are organized and governed: What processes does each group currently follow, and how could those processes be standardized to ease collaboration? What governance structures do they use, and what modifications could be made to improve decision making? Under an integrated model, the digital and conventional teams would jointly pursue the company's digital agenda and might work under a single overall technology leader—likely from the technology group—to ensure accountability at the top. They would also need to take the following steps:

- **Redefine critical roles in technology leadership.** As part of the integrated organization design, companies will need to redefine leadership roles associated with the construction of products—for instance, product managers and designers, engineers, data managers, and IT architects. New roles may be required. Those in existing roles may need to develop new skill sets and areas of expertise. The nature and extent of those redefinitions will depend on a number of factors, including the company's digital goals, its corporate culture, and its existing technology capabilities. Many leadership roles will likely need to become "hybrids"–incorporating both digital and conventional IT perspectives. A large B2C company undergoing integration of its digital and IT organizations created a role under the CIO called head of consumer technology. This individual is responsible for the development of all digital and conventional customer-facing applications regardless of the channel (online, mobile, and stores).

- **Centralize IT-architecture and IT-infrastructure teams.** In an integrated organization, common resources for digital and IT teams, such as technology architecture and infrastructure, will need to be centralized. By combining the teams managing these resources, companies can eliminate redundant tasks, facilitate standardization of processes, and deliver benefits more broadly to the business units. For instance, one manufacturer is convening an end-to-end technology IT-architecture function that would be responsible for making critical decisions relating to both digital and conventional IT assets. Senior leaders believe this new structure will help prevent system proliferation, a perennial issue for the company, and ensure that new technology capabilities are acquired or built based on company-wide needs, rather than according to business-unit or functional needs.

- **Deploy agile, user-centric product-development teams.** Technology staffers should be encouraged to move in and out of cross-functional product or project teams. These self-organizing teams would come together to offer specific customer- and end-user experiences or capabilities and then disband when objectives have been met. The leaders of these teams would work directly with business stakeholders to jointly define priorities and identify areas where

technology could significantly enhance business processes. The technology team at an online retailer came up with an idea for enhancing payment processes, and it collaborated with the business team to find funding for the project and to design and build the prototype software that would support the process change. Pilot tests were mounted quickly, with frequent input from the business, and the full process change was implemented within six months.

- **Revisit funding and portfolio-management processes.** IT organizations' funding and portfolio-management processes would also need significant changes under an integrated model. Staged venture-capital-style funding could be applied to projects that involve both digital and conventional IT team members. Funding decisions for those projects could be contingent upon the integrated teams successfully meeting certain milestones during the development cycle. They could also be tied to business outcomes. Meanwhile, business and technology leaders should jointly review all technology initiatives under way—meeting quarterly or biannually—to ensure balanced investments in initiatives that are critical for supporting day-to-day operations as well as those needed to fuel business innovation and growth. In this way, foundational technology investments, such as the modernization of aging IT platforms, which are nonetheless relevant for supporting end-to-end digital capabilities, wouldn't get lost in all the conversation about cutting-edge technology pilots and experiments.

Rethinking technology provision

IT organizations typically manage three major archetypes of work: purely digital projects (creating a mobile application interface, for instance), purely conventional projects (such as making enhancements to a mainframe application), or hybrid projects that affect both digital and conventional assets (developing a self-checkout application for in-store customers, for instance). When digital and conventional IT teams' systems and mechanisms for providing technology support remain separate, hybrid projects may be particularly compromised. Such initiatives can be delayed and deadlines missed when conventional IT teams do not anticipate the number and frequency of changes made by digital IT groups, which are typically operating under the test-and-learn principles of agile development.

An integrated delivery model would ensure joint planning on such projects—involving both digital and conventional IT teams at the very start of the life cycle of a project—which would help reduce delays and create more transparency. Companies could take the following steps to help digital and IT groups find common ground and deliver products and services more efficiently. Some of these actions may seem obvious, but it is surprising how many companies take them sporadically, or not at all.

- **Conduct regular planning sessions** to ensure that digital and conventional IT groups are aware of their commitments to project objectives and deadlines and that all potential risks have been evaluated early on. The IT infrastructure team within a conventional IT group, for instance, could agree to allocate some capacity each quarter to address just-in-time requirements from digital teams (working them in between maintenance tasks).

- **Designate a decision-making body** to help remove bottlenecks for hybrid projects. This is not unlike the job done by a traditional project-management office, which imposes standards and processes to ensure that projects stay on track. Indeed, some companies may choose to rely on their existing project-management offices to meet this need. But others may install a steering committee of stakeholders from the business units and from digital and conventional IT groups to meet and decide periodically on primary issues and risks associated with hybrid projects.

- **Encourage partnerships** among IT-support teams to address the business units' requests more dynamically. In both conventional and digital IT groups, there are teams whose sole purpose is to support development efforts—focusing on quality assurance, infrastructure management, and production efficiencies, for instance. When these groups adopt an agile mind-set—collaborating early in development phases, for instance, and sharing feedback on product and process iterations—they can reduce the turnaround time expected of them in hybrid projects. One company's digital IT group welcomed representatives from the conventional IT group—members of the infrastructure team—in daily meetings associated with the development of a new web feature. Normally, the digital team would have relied on a ticketing system to communicate with the infrastructure team and set work-flow priorities. Instead, it was able to prioritize and convey its requests directly in the meetings. In doing so, the digital team was able to launch the feature quickly, and service completion time dropped 30 percent.

- **Adopt DevOps capabilities** to reduce digital teams' wait time on components from conventional teams. DevOps is a phrase from the world of enterprise software development used to describe the agile relationship between a company's software-development and IT-operations teams. The methodology advocates for better and more frequent communication and collaboration between these two groups. Under an integrated operating model, the conventional IT team could use DevOps capabilities to gain easy access to the critical assets needed to automate processes for building, testing, and deploying new products and services. The conventional IT team could make its software code available to the digital team quickly and frequently to match its release cycles, thus increasing the speed of development for hybrid projects.

- **Use microservices** to increase the technology organization's ability to provide cross-unit and cross-application functions. Microservices refers to the development of software applications as a package of independent components, each of which can be deployed on its own or in tandem with others, and each of which runs a unique computing process. Through the use of microservices, conventional and IT groups could take advantage of applications and assets previously available to only one group or the other, and could improve their collaborations on hybrid projects that involve both groups' assets.

Revitalizing your talent strategy

The increasing rate of digitization in companies means nearly every business today must make a radical shift in its talent-management strategies. Companies will need to adapt their cultures in

ways that will appeal to both next-generation digital workers, who can bring fresh perspectives and innovation to companies, and conventional IT workers, who often carry with them years of valuable institutional knowledge. Specifically, business and IT leaders should focus on making changes in the following areas:

- **Attracting talent.** Companies will need to evaluate their pools of digital and conventional talent and identify any skill gaps that could hinder the pursuit of their digitization goals. As they begin reaching out to possible job candidates, hiring managers will need to work with recruiters to create tailored roles and customized candidate-vetting experiences. Some companies have established standard hiring archetypes (based on the type of talent being targeted) and then crafted ideal requirements and development journeys for people who fit each persona. Thus, the recruiting and onboarding experience for a developer who is fresh out of college, for instance, would be structured differently from that of an IT architect with more than ten years of experience. Companies may also need to make certain cultural changes to attract a millennial cohort that seems to perform best in less bureaucratic, more innovative environments.

- **Retaining talent.** Companies need to ensure that they have the right elements in place to motivate and retain members of the integrated technology organization. The majority of the technology workforce may perceive digital work to be more desirable, making it difficult to keep conventional IT teams motivated. To keep both sides engaged, businesses may want to establish incentives that reward employees based on the scope of their influence within the technology organization, the impact they are having on business outcomes, and their ability to collaborate across teams. In this way, both digital and conventional IT staffers will be motivated to do their best to ensure high-quality customer experiences and successful business outcomes. At one company, for instance, digital and conventional IT teams jointly created a real-time analytics product that helped to streamline the customer purchasing experience. Members of both teams were rewarded equally for their success with this hybrid project.

- **Building capabilities.** One of the core benefits of establishing an integrated technology organization is that employees of all stripes, working side by side under one operating model, will gain a greater appreciation of their colleagues' work. They may also find new advantages and opportunities in both digital and conventional areas—thereby expanding the company's talent pool while ensuring the free flow of ideas. Companies can augment this dynamic further by creating skill-development opportunities where expert practitioners can train and coach workers in real-world assignments. Such programs can go a long way toward reducing the cultural friction between the digital and conventional technology groups.

For those incumbents that are trying to catch up to digital-native companies, digital transformation of core products and processes is essential. But the transformation cannot succeed or sustain momentum when the digital technology group is not integrated with the rest of the technology function. The digital factory model will only take companies so far, especially if they aspire to bring all their technology assets to bear in building innovative customer experiences.

Companies must instead pursue an integrated digital IT operating model. Regardless of the rollout plan, the overarching goal should be to minimize the divide between digital and conventional IT groups, thereby assuring business stakeholders that the integrated teams are supporting common strategic objectives and that they are investing in the systems, processes, and talents that can ensure future success.

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Naufal Khan is a senior partner in McKinsey's Chicago office, where **Amit Rahul** is a consultant; **Gautam Lunawat** is an associate partner in the Silicon Valley office.

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In brief

Edited selections from our Digital McKinsey blog.
Full versions available at digitalmckinsey.com.

DevOps: the key to IT infrastructure

by Thomas Delaet and Ling Lau

Here are the six fundamental shifts required to extend the DevOps approach into IT infrastructure:

Work as one team: Rather than organize themselves by highly specialized functions, IT infrastructure teams need to come together to work as one unit whose top priority is to provide end-to-end value to the customer.

Apply design thinking to IT infrastructure: Creating user personas, mapping journeys to identify pain points and delighters, and running rapid test-and-learn cycles help prioritize the initiatives that deliver better and faster customer and business outcomes.

Shift to next-generation technical practices: IT infrastructure functions that can adopt software best practices—such as extensive test automation, continuous delivery of infrastructure, and a rapid test-and-learn approach to infrastructure management—will also be able to easily maintain and upgrade large-scale automation programs.

Invest in building software-engineering talent: Invest in in-house immersive boot camps that use real-life work examples to teach their IT infrastructure staff the latest and best software-engineering practices.

Overinvest in culture change: In addition to providing teams with DevOps coaches and structured programs to build capabilities, evolving IT infrastructure organizations are forming service teams focused on specific end-to-end customer journeys.

Link incentives to delivery and service goals: Put in place metrics that balance business value, time-to-market, service availability, quality, and overall employee satisfaction.

What your business needs to put in place if it wants to be agile, fast and digital

by David Hamilton and Christopher Paquette

At a recent roundtable we held, the main concern of panelists was figuring out the mechanics of how to translate a digital transformation into the daily work of the company. The fundamental answer, we believe, is to start by creating a "next-generation" operating model that has the speed, precision, and flexibility to unlock value by improving both customer experience journeys and internal processes.

We tell clients to start with four building blocks to create an operating model that fits the need of the digital business. But we shouldn't think of them as fixed rules. The digital age rewards flexibility and iteration, so when we talk about putting these building blocks in place, that should be done in a flexible way. Each building block should be tested continually and modified to evolve along with the model itself.

Six things B2B leaders do to become more agile and drive growth

by Christopher Angevine, Christoph Erbenich, Candace Lun Plotkin and Michael Viertler

While the impulse of many companies we've seen is to invest across a whole set of digital initiatives, our research into the digital practices of outperforming companies finds that less is often more. It turns out that B2B leaders drive five times more revenue growth and 8 percent more shareholder returns by doing the following six things better than their peers:

- They commit to digital at a strategic level.
- They create consistent experiences online and off.
- They use data to enable and empower the sales force.
- They connect processes end to end.
- They anchor their culture in rapid innovation and execution.
- They align their organizational structure to their digital aspirations.

How machine-learning models can help banks capture more value

by Piotr Kaminski and Kate Robu

Overfitting (the analytical description of random errors rather than underlying relationships) of the model is a typical concern about Machine Learning (ML). Overfitting of ML models can be avoided by carefully choosing input variables and specific algorithms. One way to guard against overfitting is to use the popular Random Forest algorithm. This is an ensemble of many intentionally "weakened" decision trees, essentially a partial set of variables with each iteration of the model, thereby reducing the reliance on specific variables. In another example, ML-model performance is also tested on a holdout sample not used during the model-development process. If the model performance on the sample is significantly degraded, it's a sign of overfitting.

Risk management goes digital

by Holger Harreis, Kayvaun Rowshankish, and Hamid Samandari

Banks already have good experience with using digital tools to automate processes, and can do the same in risk, particularly in credit- and operational-risk applications. Augmented reality overlays could transform applications for mortgages and auto loans. Machine learning can improve current credit models, help with fraud detection and anti-money laundering, assist with documentation, and even open up new revenue sources, like SME supply-chain financing. Stress-testing compliance is another big time-sink where automation can help. The list of tools and risk applications is long and growing every day.

Our research also found the risk-specific steps that can help banks digitally transform the function. Among the key findings: banks might need to run new and old risk processes in parallel for a time, until regulators are confident. The risk function must move forcefully and yet carefully, but it can be done. Slow and steady wins this race; this is digital transformation the "risk way."

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