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Next-gen Technology transformation in Financial Services

Introduction

Financial Services technology is currently in the midst of a profound transformation, as CIOs and their teams prepare to embrace the next major phase of digital transformation. The challenge they face is significant: in a competitive environment of rising cost pressures, where rapid action and response is imperative, financial institutions must modernize their technology function to support expanded digitization of both the front and back ends of their businesses.

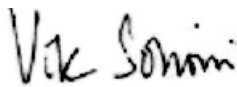
Furthermore, the current COVID-19 situation is putting immense pressure on technology capabilities (e.g., remote working, new cyber-security threats) and requires CIOs to anticipate and prepare for the “next normal” (e.g., accelerated shift to digital channels).

Most major financial institutions are well aware of the imperative for action and have embarked on the necessary transformation. However, it is early days—based on our experience, most are only at the beginning of their journey. And in addition to the pressures mentioned above, many are facing challenges in terms of funding, complexity, and talent availability.

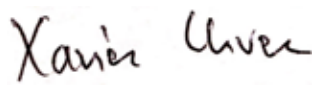
This collection of articles—gathered from our recent publishing on the theme of financial services technology—is intended to serve as a roadmap for executives tasked with ramping up technology innovation, increasing tech productivity, and modernizing their platforms. The articles are organized into three major themes:

1. Reimagine the role of technology to be a business and innovation partner
2. Reinvent technology delivery to drive a step change in productivity and speed
3. Future-proof the foundation by building flexible and secure platforms

The pace of change in financial services technology—as with technology more broadly—leaves very little time for leaders to respond. Therefore, CIOs and other executives need to accelerate and scale their Technology transformation. We hope this collection is helpful in framing and shaping this journey.



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The CEO's new technology agenda

By Klemens Hjartar, Krish Krishnakanthan, Pablo Prieto-Munoz, Gayatri Shenai, and Steve Van Kuiken

Technology performance has become critical to business success. Here's how a CEO can focus the technology function on a company's strategic priorities.

We've seen numerous companies boost their financial performance after their CEOs made it a priority to strengthen the technology function and bring more technology capabilities closer to the business's strategy and operations. Fulfilling this mandate, however, can be a challenge. Most CEOs already have a long slate of priorities, and relatively few feel comfortable enough with technology to push for transformative changes in that functional area. Even CEOs who are attuned to the threat of digital disruption and are thinking about how their companies can create value with digital tend to discount the IT function's importance.

Nevertheless, it's clear from our experience that CEOs can exert a uniquely constructive—and valuable—influence on the IT function. CEOs can do more than other executives to transform the IT function's role, resource model, and core systems, and to bring about the cultural and organizational changes that such transformations involve. In the following section of this article, we lay out the ten questions that CEOs should ask their chief information officers (CIOs) and management teams to determine how capable their IT function

is and how closely it is aligned with the business. We then lay out one CEO's successful approach to modernizing his company's IT function. Together, these insights offer CEOs a guide to shaping a technology function that's fit for the digital age.

The modern IT function: Concepts to know, questions to ask

Based on our extensive work with CEOs and top executives at large companies, three concepts define today's most effective IT functions: a new role that calls for collaboration with the business on strategy and operations; an updated resource model offering the talent, methods, and tools to accelerate innovation; and a future-proof technology foundation of flexible, scalable systems that speed releases of IT products. To help CEOs assess where their companies stand with respect to these three concepts, we've included ten key questions that CEOs can ask (exhibit 1).



Ten questions can help CEOs determine whether their companies' IT functions possess the qualities that make IT effective

	Modern IT function	What the CEO should ask to accelerate technology transformation
Role	<p>Collaboration with the business on shaping strategy and streamlining operations</p> <ul style="list-style-type: none">— Alignment between IT and business— Targeted technology investments— Advocacy for end users	<ol style="list-style-type: none">1. How are we making key technology decisions at all levels of the company?2. How do we track and maximize the value produced by our major technology investments?3. How often do our tech teams seek input from users?
Resource model	<p>Talent, methods, and tools to accelerate innovation</p> <ul style="list-style-type: none">— Ample engineering talent— Agile working methods— Leading-edge tools— Targeted vendor partnerships	<ol style="list-style-type: none">4. Have we placed high-caliber engineers in IT roles that contribute the most value to the company?5. How many projects has IT shut down because they weren't providing value?6. How long does it take for our company to deploy new applications?7. Which of our IT capabilities do vendors provide, and why?
Technology foundation	<p>Flexible, scalable systems that speed releases of IT products</p> <ul style="list-style-type: none">— Modular architecture— Enterprise-wide data and artificial intelligence (AI)— Integrated cybersecurity	<ol style="list-style-type: none">8. How much custom development work goes into building new IT solutions?9. What % of business decisions are we making with help from AI?10. For our developers, is cybersecurity a hindrance?

A new role for IT: Collaboration with the business on shaping strategy and streamlining operations

Many IT functions have trouble matching their priorities with those of the business. The problem often starts at the top: CIOs aren't included in strategic discussions, where they can shape other executives' thinking on how the business can best use technology. CEOs are ideally positioned to correct this. At the successful companies we know, CEOs have defined a strategic role for the technology function according to the following principles:

Alignment between IT and the business.

We're seeing companies make organizational changes specifically to promote seamless collaboration between the tech function and other units and functions. CEOs are adding CIOs to their leadership teams and asking CIOs to report directly to them.^[1] Some companies form unified business and technology teams that each support one technology product (for customers or employees) or one IT platform (a component, such as a customer-relationship-management [CRM] system, that supports multiple functions). CEOs can test for these patterns by asking, "How are we making key technology decisions at all levels of the company?" They'll want to hear that business users and tech experts are working side by side.

Targeted technology investments. Top economic performers are more likely than other companies to develop new digital businesses in addition to digitizing their core business. Both activities require investments in technology. However, the typical company's wish list of technology investments exceeds its technology budget. CEOs must therefore commit their organizations to prioritizing high-value investments. To reinforce this discipline, the CEO should start by asking: "How do we track and maximize the value produced by our major technology investments?" An effective approach will involve not only measuring the payback from technology investments, but also reallocating capital frequently to promising opportunities—another practice associated with strong economic performance.

Advocacy for end users. Modern IT functions follow design-thinking practices, by which they develop an in-depth understanding of users' needs as the basis for new products and features. Such practices should interest the CEO: McKinsey research shows that they're correlated with strong financial performance. CEOs can probe for them by asking, "How often do our tech teams seek

input from users?" If the answer isn't "at every step," the tech function probably hasn't adopted design thinking.

An updated resource model for IT: The talent, methods, and tools to accelerate innovation

In pursuit of cost savings, traditional IT functions outsource much of their development and engineering work and focus on vendor and project management. Modern IT functions, by contrast, value innovation more highly than cost savings, and so they assemble top-notch workers and equip them with sophisticated methods and tools, along with specialized vendor support. To build a resource model that speeds innovation, CEOs should push for the inclusion of the following four elements:

Ample engineering talent. To keep mission-critical technologies ahead of the curve, companies recruit skilled engineers and entice them to stay with quality training and appealing incentives, including non-managerial career tracks where engineers can concentrate on technical work without sacrificing the chance to earn manager-level salaries. To gauge the IT function's talent mix, CEOs should ask, "Have we placed high-caliber engineers in enough IT roles that contribute the most value to the company?" A number less than 70 percent is a red flag.

Successful companies run on flexible, scalable software foundations that let IT teams bring out products quickly and efficiently—a valuable practice for any business.

Agile working methods. Agile working methods produce good results quickly by having technology teams develop starter versions of new products, share them with users, and make round after round of improvements that users want. CEOs can test IT's agility by asking, "How many projects has IT shut down because they weren't providing value?" If IT hasn't shut down some projects, then the function hasn't truly embraced agile. That's because agile practices call for ending projects as soon as it's clear that they aren't working out—and for celebrating the discretion of the people involved.

¹ McKinsey research shows that companies with the best-performing IT organizations are more likely to say that their CIOs are involved in shaping overall business strategy.



Leading-edge tools. Modern IT functions create software and artificial-intelligence (AI) tools that automate routine software development, testing, and deployment tasks, thereby shortening time to market for tech products. They gain more efficiency by shifting systems into the cloud. To assess their IT functions' tools, CEOs can ask, "How long does it take for our company to deploy new applications?" It should take only minutes, if infrastructure is being automatically configured in the cloud.

Targeted vendor partnerships. Leading IT functions build their expertise and capabilities in areas where they seek strategic advantages and form outsourcing partnerships to obtain capabilities that are nonstrategic (think "commodity" IT services) or too specialized to recruit for. CEOs can investigate their IT partnership models by asking, "Which of our IT capabilities do vendors provide, and why?" Vendors should provide few if any strategic capabilities—and IT leaders should have a plan for reducing vendors' share of the work to administer or enhance those capabilities.

A future-proof technology foundation: Flexible, scalable systems that speed releases of IT products

Many longstanding companies have a core of aging enterprise-wide applications (enterprise-resource-planning [ERP] systems and the like) running on their own on-premises infrastructure (hardware, such as servers, plus basic software

resources). Adding features is cumbersome, and the legacy systems cost a lot to maintain. Successful companies run on flexible, scalable software foundations that let IT teams bring out products quickly and efficiently—a valuable practice for any business. With that practice in mind, CEOs should insist that their companies' IT foundations exhibit the following features:

Modular architecture. "IT architecture" describes a company's assembly of IT systems. Modern architectures consist mostly of compact, self-contained software components that are linked with easy-to-configure APIs [application programming interfaces] and stored in the cloud. CEOs should make sure their companies have versatile, innovation-friendly architectures by asking, "How much custom development work goes into building new IT solutions?" A well-designed architecture lets IT teams build solutions by repurposing a lot of previously installed software and writing modest amounts of original code.

Enterprise-wide data and AI. Today's analytics applications give users a detailed understanding of business situations so they can make better decisions. For example, think of segmenting customers into several dozen precisely defined groups, rather than a few broad categories, and precision-marketing to these groups. This approach works only if the company's IT foundation provides decision makers with AI tools that draw on data from across the business as well as from external sources. CEOs can test the penetration of data and AI capabilities by asking,

“What percentage of business decisions are we making with help from AI?”

Integrated cybersecurity. To streamline cybersecurity work and make it more effective, modern IT functions follow two practices. They apply lower or higher levels of protection to information assets based on their importance and risk exposure, rather than protecting all assets equally. And they integrate security protections with the software-development process, rather than applying protections after development concludes. CEOs should explore their companies' cybersecurity programs by asking, “For our developers, is cybersecurity a hindrance?” If so, it might be time to consider the practices described above.

Transforming the technology function: One CEO's approach

The CEOs we work with agree that their heightened efforts to guide the technology function have paid off, because so many of their companies' strategic priorities now depend on technology capabilities. CEOs can't, and shouldn't, take over the CIO's job, but they can use their unique influence to assist with the most valuable aspects of a technology transformation. Setting priorities is key: CEOs and their leadership teams should focus the CEO's efforts on tech-transformation activities that the CEO is best positioned to lead—particularly, the organizational changes required to promote better collaboration between IT and the business, and to deliver innovative IT products. Here's a look at how the newly appointed CEO of one healthcare company changed his approach to technology, in close partnership with the CIO, to suit the organization's strategic needs.

Establishing a strategic role for the technology function

The CEO knew well that technology was profoundly changing how his company carried out crucial activities such as drug discovery and drug development—and that his company's strategic direction didn't properly reflect these trends (see sidebar, “A CEO's technology education”). Working closely with the CIO and the other members of the company's leadership team, he began by developing a five-year vision for his company that not only laid out a new strategy and business targets, but also redefined the IT function's role in creating technology capabilities that would

support value creation and operational efficiency.

Developing this vision was a different effort from the company's prior strategy-setting exercises. Rather than creating a business strategy first and then developing a technology strategy to match, the leadership team planned a unified strategy covering business and technology priorities.

The new strategic vision helped the CEO and the management team to recognize that the company would need to transform its technology function. The CEO and CIO turned their attention to developing a plan for redirecting most of the IT function's efforts to delivering digital and digitally-enabled products and services, as well as technology solutions, that would help the business to greatly lower its operating costs. As part of the plan, the CEO and CIO chose to place extra emphasis on change management. They understood how important it would be to reorient the mind-sets of IT staff toward developing IT products that would be intuitive to use and easy to adopt. Accordingly, they called for new investments in communication and skill building, with a focus on agile, user-centered ways of working. To ensure that the IT function would be well equipped to fulfill its new expectations, the CEO and CIO also called for renewing the company's core IT systems and adding technology talent.

Elevating the CIO

The CEO knew that the organization's business units and functions would achieve their strategic goals only if they aligned their activities closely with those of the technology function. Tech would need to become their partner in pursuing innovations and seeking operational efficiencies. The CEO resolved to strengthen the working relationships between the company's business units and functions and the tech function, starting in the company's uppermost ranks.

The company's previous CEO had established a leadership team consisting of the heads of the company's main business units, the head of human resources, and the head of supply-chain management. The new CEO added the CIO to this leadership team and invited him to all leadership meetings. At those meetings, the CIO began learning firsthand about the business's aspirations and framing how technology could support progress toward those aspirations.

Joined by the CIO, the leadership team also became a forum for engaging the business in technology decisions and for explaining why

certain technology changes were necessary. For example, after the IT department determined that productivity and collaboration would increase if the company consolidated its multiple communication platforms, the IT leader explained the opportunity to business leaders firsthand and sought their support for pursuing it. Together, the leaders developed a plan for promoting the new communications platform and encouraging employees to use it. As a result, employees adopted the new communications platform more readily than they had adopted other new technology tools.

Another important change the CEO made was sharing the company's technology plan with the board. He knew it was unusual for a board of directors to sign on to a technology plan, but he also knew that the company's technology plan would have as much strategic importance as the other plans that the board was accustomed to considering. He also felt that making a commitment to the board would motivate him and the leadership team to remain focused on the technology transformation.

Rebalancing technology investments and tracking their business value

Like many a CEO, the chief executive of the healthcare company had risen as a leader partly because of his ability to deliver value, closely monitoring the funds that were being disbursed and the cost savings and revenues associated with those investments. He knew that the company's stepped-up technology program would pay off only if leaders applied the same discipline to tracking its value. The CEO asked his CIO for help devising a system to link technology investments to business value—both the value from selling new tech-enabled products and services, and the operational efficiencies from embedding technologies into business processes.

Tracking investments in IT and the resulting returns proved to be more difficult than the CEO expected. The costs of running core systems and developing new applications weren't consistently divided among business functions. That made it hard to determine which functions were the heaviest consumers of IT services and whether investments were properly divided between technologies to sell and technologies to streamline operations. And when the IT function created new applications or features, business functions didn't always record the revenues or cost savings that resulted from their use.

Nevertheless, the CEO and CIO were determined to try measuring the payoff from at least some tech investments. In one instance, they focused on the technologies that would support a strategic goal of enabling patients to access and order the company's products and services online. A few quarters after setting that goal, executives discovered that IT spending allocated to it fell short of what would be needed to implement all the business-process changes they'd outlined—and was much less than the planned IT spending in nonstrategic areas.

To accelerate improvements in key patient-access processes such as tracking inventory and dispatching supplies, the team reallocated IT investments toward changes to the patient-access platform and to underlying systems such as ERP. They also set up key performance indicators (KPIs) and objectives and key results (OKRs) to measure how much business value resulted from investments in patient-access technologies.

Once the team could gauge the value of tech features to improve patient access, they began to release additional investments only for features that showed a positive return, rather than funding them with an upfront, no-questions-asked budget allocation. The new investment approach helped the company achieve a 28 percent increase in sales in less than a year and made the software-development process more agile and patient-centric, leading to improved customer-satisfaction scores and a 30-percent reduction in time to market.

Building a world-class tech workforce

As the CEO, the CIO, and the leadership team realigned the tech function with the company's other functions and raised its strategic importance, the CEO realized that IT would need a new resource model as well—a resource model more like that of other functions, which recruited and trained employees to support the business's strategically significant capabilities. Traditionally, the IT function had relied on external vendors to perform software-development projects. IT staff largely oversaw those vendors and managed vendor-created technologies after they'd been implemented. And the caliber of its in-house tech talent wasn't as high as it was for other functions.

The CEO made it one of his priorities to strengthen the tech function's resource model by assembling an in-house cohort of skilled technology workers. He called for hiring dozens of proven engineers and experts in technology

disciplines, such as design and user-interface (UI) and user-experience (UX) development, that the company formerly obtained from vendors. He also approved investments in training and on-the-job apprenticeships. Finally, the CEO saw to the creation of incentives that reflected the value of tech workers, along with career paths that would supply them with interesting business problems to work on.

Today, the company's IT workforce has a better appreciation of the company's strategic needs and a stronger association with colleagues in other business units and functions than vendors ever did. Continuity in staffing has been a major factor: tech specialists spend longer periods working with the same business peers than vendor-provided staff, who were frequently reassigned to other accounts. Overall, improvements to the company's tech workforce have increased collaboration between the business and IT, supercharged

innovation, and reduced the costs of hiring, onboarding, and training.

The potential for technology to deliver winning business capabilities and change a company's fortunes is simply too great for CEOs not to lead technology's integration with the wider business. CEOs who actively influence and shape their companies' technology functions can position their companies for greater success in an economy where digital savvy is at a premium.

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The CIO challenge: modern business needs a new kind of leader

By Anusha Dhasarathy, Isha Gill, and Naufal Khan

As technology becomes increasingly important, an organization's success depends on whether the CIO can move from being a functional to a strategic business leader.

There's no worse time than now to be an average CIO." These words, uttered by an executive at a recent conference, neatly capture the intense pressure on CIOs. For years, executives have stressed the need for CIOs to move beyond simply managing IT to leveraging technology to create value for the business. This priority is now a requirement. New technologies have been at the center of trends—from mobile-first consumer shopping preferences to the promise of artificial intelligence in critical decision making—that have reshaped the competitive landscape and disrupted business models. For this reason, companies need to be tech forward: technology needs to drive the business.

Despite this pressing need, of the organizations that have pursued digitization, 79 percent of them are still in the early stages of their technology transformation, according to McKinsey's 2018 IT strategy survey. Legitimate factors are delaying progress, from the scale of the change to the mind-boggling complexity of legacy systems. We believe, however, that one of the biggest issues is that many CIOs have not accepted the degree to which their role needs to expand beyond cost and performance responsibilities in order to transform IT into a core driver of business value.

Three vectors of a holistic transformation

Before understanding the responsibilities of the new CIO, it's important to understand the nature of tech transformations themselves. In most cases we've observed, tech transformations are implemented as a set of disjointed initiatives across IT. That leads promising developments to stall out or underdeliver. We have found that a tech transformation must be holistic to deliver full business value. Creating powerful customer experiences, for example, requires a data architecture to track and make sense of customer behavior. Architecting modular platforms needs revamped approaches to hiring in order to get top-flight engineers.

This reality requires a CIO to first come to terms with the scope of the transformation itself. In our experience, it's been helpful to think about it along three vectors:

- 1. Reimagine the role of technology in the organization.** This vector includes establishing the role of technology as a business and innovation partner to design a tech-forward business strategy (for example, tech-enabled products and business models), integrate tech management across organizational silos, and deliver excellent user experiences.

- 2. Reinvent technology delivery.** IT needs to change how it functions by embracing agile; improving IT services with next-generation capabilities such as end-to-end automation, platform as a service, and cloud; building small teams around top engineers; and developing flexible tech partnerships.
- 3. Future-proof the foundation.** To keep pace with rapid technological advancements, organizations need to implement a flexible architecture supported by modular platforms, enable data ubiquity, and protect systems through advanced cybersecurity.

Five traits of a transformative CIO

For IT to become a driver of value, the transformative CIO also needs a new set of skills and capabilities that embody a more expansive role. In working on tech transformations with hundreds of CIOs, we have identified five CIO traits that we believe are markers of success.

1. Business leader

To help technology generate business value, the transformative CIO has to understand business strategy. Findings from our 2018 IT strategy survey reveal that companies with top IT organizations are much more likely than others to have the CIO very involved with shaping the business strategy and agenda, and strong performance on core IT tasks enables faster progress against a company's digital goals. CIOs who can make this leap tend to take the following actions.

Learn the business inside and out

The scope of an IT transformation means that CIOs must be prepared to interact with the business in different ways. We have found, for example, that the best CIOs go far beyond meeting with the C-suite or attending strategy meetings. They invest time with functional and business-unit leaders and managers to gain an in-depth understanding of business realities on the ground and go out of their way to develop a nuanced and detailed understanding of customer issues. CIOs do this by continually reviewing customer-satisfaction reports, regularly monitoring customer-care calls, and participating in user forums to hear direct feedback.

As one large financial institution set out to build its digital products, the business and technology teams jointly led user listening and feedback

panels early and often throughout the development process. Both technology and business leaders made it a priority to attend these panel discussions so that they could effectively guide their teams on developing products that would best address the needs of end customers. The CIO of a B2B technology-services company, meanwhile, meets customers on a regular basis to get firsthand feedback on both products and the customer's experience of doing business with the company. He uses these perspectives to inform his technology decisions.

Take responsibility for initiatives that generate revenue

CIOs can further develop business acumen by taking responsibility for initiatives that generate business impact, such as building an e-commerce business, or by working with a business-unit leader to launch a digital product and then measure success by business-impact key performance indicators (KPIs), not technology KPIs. Such efforts allow CIOs to build a deep understanding of the business implications of technology, such as customer abandonment because of slow download times on a site or other poor user experiences.

As part of a digital transformation, for instance, the CIO at a large financial institution committed to developing digital products to help the business scale its presence in a new market. While the CIO already understood how to build systems to support financial products, he and his team had limited experience in creating new digital products to sell directly to consumers. So the team created a program built on rapid test-and-learn cycles to identify what mattered to customers and meet those needs. Subordinating tech decisions to customer needs was crucial in allowing the CIO and his team to develop a digital offering that succeeded where it mattered: with consumers.

Get on boards

Developing a deeper well of business knowledge often requires CIOs to extend their networks beyond the organization. One of the best ways to do that is by joining the board of another company. A third of the boards of companies within the Fortune 500 today include a former CIO or CTO, and that number continues to increase.¹

2. Change agent

A full technology transformation is not about moving to the cloud or embracing new IT solutions. It also involves infusing technology into every

strategy discussion and process throughout the organization. Driving a transformation around the three vectors we laid out earlier (reimagining the role of technology, reinventing technology delivery, and future-proofing the foundation) starts with a CIO mind-set that both acknowledges the need for transformative change and commits to a multiyear journey.

Partner with business leaders

Generating support for a transformation among business leaders across the organization requires creating true partnering relationships with them based on common goals, mutual responsibility, and accountability. According to a McKinsey survey on business technology, in fact, the companies in which IT plays a partner role in digital initiatives are further along in both implementation and achieving business impact.

To kick-start the transformation journey, the CIO of a transportation-and-logistics company made it her first priority to meet with every single business leader to understand their goals and issues and to set expectations on how they could best work together, by clarifying, for example, what the business side could expect to get from IT in a consultant role versus IT as a service provider or partner. This effort to understand what mattered to each leader established trust, and from each of these discussions it became clear that the business wanted a true partnership with technology and understood what it meant. The CIO further built on the relationship with the business by prioritizing initiatives in the tech transformation that addressed business needs and working closely with business leaders to drive progress. This active collaboration ensured that the products and services IT developed were adopted.

Articulate the 'why'

Gaining support for a transformation requires that stakeholders understand that true change will come only from tackling all three transformation vectors in a strategic, interlinked manner. That means not just explaining how this three-pronged approach is better for IT but also clarifying how it drives business goals and how it can be implemented. When considering a shift to cloud, for example, executives tend to understand it first as a cost-saving opportunity. But in helping executives understand the full range of cloud benefits—improved speed to market, better developer productivity, and improved resiliency and disaster recovery—CIOs can help them see how the cloud can unlock new revenue models and services tied to business priorities.

¹ "The digital CIO has arrived," MIT Sloan CIO Symposium, 2016.

Have an integrated plan that highlights risks and dependencies beyond IT

Large IT initiatives have always required detailed planning, but business-oriented CIOs ensure that transformation plans account for dependencies outside of IT, such as marketing campaigns or legal implications. They approach planning as a dynamic process rather than something static, which allows transformation teams to better remove roadblocks and to allocate people and spend when and where they are needed. To actively manage this process, such CIOs also put in place a “war room,” a dedicated team that ensures transformation initiatives are delivering value by actively tracking progress and helping to break through root-cause issues.

This was the approach taken in a large global retailer’s digital and technology transformation. The CIO set up a transformation war-room team that worked jointly from the beginning with leaders outside the IT function, including marketing, operations, sales, and e-commerce. Together, they created detailed work plans. This detailed early planning revealed which systems needed to be upgraded and when. The war-room team actively tracked progress and quickly escalated issues for speedy resolution. The results were clear: a fivefold jump in digital sales, and project delivery four times faster than projects of similar scope had previously taken.

3. Talent scout

Nearly half of respondents to McKinsey’s 2018 IT strategy survey cite skill gaps on traditional teams as the top obstacle to a successful digital transformation. So CIOs need to focus not just on recruiting top people but also on retaining them. Two solutions have proven effective.

Reimagine how to attract tech stars

Companies can reap tremendous benefits from outsourcing. In the oil and gas industry, for example, the outsourcing of application development grew 50 percent between 2014 and 2018. But that needs to change, especially around the most crucial capabilities. CIOs who want to reinvent tech’s role need tech stars, particularly the best engineers. By hiring the best tech people, we’ve seen companies reduce their technology costs by as much as 30 percent while maintaining or improving their productivity.² CIOs need to move quickly. In just 18 months, one CIO at a transportation-and-logistics company radically reshaped its talent profile. All the direct reports and approximately 50 percent of tech employees were new, and 80 percent had transitioned to different roles.

The head of technology and analytics at a large retail organization set up a talent war room to hire data scientists and engineers. As part of this effort, the war-room team revamped recruitment and onboarding processes by using different talent sources, such as HackerRank and General Assembly, and by updating candidate screenings and interviews with appropriate assessments of technical and other skills, such as coding and collaboration. In addition, they led weekly check-ins to track the talent funnel and adjust the process as needed.

Build up internal talent

Getting good people doesn’t matter if you can’t keep them. Top CIOs, therefore, develop diverse career paths so that top talent can advance in their own areas of strength—for example, by letting a top-notch software engineer advance while continuing to code design software rather than forcing her to manage others in order to succeed.



² Klemens Hjartar, Peter Jacobs, Eric Lamarre, and Lars Vinter, “It’s time to reset the IT talent model: Foster an engineering culture of smaller teams of better engineers to maximize productivity,” forthcoming in *Sloan Management Review*.



Retraining the existing tech workforce also needs to be an important element of this platform. The CIO of a large consumer company made digital and analytics upskilling one of the company's key strategic priorities, launching an enterprise-wide program, in tandem with HR's learning team. The program invested in an online learning portal to create personalized online learning experiences based on an employee's goals and learning needs. These were supplemented by other programs, including in-person training, top management immersion sessions, and the cultivation of an in-house expert network that people could tap on specific topics.

4. Culture revolutionary

An effective talent strategy requires a culture that supports talent.

Build a true engineering community

Pay matters, of course, but top people want to go where they're valued. One way to create that kind of environment is to provide engineers with more autonomy by reducing the number of managers and often-bureaucratic processes, such as time-consuming reports and multiple rounds of approval.

Creating ways for cohorts of similar skill sets to get together can be a powerful way to share best practices and foster a sense of community. The CIO of a software company established various community-building and knowledge-sharing

efforts—hackathons, “dev days,” tech spotlights, brown-bag lunches—where product managers, developers, data engineers, and architects could meet on a weekly basis to share details about their projects and bring up ideas or issues for discussion. The CIO attended and actively participated.

Model and support true collaboration

Promoting collaboration across technology teams and between the business and technology is one of the most crucial prerequisites for a successful transformation. Top-quartile IT organizations are more likely to have an integrated or fully digital operating model, according to McKinsey's 2018 IT strategy survey.

In practice, CIOs can enable collaboration if they're willing to relinquish some control. One CIO at a financial-services firm realized that for his people to increase their impact, they had to be more closely tied to business teams. So he embedded them into cross-functional teams aligned around specific products, relying on informal networks of guilds and chapters to provide guidance and light oversight. The most effective CIOs ensure this level of collaboration is the norm within IT itself as well. This is particularly important around cybersecurity. IT can radically reduce cycle times and maintain effective security by incorporating security early into development and working closely with the cybersecurity team on an ongoing basis.

5. Tech translator

In the past, IT transformations have often proven expensive, time consuming, and short on value, and this has made some companies leery of undertaking them again. To address this issue and build trust, the best CIOs play an active role in educating leaders about technologies and their applications for the business.

Make the business implications of tech decisions clear

Many tech decisions don't get sufficient business scrutiny beyond cost and high-level strategy discussions. Transformative CIOs don't settle for that kind of interaction, articulating instead how a proposed solution solves the underlying business problem, what alternative approaches exist, and the pros and cons of each. The CEO of a B2B technology-services company found this level of insight so important that he asked the CIO to present periodically to the board on technology-led business models.

This role was particularly important when a retail giant was looking to acquire an analytics company.

The CIO and his leadership team were involved from the very beginning in determining the data and analytics capabilities needed to fulfill the company's business strategy. They performed deep-dive technical assessments, system and data-platform compatibility reviews, and tests of vendor capabilities. The CIO ran a pilot with a business unit and operations team for three months to determine whether the final vendor could deliver on its capabilities. At the end of the process, the business was able to make an informed decision.

These skills are the tools that enable a CIO's ability to transform IT. And in an increasingly tech-driven business landscape, they position CIOs as legitimate contenders to lead businesses as well.

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The platform play: how to operate like a Tech company

By Oliver Bossert, and Driek Desmet

For tech to be a real driver of innovation and growth, IT needs to reorganize itself around flexible and independent platforms.

The question is not how fast tech companies will become car companies, but how fast we will become a tech company.” This is how the board member of a global car company recently articulated the central issue facing most incumbents today: how to operate and innovate like a tech company.

The tech giants of today have been some of the most innovative companies in the past generation. A handful of industry leaders, such as Ping An and BMW, are fast joining their ranks by reinventing their core business around data and digital. What distinguishes these tech companies is that their technology allows them to move faster, more flexibly, and at greater scale than their competitors. IT is not a cumbersome estate “that gets in the way,” but an enabler and driver of continuous innovation and adaptation.

The reason this is a competitive advantage for tech companies is because their IT is organized around a set of modular “platforms,” run by accountable platform (or product) teams. Each platform consists of a logical cluster of activities and associated technology that delivers on a specific business goal and can therefore be run as a business, or “as a service,” as technologists say. These platforms are each managed individually, can be swapped in and out, and, when “assembled,” form the backbone of a company’s technology capability. Just as important is that the business and tech sides of the company work closely together and have the decision-making authority to move quickly.

This modular, platform-based IT setup of tech companies is what enables them to accelerate and innovate. They can experiment, fail, learn, and scale quickly: they can get products to market 100 times faster than their more lumbering peers (think weeks instead of months). With this kind of speed and flexibility, IT can and should become a focus for innovation and growth at the executive committee and board level. With new technologies and ways of working coming online, tech should be a competitive advantage, not a burden as it is in far too many companies today.

What a platform-based company looks like in practice

One of the global leading banks created about 30 platforms. One such platform was payments,

which consisted of more than 60 applications that previously had been managed independently from each other. The top team decided to bring the 300-plus IT people working on development and maintenance of payments together with the corresponding people on the business side. Under joint business/IT leadership, this entity was empowered to move quickly on priority business initiatives, to modernize the IT structure, and to allocate the resources to make that happen.

The team shifted its working model and started running the payments platform as an internal business that served all the different parts of the bank (think payments as a service). This approach made it clear where to focus specific tech interventions: removal of nonstrategic IT applications; modernization and accelerated shift of the target applications into the cloud; connectivity to enable swapping solutions in or out easily; and, most important, a major step-up in feature/solution development for the internal business clients. This platform-based way of running the business was then progressively rolled out across the group. Prioritization is set by the top team (because empowerment does not mean anarchy), and all IT interventions are run the same way, to ensure consistency and replicability.

This is in stark contrast to the way large organizations normally act. Just establishing a business unit to manage a new offering or running a typical large IT project generally becomes a multiyear endeavor.

A closer look at the platform-based company

Think of a platform not just as technology but as a service, or what Silicon Valley calls a “product.”

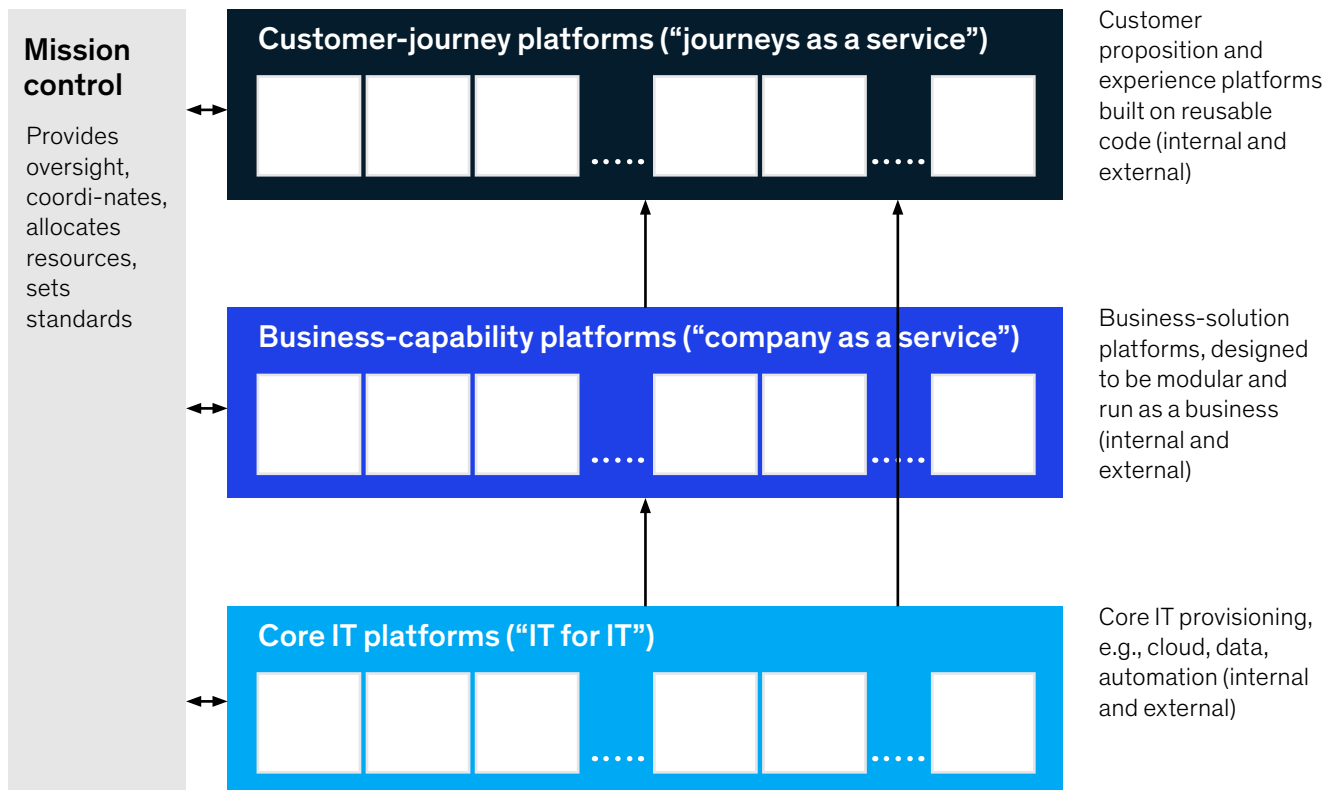
Platforms focus on business solutions to serve clients (internal or external) and to supply other platforms. They operate as independent entities that bring together business, technology, governance, processes, and people management and are empowered to move quickly. They are run by a platform owner, who takes end-to-end responsibility for providing the solution and operating it like a service. Platform teams are cross-functional, with business, IT, and anything else that is needed, such as analytics, risk management, and so on. (Some companies call this a “tribe.”) They work in an agile manner,

delivering the solution itself, enabling continuous business-led innovation, and developing and running all necessary IT.

A platform-based company will have 20 to 40 platforms, each big enough to provide an important and discrete service but small enough to be manageable. To simplify platform management, it helps to group them into three broad areas: customer journeys, business capabilities, and core IT capabilities (Exhibit 1).

Exhibit 1

Platforms are grouped into three broad areas



For example, in personal banking, the customer-journey platforms cover the customer experiences of searching, opening an account, getting a mortgage, and so on. The business-capability platforms deliver the banking solutions, such as payments and credit analytics, and the support capabilities, such as employee-pension management, visual dashboarding, and management information systems (MIS). Finally, the core IT platforms provide the shared technology on which the journeys and business capabilities run, such as the cloud platform, the data analytics environment, and the set of IT connectivity solutions (Exhibit 2).

Retail and banking examples show the services offered on each platform

	Retail example	Banking example
Customer journey examples	<ul style="list-style-type: none"> — In-store browsing and shopping for weekend — Clicking and collecting — Same-day home delivery — Subscribing — ... 	<ul style="list-style-type: none"> — Searching — Account opening — Transacting — Buying house (from valuing house to getting mortgage) — ...
Business-capability platforms (to enable journeys)	<p>“Retailer as a service”</p> <ul style="list-style-type: none"> — Store-and warehouse-inventory management — Merchandising — ... 	<p>“Banking as a service”</p> <ul style="list-style-type: none"> — Payments — Real estate valuation — Credit underwriting — ...
	<ul style="list-style-type: none"> — Employee-pension management — ... 	<ul style="list-style-type: none"> — Employee-pension management — ...
Core IT platforms	<ul style="list-style-type: none"> — In-store live video data-management platform — ... 	<ul style="list-style-type: none"> — Omnichannel IT platform-development environment — ...
	<ul style="list-style-type: none"> — In-store face recognition — Cloud platform — Access and identify management — ... 	<ul style="list-style-type: none"> — In-branch face recognition — Cloud platform — Access and identity management — ...

Mission Control to manage across platforms

Platforms are distinct units, but their value is based on how effectively they work together. Most companies overlook the criticality of making all IT components work together seamlessly because their attention is focused on individual projects. While most organizations understand the need to coordinate, the best ones develop a Mission Control capability with the resources and authority to lead and manage across platforms in three ways:

- 1. Make strategic and allocation decisions.** The best Mission Control teams take a “clean sheet” approach to allocation decisions every year, prioritizing spend and effort on those platforms that can best support business goals and/or are in most urgent technical need. This means much more radical reallocations in budgeting and resourcing across platforms (and business units) than the typical 5 to 10 percent increase or decrease that dominates allocation decisions at many companies. Mission Control needs to work directly with the executive committee to secure resources and make these difficult trade-offs, while diving deep enough into the IT to manage critical path dependencies (cloud migration may require application rationalization first). In one case, the executive committee reduced the IT budget for one business unit by a third to prioritize platforms in the other two business units, based on the understanding that the following year’s allocation would be a clean sheet again.
- 2. Set and enforce standards for speed and interoperability.** The team establishes business standards, such as how teams work together in an agile way. It also sets technology standards, such as platform and application interfaces for seamless connectivity, the way code is written and logged in service libraries to ensure easy access, and what IT tools should be used for agile team management. Clear standards empower teams because they no longer have to worry about redoing work, miscommunication, or wasted effort in creating applications that won’t work well with other applications. Mission Control has the authority to enforce the use of standards by, for example, not releasing any budget for project elements that deviate from them.

- 3. Manage and coordinate programs that cut across platforms.** This function is more critical than previously understood, because working in a more agile and iterative way means that many requirements and dependencies, such as data access for a given business platform, for example, become clear only as work progresses. This reality is the blind spot of program managers and systems integrators because they understandably focus only on their own tightly defined mandate and project. Mission Control acts as the design authority and oversight team to drive consistency and critical path delivery. Our research shows that not doing this severely slows down IT programs and wastes 30 to 40 percent of IT project spend.

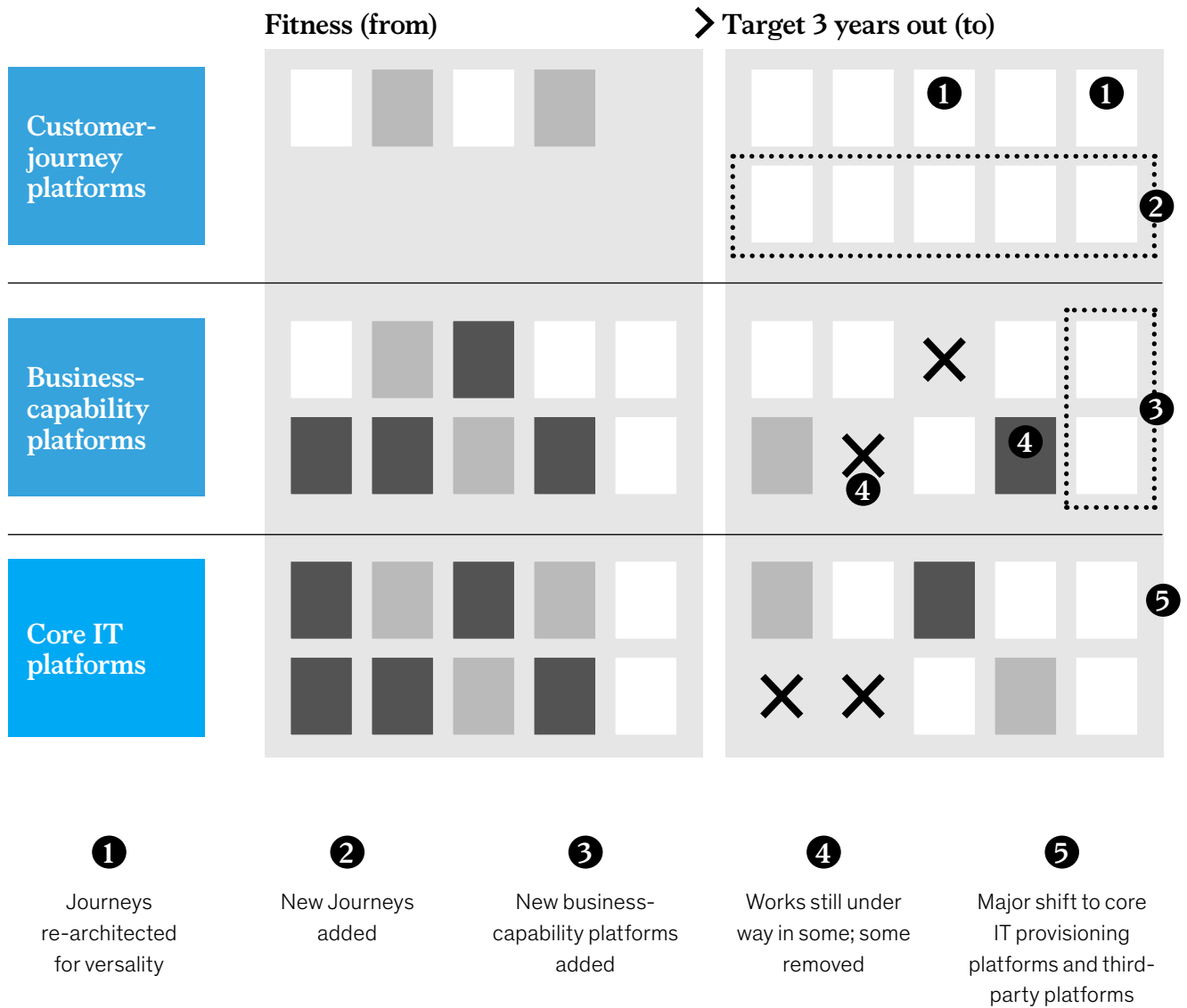
How to take a platform approach

Becoming a platform-based company goes a step further than what most think of as traditionally transforming IT. It is a fundamental organizational and operational change to create an IT environment that runs as a set of platforms. As with any major transformation, it requires strong CEO leadership, quality teams, strong project management and communication, as well as value assurance. We’ve found that the following four actions have an outsize importance to successful completion of the shift to platform-based IT:

- 1. Assess the fitness of the platform portfolio.** Business and IT should together quickly cluster the company’s activities and associated IT into a set of 20 to 40 platforms that cover customer journeys, business capabilities, and core IT. This does not have to be definitive, just a useful starting point. Then conduct a fitness check on each platform: “fit” platforms are in good shape and only need investment to innovate and capture more value; “healthy” platforms work now but need modernization to prepare for future requirements; and “sick” platforms are no match for what competitors can do. They need a complete overhaul. DBS, one of Asia’s leading banking groups, used a similar approach and communicated the assessment to the whole market at the end of 2017. Visualizing the fitness of all platforms is powerful because it enables an executive team to have the right debate on tough trade-offs and priorities and to then assertively reallocate resources (Exhibit 3).

Companies need to perform a fitness assessment of their platforms

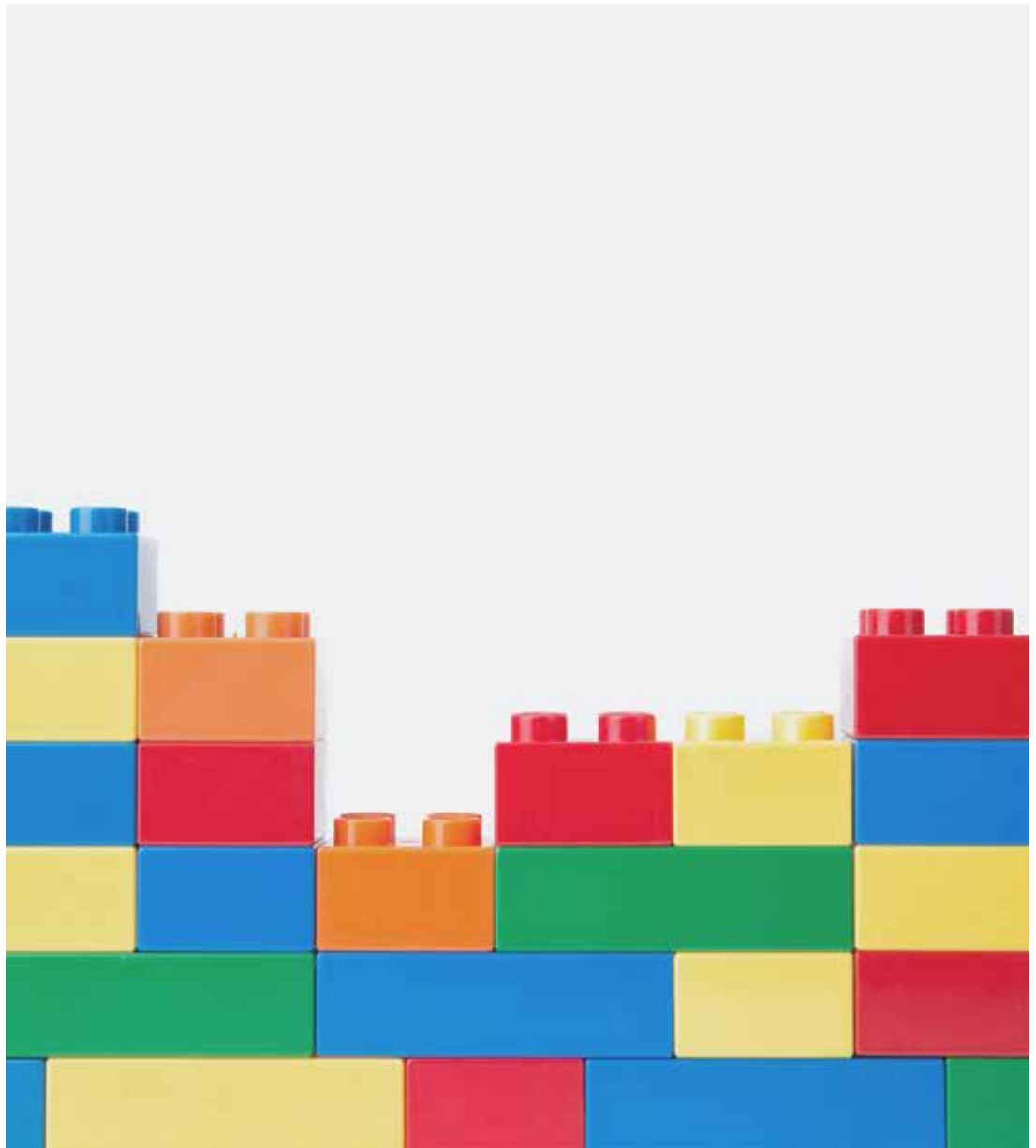
Fit: invest
 Healthy: modernize
 Sick: renew/replace



2. Set up the initial platform teams and Mission Control. A successful transformation is about putting the right people in place at this stage. Establish teams for two to three priority platforms. Typically, a platform team will start with 20 to 30 people, which can then quickly ramp up to hundreds. It includes specific roles:

- **Platform leader**—either a business or IT executive, or sometimes both as coleaders; a platform leader should be able to act like a real “product owner,” a mini-business CEO with an IT engineering mind
- **Business members**, who share responsibility with the technical team for all the design and the ongoing management as a business

- **Technical members**, who manage all the IT applications associated with the platform and take full responsibility for modernization, renewal, ongoing feature development, and day-to-day operations
- **People with necessary functional skills**, from analytics to finance. In parallel, start building out Mission Control with eight to ten of your very best finance, IT architecture, and program-management people. They need to constitute the most influential team working directly with the CIO, sometimes even reporting directly to the CEO. Mission Control needs to have decision rights (or at least veto rights) on all IT spend and all platform budget requests.



3. Transform platform by platform.

The transformation approach should progress platform by platform, focusing on top priorities. Platform teams take full responsibility for their work. They move quickly, using agile to carry out fast iterations of discrete pieces of work. With guidance from Mission Control and following prescribed standards, they are spared traditional alignment meetings, formal approvals, and other dependencies that slow everything down and create unnecessary complexity. Platform teams generally focus on a few core activities:

- **Converting platform capabilities to serve customers and other platforms.** Affecting this shift requires a complete focus on the user experience through design thinking and digitization/automation, and on interoperability by putting in place application programming interfaces (APIs) based on established standards and by creating service catalogs.
- **Evaluating and managing existing and necessary applications.** This means decommissioning old and infrequently used applications; updating, renewing, or replacing core applications; and building value-added features outside of old applications. This is often where most of the work is needed. In conjunction with this effort is an acceleration into the public/private cloud.
- **Injecting data analytics into all possible activities of the platform.** This means piloting and scaling use cases and explicitly accessing the company's

analytics and data platforms (or starting to build them).

- **Writing (or rewriting) code** as self-contained blocks or modules that can be easily swapped out and replaced wherever possible. Extensive use of APIs can help to provide the necessary flexibility to existing code.

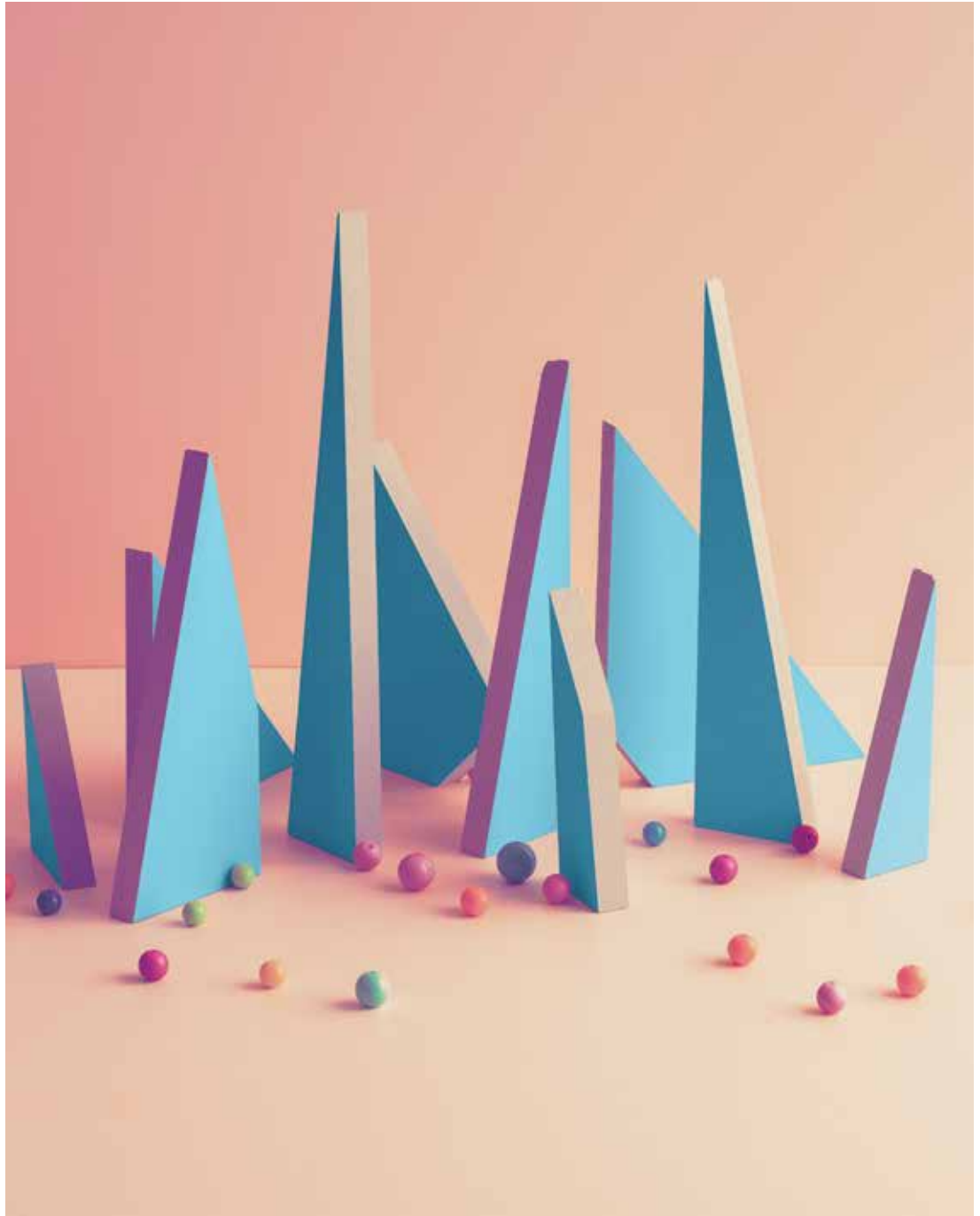
4. Manage through the executive committee.

While Mission Control plans and tackles the platform transformations day to day, allocating resources (the best people and the total IT budget) away from less productive platforms to those that are more productive and critical, the executive committee enforces the big decisions, sets a high business bar for transformation goals, and mediates all group-level issues. For example, during the transition, Mission Control may decide to deprioritize a platform but be overruled by management on the business side. This is when the executive committee needs to intervene.

Becoming a platform-based company is ultimately a question of mind-set. It requires both the determination to stay the course and the flexibility to change and adjust based on what platform teams learn. By committing to this approach, IT can stop slowing down change and start accelerating it.

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How mid-cap banks can solve the conundrum of scale in Technology

By Vishal Dalal, Paul Hyde, Tolga Oguz, and Vik Sohoni

Almost everyone agrees that scale is the name of the game in banking technology. If that's true, is there a way for smaller banks to compete?

Scale in tech spending is projected by many to become a major differentiator in US banking over the next decade. But thus far investors have not unequivocally signaled their agreement with this notion. So, smaller banks face a conundrum about when and how much to invest in building their own technology. If they outsource, they will be relying heavily on vendors who by definition will not offer differentiating solutions—which defeats the original purpose. M&A is another option, but getting to a perceived threshold size may be out of reach for many small banks, and mergers alone cannot cover for poor technology, and may even create more tech issues.

Given this challenge, mid-cap banks need to make strategic choices about where and how to play, and use new talent, operating models, and tools to overcome their lack of scale in technology. This is no easy task, but many Asian banks, and some US and UK fintechs, are showing that it is possible. It will take urgent action for US mid-caps to follow these examples, however.

For US mid-cap banks (\$10 billion to \$100 billion in assets, or \$500 million to \$5 billion in revenue), the new age of banking technology is a clear strategic threat. Like larger banks, mid-caps spend 6 to 8 percent of revenue on technology. But given their size, that's at most a few hundreds of millions of dollars, compared to billions for the larger banks. Meanwhile, the scale of tech spending is being widely commented on as a future differentiator. This is creating a sense that outsized investment will confer unassailable competitive advantage and market value gains, and leave behind banks that do not or cannot invest at comparable scale.

Already, for some mid-cap banks, entire areas of banking—such as consumer payments (e.g., credit cards, peer to peer, instant pay), mortgage origination and servicing, and online deposit gathering—are becoming inaccessible. The advanced capabilities that power these services (e.g., the latest mobile-first capabilities, cloud-based services, or cutting-edge marketing analytics tools) are beyond their reach. As a result, these banks are increasingly reliant on commoditized vendors (often of variable quality) or are late joiners to industry consortiums like Zelle. And as the best engineers, analysts, and product owners are being recruited by larger institutions that can offer rich career paths, exciting technology, and high salaries, mid-cap banks struggle to build the talent bench that might prevent a strategic spiral downward.

The wrinkle, however, is that the market has not yet actually signaled unequivocally that bigger is better. For example, many mergers over the past decade have not moved returns to shareholders significantly. Pure financial performance has not demonstrated bigger is better—21 of the top 25 highest price-to-book value US banks were mid-caps as of June 2019. Between 2013 and 2018, mid-caps had the highest return on assets and revenue growth, and the best efficiency ratio

across all size categories. The cost of technology will continue to fall, potentially becoming more accessible. Many segments are more sensitive to relationship than to technology (e.g., commercial lending, advisory wealth management, or new mortgages originated via realtors). Even in treasury management, which is often highly tech-enabled, relationships are a crucial part of the sales approach. And there is more evidence against the primacy of scale: many smaller fintechs are growing rapidly, demonstrating that success in certain verticals is not scale dependent (e.g., unsecured or point-of-sale lending). Finally, some Wall Street analysts complain that returns on digital investment have been low and opaque (while risks have been high).

So, thus far, many smaller banks are not being penalized by the stock market or by customers, creating a real conundrum around when and how much to invest.

But anxiety is growing in the mid-cap space, along with a sense that scale could make a real difference to smaller institutions in at least three areas.

First, retail deposits could become a key battleground. While generally among the more “sticky” banking businesses—US banking consumers keep a vast majority of deposits at far lower rates than they might receive by switching—the “glue” that keeps customers loyal to their deposit bank shows early signs of weakening. For examples: more than half of US deposit consumers now use their mobile phones to access their deposit accounts at least every three months; experience-based attackers like BankMobile and Chime have reportedly gathered millions of customers; and transactions and traffic in branches are dropping at 5 to 10 percent per year, in line with broader retail trends in the US. For small banks that rely heavily on retail deposits to fund commercial lending activity, a movement by customers toward more digitally sophisticated players could be a major disruption they will struggle to counter.

The second area where scale could begin to create real separation between banks is the broader payments space, which is witnessing tremendous technology-enabled change (e.g., peer-to-peer payments, faster payments, merchant acquiring for mobile players, point-of-sale terminal sophistication). It is true that smaller banks do not really play a big role in this space; but if payments are used to disintermediate the deposit relationship (or even treasury management relationships), it could lead to serious disruption.

Third, across the board, the use of data and analytics is a key battleground, though its reliance on pure technology is lower than some might expect. Still, the skills to host and analyze the massive amounts of data created by consumers interacting digitally in every aspect of their lives are aggregating to the largest financial

institutions. As well, the largest technology companies are demonstrating they prefer to partner with large financial institutions for products that plug into their ecosystem.

What should mid-cap banks do?

We suggest there are four interrelated moves that mid-caps can make to lessen the increasingly disruptive impact of scale:

1. Clarify what is truly strategically important and focus investments on those areas only. Use this clarity to build a compelling vision for new talent.
2. Modernize the “delivery infrastructure” in a targeted way; for example, by leveraging new cloud-based cores for select parts of the business that will need to move rapidly, and by building other modern tools to enable rapid speed to market.
3. Dramatically upgrade the technology group’s talent and skills, practices, and counseling ability, with the aim of reducing costs by as much as 30 percent.
4. Build an operating model that is far more technology enabled and collaborative.

1. Clarify what is truly strategically important

Some bank CEOs have asked their teams a very powerful question: “Does our IT project portfolio reflect the focus of our strategy?” The answer is quite consistently “no.” IT project portfolios can be visualized by duration, strategic business focus, impact, budget commitment, and resourcing/skill level. These visualizations often show that while mid-cap banks may say that “commercial lending and retail deposits are where we make money,” their IT projects are geared toward retail lending and payments; that while the CEO wants to focus on high-impact strategic work, the projects are actually geared toward “keeping the lights

on”—maintenance-level work. Or while the CEO wants to build analytics and digital marketing and cloud skills, most of the projects involve coding languages from the 1980s or commoditized skills. Or while the CIO wants to build a talent bench for the future, the most sophisticated work is outsourced, and the bank’s employees focus on commoditized work.

Clarifying the business strategy and ensuring the IT project portfolio and workforce reflects this prioritization is an indispensable first step.

2. Modernizing the delivery infrastructure in a targeted way

Mid-cap banks’ IT groups often focus their development work on customizing vendor platforms (creating more maintenance work for themselves over time). With what capacity they have left, they build new features that try to catch up with what larger banks can achieve by deploying their large workforces. And typically, mid-caps don’t leverage their smaller size to become more nimble—their IT projects move no faster than those at more complex institutions.

In technology as in nature, being large and fast is best . . . large and slow can work . . . small and slow is a pathway to extinction. To be competitive, mid-cap banks need to be nimble. But even the best intentions cannot overcome Jurassic tools and infrastructure. Legacy core banking systems slow down time to market for new products, the lack of microservices and APIs, the missing DevOps tools, the reliance on non-cloud-enabled data and analytical packages, and the lack of “agile-scrum” ways of working—all conspire to hamstring efforts to be nimble. And all need to be modernized.

The technology is now available to help scale-constrained mid-cap banks to compete. For example, our analysis suggests that new (albeit less proven) cloud-based core banking systems could lead to significant improvements in efficiency over legacy core systems (Exhibit 1).



Exhibit 1

Next-gen cloud-based core banking systems could lead to significant improvements in efficiency over legacy core systems

FTE days

	Time to deliver functionality on typical legacy core system	Time to deliver functionality on typical next-gen core system
Simple functionality (e.g, address change from mobile app)	40-100	0-10
Medium complexity functionality (add family member as a joint account instantly from any device)	50-150	0-10
Complex functionality (suspend a card and receive new card instantly on mobile wallet)	200-400+	10-30

However, given budget constraints as well as safety concerns (legacy systems are often very stable), mid-cap banks need to be careful about what parts of their delivery infrastructure they modernize, and how they do it. There have been several cautionary tales globally of banks investing hundreds of millions of dollars in the move to new core systems, and the resulting customer disruption. Smarter ways of leveraging new cores are emerging that may bring down costs and risks significantly, and the first proofs of concept are now underway in Europe and the US. In a similar way, new approaches in other parts of the delivery chain (e.g., web services in the existing core to speed up predictable and frequently demanded services; automated testing) can make the development environment far faster.

3. Dramatically upgrade the technology group's talent, practices, and counseling ability

Moves 2 and 3 are interdependent. It is impossible to upgrade a delivery infrastructure without the right engineers and tech leaders to manage that modernization. But those engineers are unlikely to join the bank unless there is a compelling value proposition and development environment to attract them.

Breaking this chicken-and-egg cycle requires small but meaningful steps. Some banks are setting up new business capabilities (e.g., digital deposit attacker, new treasury management lab) using new technologies, in cities with talent bases, to attract talent to the bank and build a sophisticated and more modern culture. They



are rotating current employees with potential into these new groups to build the expertise. In parallel, they are leveraging the deep expertise and knowledge of current employees to modernize legacy systems as well.

Other banks are experimenting with the new technologies while modernizing their legacy systems. Importantly, experiments all have ROI targets attached to them.

Finally, nearly all the banks we have seen embark on this journey are setting an aspirational technology vision, articulating how it will support their strategy, and developing a fit-for-purpose employee strategy.

And most importantly, they are breaking down the walls between business and technology, and the C-suite is role-modeling the change in mindsets and behaviors.

4. Build a new operating model with the business

According to our analysis, some engineers can be as much as eight times more productive than the lowest performers in their group. But highly productive individuals do not always make for productive teams. A talent reset has to be accompanied by an operating model redesign in which silos and individuals come together to work on their teams' mission. Many larger banks are already seeing success with this "mission-based" operating model—with some calling the resulting model a digital factory with very different way of working and interacting with the rest of the company.

What success could look like

At least one Asian bank built on a digital-native stack has a technology cost per customer of \$1 compared to the average of \$30 to \$50 for US banks. On its own, this efficiency is not game-changing, as total IT expense is only 6 to 8 percent on average of a bank's revenue. But the capabilities it confers can be disruptive in capturing market share; for example, by facilitating value-creating M&A by enabling rapid onboarding of new customers (one Asian player that owns a payments company was able to onboard 25 million customers in one quarter, a population the size of Texas); or by increasing flexibility and innovation. For example, a digital bank in the UK can provide a replacement debit card in 45 seconds directly to a customer's mobile app—exactly the kind of "delightful" moment that will foster loyalty and generate share gains in a competitive market. It is not overstating the case to say that for some mid-cap banks, offering these kinds of experiences to retail deposit or treasury management customers could mean the difference between extinction and success in the next decade. And if they are going to begin the transformation, the time is now.

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Transforming a bank by becoming digital to the core

By David Gledhill, and Vinayak HV

Understanding what it takes to act like a tech company requires a few key breakthroughs, as this interview with the CIO for DBS Bank highlights.

The digital transformation of any enterprise is a herculean task requiring a willingness to embrace cultural change, the ability to immerse the entire organization in the customer journey, and a total commitment to digitize to the core. DBS Bank Chief Information Officer David Gledhill shares his insights on DBS's digital transformation with McKinsey's Vinayak HV, a partner in the Singapore office.

DBS's digital transformation

When we were thinking about the digital transformation of DBS, we saw three key elements as vitally important. One is how we digitized to the core. We saw many companies put on digital lipstick, some kind of front-end system, and a fancy website.

The second was: how do we embed ourselves in the customer journey and push customer-journey thinking throughout the organization? The third was changing the culture of the company to make it feel and operate like a 22,000-person start-up.

These last two points were just as important as the first one. If you focus purely on digital and forget the organizational change you have to make, you won't get very far.

Digital to the core

Digital to the core means you have to have a rock-solid foundation of core systems that you're going to build on. In fact, we spent the first five years of our transformation putting in place common platforms that are strategic across all of our locations. Once you do that, you can start to think about how you really start to accelerate and become nimble, accelerate speed to market, and increase your cadence.

And we said to ourselves, "If we want to be digital to the core and act like a technology company, it's best we learn from the technology greats, figure out how they do it and see if we can't bring in some of those things internally."

So we started to learn how the best technology organizations operate, how they build technology,



and how they move quickly. We learned a few things along the way. The first thing is that most of these technology companies started much like where we are today. They had big systems. They were hard to shift, and they went through this whole transformation agenda, and along the way, built a load of tools that we thought we could also use. So if they'd done it, we could do it.

We also learned about their culture and which cultural elements we could take on board and shift. So it wasn't just sharing the latest business article. It was really going into how these companies are engineered.

Our rallying call: Becoming the “D” in GANDALF

The first letters of Google, Amazon, Netflix, Apple, LinkedIn, and Facebook together spell GANALF. That was missing a D, and we, as DBS, fortunately have a D. So, our mission became how to become the D in GANDALF.

Now that might sound a little cheesy, but in actual fact, it was an amazing rallying call to our people. It had a bigger impact on our technology people and many other people in the organization than anything else we've done, because it started to make them think about what was possible. It got them to think, “We're not acting like another bank, and here's how we really start to transform ourselves like a technology company.”

We came up with five key elements that had to change. One was to shift from individual projects that need approvals, subcommittees, and things like that, to giving the freedom to a group of people to operate like a platform.

Then you fund the platform, look at what outcomes that platform can give, and set it free. With that, you can really start to practice agile at scale.

Third, you have to really think about organizational constructs: How does DevOps work? How do you build infrastructure engineering? How do you build business-ops teams, and how do they interact?

You then have to think about how you engineer the technology and how you build for modern systems that are scalable, elastic, and made for experimentation.

Finally, how do you automate everything from testing through deployment to increase cadence?

So those five elements became the mission that we're on and the delivery pipeline that we started to build.

Our outcomes

The outcomes of our transformation are speed to market, scalability, experimentation, and all of those things that you see in these technology companies.

One successful example would be a bank offering

we did in India. We were trying to figure out how to scale our presence in India, where we had very few branches. So how do you attack a market of a billion people? We came up with a mobile-only offering.

Now first of all, we had no clue how it was going to work. I understand how to create a mortgage product and sell it, and I know how to build systems for it. But how do you build a mobile-only bank in India and attract customers at scale? No idea.

So we had to learn as we go, which means we had to iterate very fast. We were actually pushing out releases weekly into the app store.

So, test and learn, test and learn, test and learn was the only way we could get into a brand-new market with a product that we had simply no idea how it was going to operate when we launched it.

A scorecard for the mission

Transformation could consume every hour of every employee in the company for the next five years. Obviously, we wouldn't make any money and that wouldn't be a good outcome.

So you have to balance it. And the way we balance it is through group scorecards, which really drive everything we do and clearly indicate to people the amount of time we expect them to spend on certain areas.

The top part of the scorecard is all financial metrics, customer metrics, shareholder value-add, and revenue generation. The middle part is where the core of the digital transformation comes in, and we ascribe 20 percent of the value of the scorecard to this, which is then used to drive compensation for the company. Below that we have the strategic initiatives we need to get done, and that's another 40 percent. So big transformations like automated lending into India or how to transform future-ready employees, go in that box.

We obsess over those scorecards and critique each other's scorecards. It's a collective and collaborative thing to come up with each person's scorecard and the weightings of those. Once that's set for the year, it's very clear what everyone's mission is.

Advice for others on this journey

I'd say you really need to boil down the essence of what your mission is and what the problem is that you're trying to solve.

Once you're clear on that, the rest starts to become very easy. And I would not necessarily focus on the pet projects. Focus instead on what gets the business moving, what gets speed to market faster, what gets journey thinking embedded in the organization, those sorts of things.

If you can crystallize that down to a message that everybody can grasp on a single page, then you have something very powerful that you can start to push on. When we looked at customer service, for example, we came up with RED: Respectful, Easy to deal with, Dependable. It was very clear, something people could act on, and that drove massive change through the organization. When we thought about how we wanted the business to digitize, we came up with a very simple framework of Acquire, Transact, Engage—customers Acquire digitally, Transact digitally, Engage digitally—and drove metrics around that.

Without those clear missions, we'd have had people going in all sorts of different directions.

Lessons learned

We learned you have to embed this thinking into the management fabric of the company. If you just say you want customer journeys, that's not going to drive results. If you embed that into the KPIs and scorecards that everybody's measured by—and make sure it's continually reinforced from the CEO and the leadership team down—then you get results and can shift and move.

The other learning for us, and perhaps the thing that was most difficult, was that we had to learn how to learn. What I mean by that is, we understand banking, and we understand credit and market risk and how to build great mortgage systems. But when you get into this new digital space of experimenting with ecosystems, with start-ups, with launching a brand-new product that nobody's ever tried in a new market, you get lots of things wrong.

That was hard for us to accept, actually. So you'd have these meetings and people would ask, "How could we possibly not have known that?" Well, it's an experiment. Of course, we don't know.

So this learning that it's okay to experiment, that many of the experiments we try will fail, and for everybody to accept that and actually treasure it was a very difficult change to make.

About the author(s)

David Gledhill is the Chief Information Officer for DBS Bank. This interview was conducted by **Vinayak HV**, a senior partner in McKinsey's Singapore office.



After the first wave: How CIOs can weather the coronavirus crisis

By Sven Blumberg, Peter Peters, and Christian Stür

Chief information officers must act swiftly to manage IT through the pandemic in a pragmatic way.

“The new normal is not clear yet, but we need to start moving toward it.”

The implications and repercussions of the COVID-19 crisis are far from certain. But as the quote above suggests, technology leaders are now starting to think about how to get past the first wave of crisis management.

This humanitarian crisis is still unfolding: quarantines, lockdowns, and harrowing images of hospitals straining under the weight of sick patients all underscore the devastating human effects of the pandemic. The economic picture for many countries is dire. As we wrote recently, COVID-19 is a crisis that requires companies to address lives and livelihoods. CIOs have a critical role to play because social distancing and the lockdown of economies require technology not just to maintain business activities but also to lead businesses.

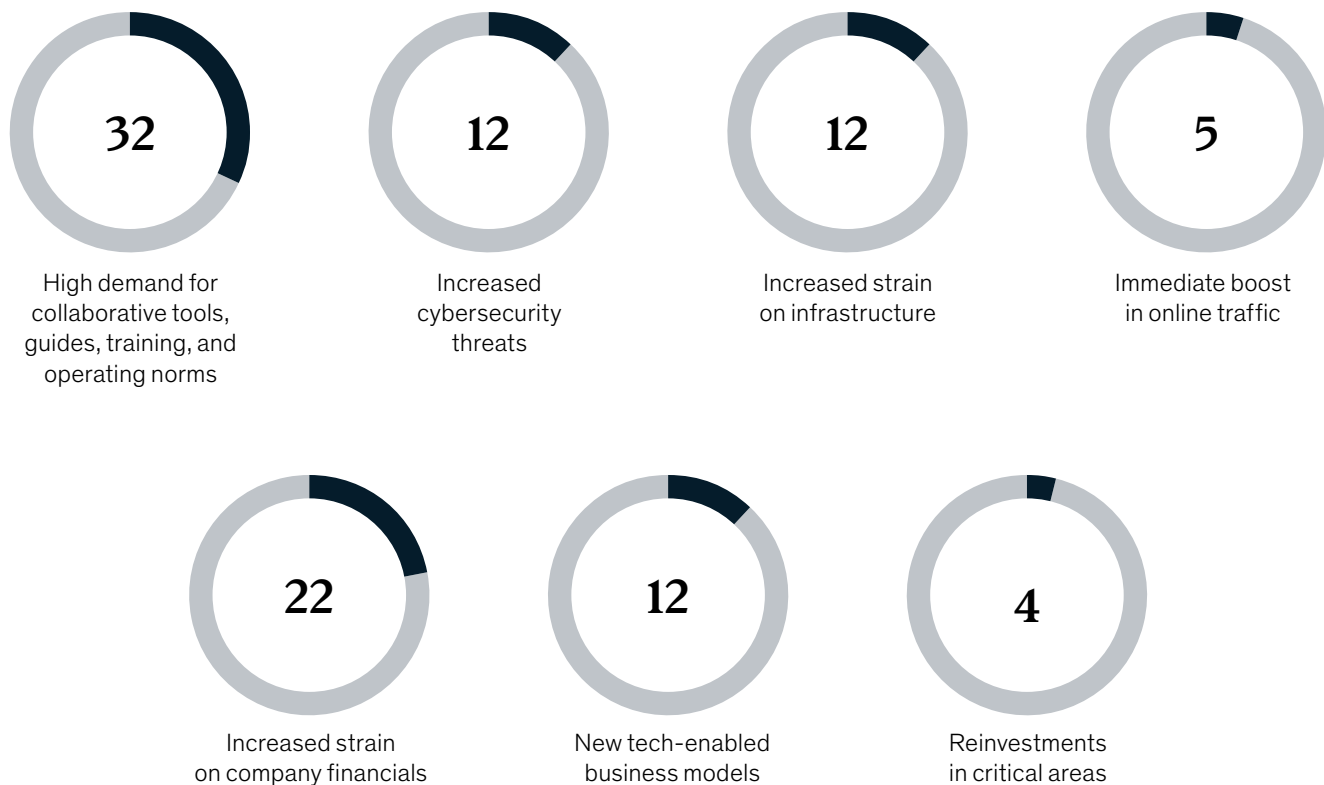
CIOs must still focus on emergency measures and navigating through the chaos of the first wave of this crisis. But the economic implications require CIOs to start thinking ahead as well and to position their organizations and businesses to weather the downturn.

CIOs are already balancing important priorities across horizons. Polls we conducted during two recent webinars with more than 150 IT leaders highlighted their top concerns: putting in place collaboration tools and operating norms for working from home at scale, a near-term priority, and the increased strain on financials, a medium- and longer-term consideration (Exhibit 1).

Exhibit 1

High demand for collaborative tools and operating norms and increased strain on company financials are the top concerns for chief information officers.

Top technology concerns for organizations,¹%



¹ Question: Which of these are key concerns for you and your organization? Percentage of 161 participants attending 2 McKinsey webinars. Source: McKinsey webinar, March 20 and 26, 2020, “The CIO moment: Leadership through the first wave of the coronavirus crisis”

Given the gloomy economic outlook, CIOs may be tempted to take a radical slash-and-burn approach in an attempt to shore up IT. That would be a mistake. While containing costs must be a crucial element of the second-wave response, CIOs have an opportunity to accelerate programs and push priorities that can help position the business to succeed when the downturn ends. There's no point in winning the battle but losing the war.

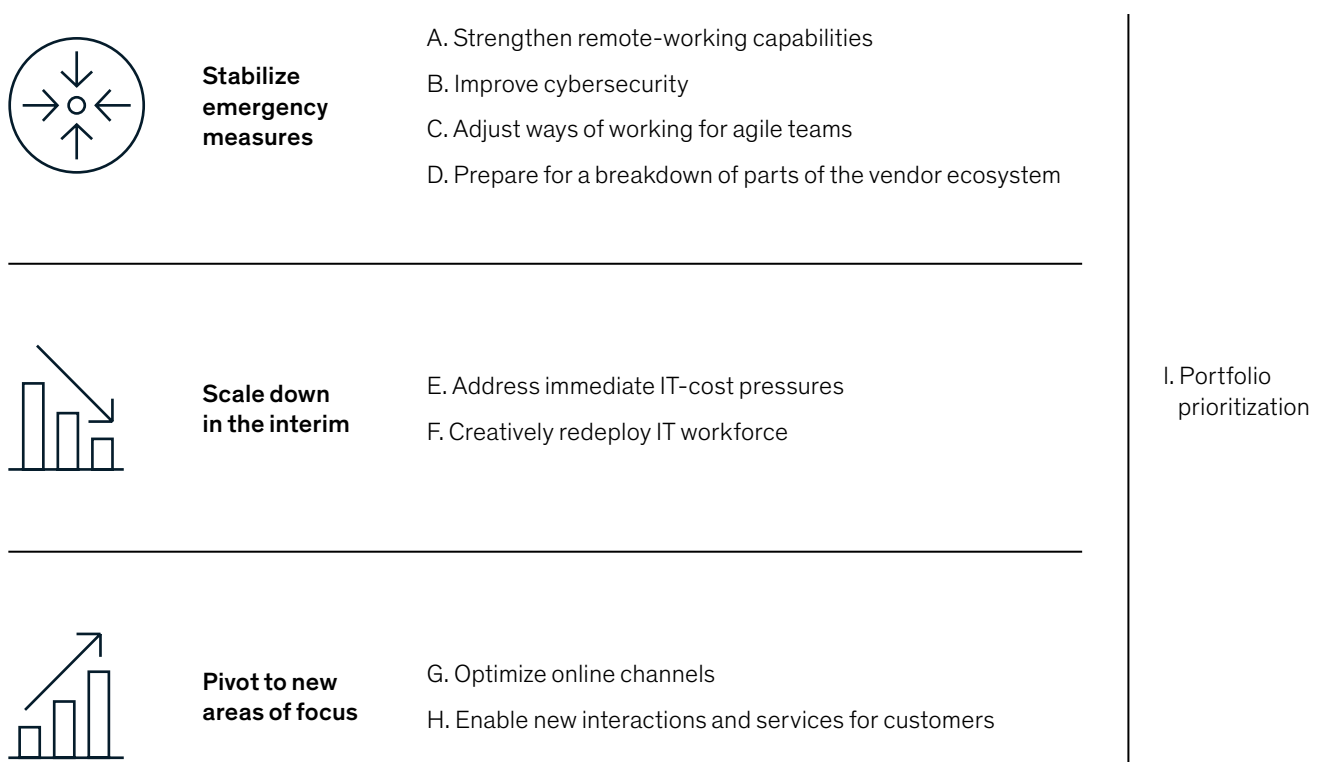
As CIOs begin to shift their focus toward the next wave of the crisis, they should concentrate on three dimensions (Exhibit 2):

- Stabilize emergency measures.
- Scale down in the interim.
- Pivot to new areas of focus.

Exhibit 2

Chief information officers in the next phase will need to take swift actions along three dimensions

9 actions to weather the crisis



These moves will require a corresponding reprioritization of the project portfolio.

Stabilize emergency measures

We expect that the emergency measures taken as an immediate response to the COVID-19 lockdown will be sustained as long as the crisis continues. CIOs should prioritize four areas on this front.

Strengthen remote-working capabilities

Companies moved at mind-boggling speed to support remote work. It's now important to revisit those emergency measures to understand what must be updated, changed, or replaced to deal with issues that continue to hurt productivity.

First, organizations must review their ad hoc vendor-selection procedures in light of the alternatives in the market, increase network capacity, implement scalable support processes, and tighten controls that can secure and deploy temporary solutions at scale.

Second, CIOs will need to address the needs of special user groups, such as contact centers, users of critical systems, and employees of finance functions, to ensure that they can continue to operate in an effective way remotely. For contact centers, this may mean changing the routing of calls to a dedicated COVID-19 subteam to adjust for changes in questions from customers. Users of critical systems may need to build up redundancy in their remote-working setups. One energy company can now run an entire trading floor from the homes of employees, though with limited access to information and slower decision support.

Finally, hardware supply-chain interruptions have already proved to be a significant challenge as peaks in short-term demand for devices and IT hardware confront a breakdown of international logistics. It might be an option, if not a necessity, to reprioritize demands by their importance—for example, prioritizing critical “tier 0” users, such as traders in banks or board members; reducing services; determining which of them can be migrated to the cloud; and using alternative purchasing channels and geographies.

Improve cybersecurity

In general, social engineering and insufficient security measures for remote work are the two main cybersecurity risks that organizations face during this time of crisis.

In recent weeks, we have seen an increase in COVID-19–focused social-engineering cyberattacks, which have exploited the current confusion and decreased the effectiveness of the “human firewall” (for instance, the verification of uncertainties with colleagues sitting nearby). CIOs, working with their chief information-security officers must shore up their cyber protocols to deal with compromised credentials and data, as well as intellectual-property theft, fraud, and other crimes.

To address these problems, technology leaders should continue to focus on people-based initiatives that heighten the awareness of risk. The initiatives may include placing messages on lock screens or pop-up windows and creating secure, dedicated, quick, and effective two-way communication channels to the security team. To support these solutions, organizations need to beef up key processes, such as IT capacity to help employees install and set up security tools, not to mention implementing at scale security technologies such as multifactor authentication-and-control mechanisms that provide remote access to on-premise applications (for instance, teller interfaces).

Adopt new best practices for agile ways of working

Co-location is an important factor for agile ways of working to be productive. Remote work obviously introduces real challenges, such as disrupting a team’s continuous alignment, limiting interactions, and complicating agile ceremonies—all of which threaten to drive productivity down. Furthermore,

remote environments amplify any previous lack of clarity in roles, responsibilities, and objectives.

Yet there are some companies that have transitioned their digital units almost seamlessly to remote settings, where individual team members feel that they are working more productively than before. One tech company, for example, has fostered an outcome-driven culture that empowers teams to undertake their work outside traditional working hours. In weekly review meetings, they are still held accountable for getting things done.

When we looked more closely at companies that have moved beyond shifting employees to work from home during the first wave of the crisis, we found four differentiating factors: they changed the structure of teams to create smaller agile ones of around five people, strengthened direction setting through leadership, emphasized cultural elements and delegated decisions, with clear accountability, to individual team members, and expanded the use of technology that promotes effective collaboration.

Prepare for a potential breakdown of parts of vendor ecosystems

IT-outsourcing and offshoring vendors, as well as shared-service centers, may well shut down at times. To address that risk, CIOs are strongly advised to make their vendor dependencies and individual situations transparent—both their location and the fallback options. Mitigation efforts should be prepared not only with existing vendors but also with alternative sources in different regions. A McKinsey survey found that some global capability centers already launching mitigation measures report that “full” (more than 80 percent) production capacity can be maintained for an average of 40 days during the crisis.

Scale down in the interim

Meanwhile, CIOs must address the immediate pressures on IT costs and creatively redeploy the IT workforce.

Address immediate IT cost pressures

With revenues and margins for many businesses plummeting during the crisis, cost pressures on IT will increase. In addition, emergency decisions to manage the initial crisis response might have increased costs—both operational and capital expenditures. Technology and IT departments will be asked to find short-term cost-reduction opportunities to mitigate those effects. CIOs should therefore consider some guiding principles:

- **Be aggressive in IT cost reductions** not only to free up capital but also to invest in capabilities for the “new normal” (more remote work, more online interaction, and more automation). We have found that IT costs can typically be reduced by up to 30 percent quickly.
- **Fully exploit areas of flexibility** to address cost pressures quickly before cutting into

capabilities that might affect the future business. In practice, this means deferring nonessential projects and investments that can be reversed, before considering more permanent and potentially damaging changes.

- **Quickly build a task force** to establish the baseline and full potential of cost-reduction measures that then can be deployed in line with the developing business situation. Additionally, define thresholds when cost-reduction measures affect business operations and align on them with stakeholders.

Creatively redeploy the IT workforce

Disruptive changes in customer behavior and emergency responses have dramatically shifted workloads within organizations. Many on-site operations have been drastically reduced and long-term software-transformation efforts paused, but call centers and online channels still must be scaled up rapidly to meet demand. These realities must guide CIOs when they redeploy their people—which includes reevaluating the role of outsourcing partners. Other examples include back-filling for colleagues most affected by the crisis (for instance, those who must take care of small children or affected family members) and filling roles left open by external workers affected by the crisis.

In the past week, we have also seen many highly inspiring examples of companies repurposing their capabilities to help society cope with the crisis. Tech companies have partnered with the World Health Organization, pooling tech talent to work on projects tackling challenges caused by COVID-19. Another recent example: SAP set up a team of 40 developers and created an emergency web application in 24 hours for the German Federal Foreign Office to manage the repatriation of citizens abroad after the legacy system became overloaded.

We believe this kind of thoughtful and creative redeployment helps organizations cope with the crisis, strengthens the sense of contribution and purpose among employees, and keeps them engaged during a period of remote work.

Pivot to new areas of focus

Looking ahead, CIOs must also bolster the online channels of their organizations and support new interactions and services for customers.

Bolster online channels

With people forced to work at home and to minimize visits to brick-and-mortar stores, online sales and service channels are experiencing a massive spike in traffic—in China, we have recently seen increases of 200 to 300 percent. In the medium term, the traffic baseline for online behavior will probably rise as a result. For now, organizations must act to optimize and bolster their existing online channels to improve customer interactions and solidify retention.

The management of traffic spikes is the most pressing matter for online channels. Mildly invasive short-term measures might include expanding hardware capacity, decreasing or redistributing loads (for instance, by running promotions during off-peak hours), technical optimization (such as horizontally scaling the caching layer), or rerouting of traffic to scalable cloud solutions.

Support new interactions and services for customers

Some companies have responded quickly to the new digital customer behavior by establishing new products, such as mortgage deferrals and crisis-related insurance, or shifting customer interactions to online channels. A government in Western Europe, for example, embarked on an “express digitization” of quarantine-compensation claims to deal with a more than 100-fold increase in volume.



Sometimes this effort is about taking loads from call centers, but more often it addresses real new business opportunities. To engage with consumers, for example, retailers in China increasingly gave products at-home themes in WeChat.

Technology departments must anticipate and prepare to offer more of these kinds of digital services, products, and channels. The key to reaching customers will be creating suitable access interfaces between internal IT systems and external social platforms and accelerating the integration of new vendors and distributors.

Portfolio prioritization

Given the enormous pressures CIOs are facing, the entire project portfolio must come under scrutiny to measure the tangible impact it can deliver and how it fits in with the new priorities. One CIO, for example, said that he has already committed himself to continuing only projects that are already nearly complete, reshaping or reducing in scope other projects, and applying a much more rigorous process to the selection and advancement of projects.

We believe that CIOs should apply a crisis checklist to review portfolio projects systematically against key criteria, including these: “Are we still able to deliver, either internally or with potentially affected

vendors?” “In what way does the project address new business priorities?” “Does the project assume functioning supply chains?”

With a clear crisis checklist in place, CIOs and their teams can objectively continue, stop, defer, or ramp down projects to maintain focus on what really matters. As the crisis continues to unfold and CIOs develop greater clarity about what the next normal will look like, they will need to adjust their criteria.

CIOs are already under a lot of pressure. After the first shock and successful response, however, CIOs must now manage multiple planning horizons in parallel to handle the current crisis, prepare for the downturn, and ultimately position the business for success when the recovery comes.

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Transforming banks' IT productivity

By Kumar Kanagasabai, Phil Tuddenham, Irina Shigina, and Tomas Thiré

Banks need highly efficient IT delivery models to meet the challenges of digital disruption and control costs.

Bank CIOs are facing a perfect storm. IT demands are escalating while pressures to keep costs down are intensifying, as banks cope with generally meager returns on equity. We believe that CIOs must look for ways to control costs through productivity gains in order to make room in their budgets for investments in critical tech-enabled changes and be true partners to the bank's business side.

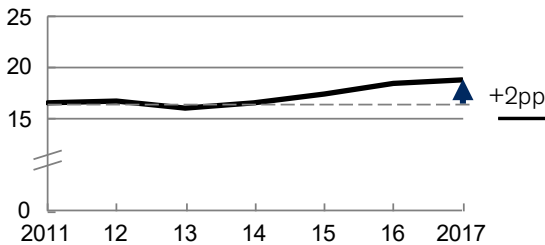
Historically, banks have offset some IT cost increases with productivity gains. A McKinsey Digital 20/20 survey of global banks showed that IT costs rose from 16.5 percent of expenses in 2014 to 18.5 percent in 2017. While run spending remained largely flat, change spending increased roughly 40 percent in the same period (Exhibit 1). But going forward we expect CIOs will need to improve productivity efforts considerably, aiming for structural productivity gains of 25 to 40 percent over the next five years just to keep costs flat (Exhibit 2).

Exhibit 1

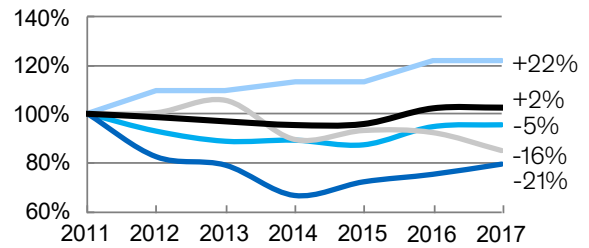
Banks' IT costs are rising, driven largely by IT change spending

- Application maintenance
- Data center
- End-user services
- Network services
- Total IT run
- Application development

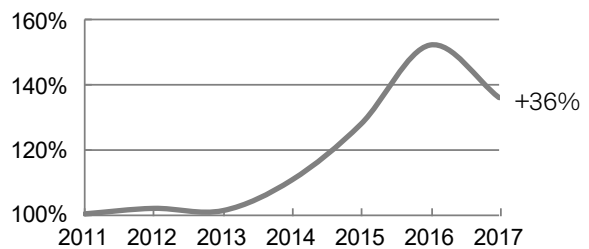
IT spend¹: % of operating expenses



IT run spend (2011=100%)¹, % of expenses



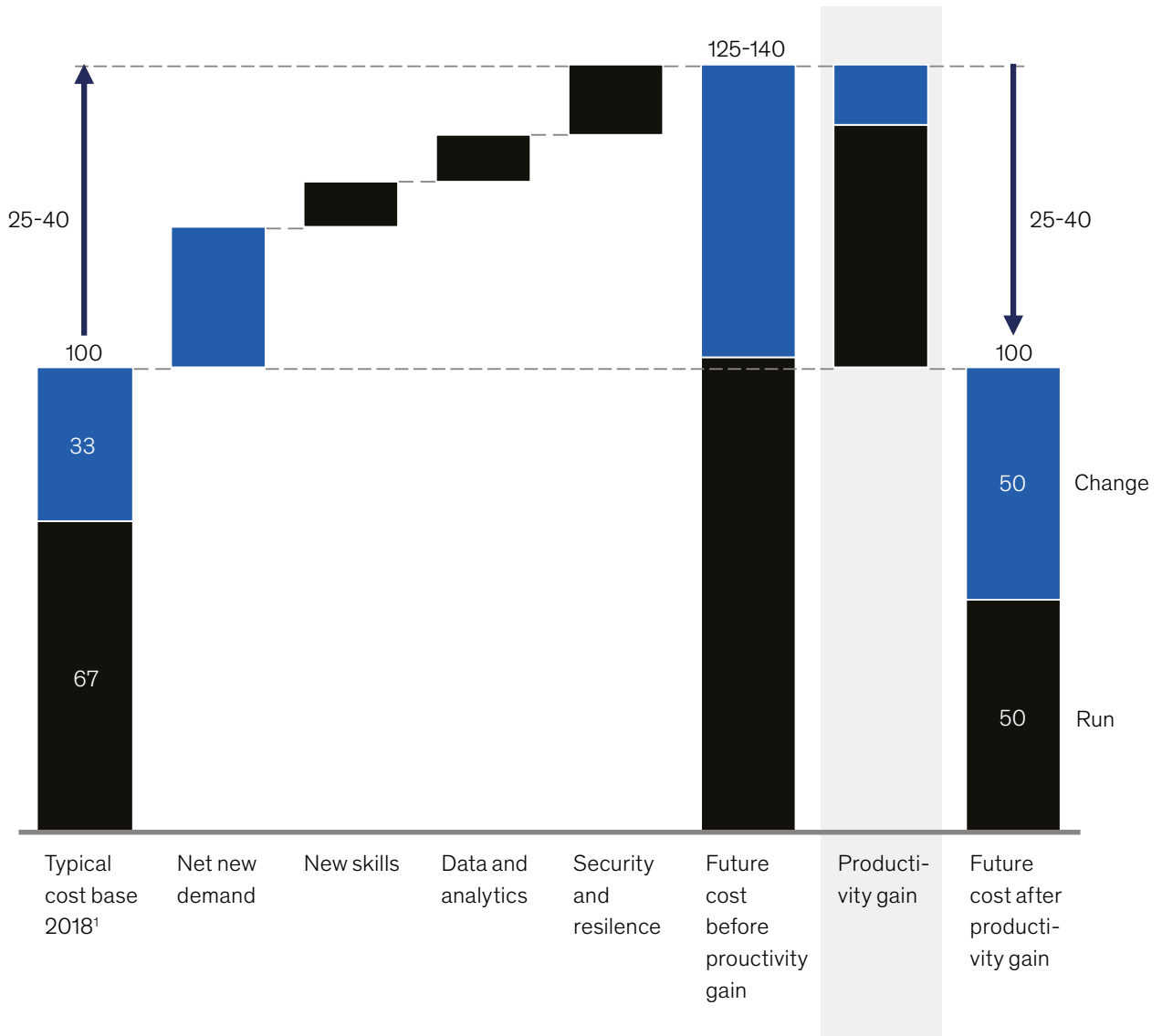
IT change spend (2011=100%)¹, % of expenses



¹N=8 Global Banks for 2011-17
Source: McKinsey Digital 20/20 Survey

Banks will need to achieve 25-40% in structural productivity gains to create capacity for new demand

IT cost evolution over next 5 years,
Indexed to 100

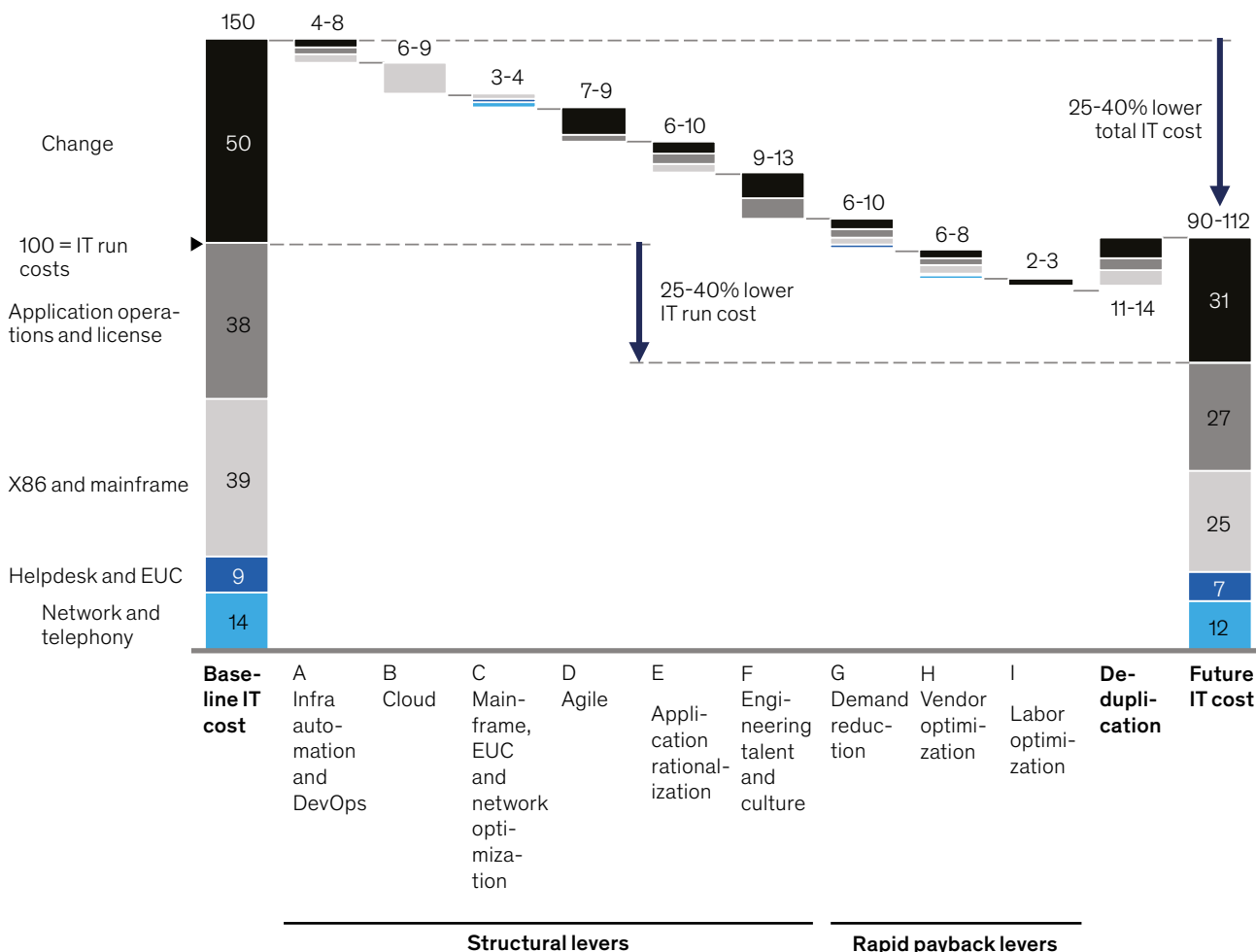


¹Based on Digital 2020 benchmarking of Financial sector firms, 2017
Source: McKinsey Digital 20/20 Survey

Fortunately, CIOs have many ways to improve productivity. Our experience working with banks in the last five years suggests the full set of levers can lead to 20 to 30 percent in productivity gains (Exhibit 3). The investment required would be about 1 to 1.5 times run-rate savings, with 5 to 10 percent run-rate savings achievable within the first year. A well-planned rollout could break even within two years.

The full range of levers can deliver 25-40% in productivity gains, which can be reinvested in new demand

Hypothetical example; IT cost indexed to 100=baseline IT run cost, 150=baseline IT total cost



Three rapid payback levers

1. **Demand reduction.** For most banks, a comprehensive review of IT expenditures can reduce demand significantly and deliver 5 to 10 percent savings within six to 12 months. Examples include prioritizing projects that are directly linked to the bank’s strategic goals (for example, next-generation payments strategies), reducing service levels to match real demand, reducing non-value-adding service levels, shifting workloads away from peak times, capping usage, purging historic data, matching the number of licenses to the number of users, and capping end-user usage.
2. **Vendor optimization.** Banks can reduce third-party expenditures by working more efficiently with vendors (for example, standardizing laptop images), moving vendors to alternative pricing models (for example, fixed- or performance-based pricing where appropriate), renegotiating prices (for example, estimating “clean-sheet” costs), and consolidating relationships. These efforts typically deliver 5 to 10 percent savings within six to 12 months.
3. **Labor optimization.** Replace simple labor models, such as wholesale outsourcing, with a strategic mix of insourcing, outsourcing, offshoring, and strategic partnerships that balance costs with responsiveness, controllability, and agility. For example, many institutions are restricting the usage of temp labor to only those roles which are truly scarce or flex capacity, which can save up to 20 percent of temp labor costs.



Six longer-term structural levers

1. **Cloud.** Transitioning to public cloud can improve efficiency 30 to 40 percent compared to traditional hosting for some workloads. In particular, labor savings can reach up to 90 percent, and banks can reduce non-labor costs by eliminating data-center related spending (e.g., housing, networking assets) and through better utilization management (e.g., shutting down development/test servers). Cloud also enables other transformation levers, such as infrastructure automation.
2. **Infrastructure automation and DevOps at scale.** It's possible to automate 30 to 35 percent of activities across the IT value chain—particularly provisioning, testing, deployment, patching, and support. One large traditional European bank reduced its IT infrastructure team by 45 percent in 9 months by moving to standardized, automated infrastructure products that development teams could use without manual intervention.
3. **Agile.** Agile ways of working allow CIOs to rapidly take ideas to market, speeding up the release of new functionality from quarterly or monthly to several times per week. Agile improves application development and maintenance efficiency by 20 to 30 percent, which banks can capture either as savings or as freed up capacity.
4. **Engineering talent and culture.** Experienced software engineers are an order of magnitude more productive than novices. However, many institutions routinely source large teams of offshore novices, leading to lower costs but very low productivity. Leading banks are insourcing roles that can provide competitive advantage and increasing the share of expert engineers (relative to novices) to improve productivity.
5. **Application rationalization.** Banks can optimize and modernize their application landscapes by increasing cloud-based functionality and SaaS, microservices and highly configurable API-based architectures. A systematic, top-down, simplification program can reduce applications by 30 to 40 percent and the cost of ownership of applications by 15 to 20 percent. One European bank managed to reduce its total IT costs by 8 to 10 percent per year by rationalizing its application landscape.
6. **Mainframe, end-user computing, and network optimization.** By optimizing core infrastructure components banks can build a solid foundation for the other transformation levers and reduce their run costs. Mainframes can be managed by offloading applications or transactions, using a shared mainframe environment, or smoothing peaks—which together can reduce costs by 20 to 30 percent. Helpdesk and end-user computing costs can be reduced by automating common requests (e.g., password resets), harmonizing device specifications, and through systematic root-cause analysis of the most common

issues—which can reduce costs 20 to 30 percent. Network costs can be reduced through software-defined networking that responds to demand fluctuations rather than provisioning fixed capacity.

Done right, the new IT function will have a structurally lower cost base, improved customer-oriented mindsets and capabilities, and significantly improved speed and quality of delivery. It will also be better equipped to deliver future platform needs such as APIs and customer authentication, as well as business enablement needs such as digital services, AI, and so on.

As they begin this transformation journey, forward-thinking CIOs are asking themselves three questions:

- How much headroom in the IT budget do I need in order to deliver new value-adding capabilities?
- How do I sequence the IT productivity transformation in a way that is self-funding or close to self-funding?

- How should I get started on these initiatives in a way that balances the benefits, risks, and execution challenges?

Digital disruption continues to change the banking landscape and put pressure on the traditional banking model; meanwhile, growth is becoming more difficult for banks as the global economy appears to slow. To thrive in this environment, banks must build highly efficient IT delivery models. The eventual winners will be those that use these productivity gains to create the necessary “headroom” in their budgets to invest in critical tech-enabled changes, thus ensuring they are a true partner to the business in an increasingly dynamic environment.

About the author(s)

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An executive's guide to software development

By Chandra Gnanasambandam, Martin Harrysson, Rahul Mangla, and Shivam Srivastava

This essential capability is a blind spot for many nontech leaders.

In his 2013 message to GE shareholders, CEO Jeffrey R. Immelt wrote, “We believe that every industrial company will become a software company.” Last year, he doubled down, moving GE’s corporate headquarters from Fairfield, Connecticut, to Boston, in large part to lure world-class software engineers in the area.

GE is not alone in upping its bet on software-driven innovation. Today, a Tesla car has more lines of code than macOS or the Windows Vista operating system. However, the fact is that many companies that have made their fortunes outside of high tech—in medical devices, retail, and other analog industries—have been slow to catch on to this game-changing shift in what drives sustainable innovation, the shift from creating physical goods and experiences to smart software development.

Despite the mission-critical nature of software, it gets surprisingly little attention in the C-suite. Even those who have built decent software-development capabilities often have done so on the cheap; software executives are rarely given a seat at the table of top management, and software strategy is often determined three to five layers down the hierarchy. Companies pay a steep price for dismissing software’s importance. These include the following:

- **Vulnerability to tech-based disruption.** Increasingly, business models are being disrupted through tech-driven innovation—just ask Uber’s competitors in the taxi business.
- **Subpar user experience and churn.** With the pervasive availability and use of high-quality applications on mobile platforms, the customer’s expectations have been reset. It’s hard to imagine a successful business without a strong online and mobile presence.
- **Higher costs and lower margins.** Beyond customer experience and differentiation, software is pivotal in helping optimize operations and rein in costs. Global freight companies like FedEx extensively use technology to optimize supply-chain operations.

Fortunately, leaders in all industries can learn from the last two decades of software innovation and adopt the processes, tools, and organizational structures that have proved to be most effective.

To make software an advantage, executives need to be fluent in leading software-development practices and carefully determine how software is integrated into the organization. Most important for executives to get right from the start, however, is making software development a strategic priority, not an afterthought.



Understand leading software-development capabilities

The innovations behind software are just as critical as the software itself. Executives don't need to code (their developers may insist they don't!), but must understand leading development practices to determine the right approach for the company. According to McKinsey's software-maturity diagnostic framework, 15 practices across five stages define the software-development life cycle, and world-class companies typically excel in a majority of these areas (exhibit 1).

Exhibit 1

Fifteen practices help define a world class software-development organization

Setup decisions that guide the strategic road map

1. Cloud-migration path
2. Platform choice
3. Microservices/ container architecture

Product-delivery practices to ensure quality delivery

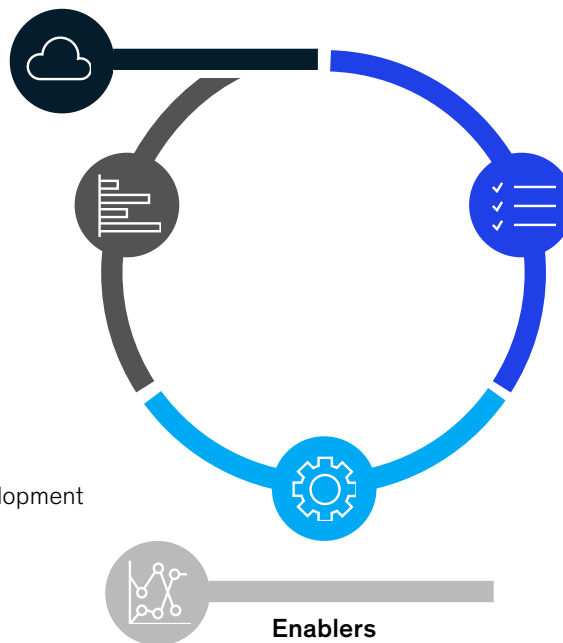
10. Analytics and use of telemetry
11. A/B testing
12. Community-driven development

Product-management practices to aid in product conceptualization and design

4. Product-management excellence
5. Human-centric design

Product-development practices to build and test quality solutions

6. DevOps (CI/CD¹)
7. Test automation and TDD²
8. API³-based architecture
9. Productivity and quality



Enabling elements to plan and operate

13. Portfolio management and product economics
14. Talent and governance
15. Product security and risk management

1 Continuous integration/continuous deployment
 2 Test-driven development
 3 Application programming interface

Setup decisions

The strategic choices about how software is set up—where it is hosted and the underlying architecture—are one-time decisions with long-term implications. Such decisions should be made with the same degree of rigor as any capital investment that is expensive and difficult to unwind.

- **Cloud-migration path.** With cloud technologies more pervasive than ever, organizations not already in the cloud need to chart a path to get there. One course is fast and direct: companies can create an extensible architecture that uses the on-premise code base as the core, with cloud-based applications developed from scratch. This approach is ideal to achieve a shorter time to market. Alternatively, a clean-sheet approach is better if the company plans to make the cloud the primary medium of delivery and the customer use case for cloud solutions differs significantly from the on-premise offering.
- **Platform choice.** Coupled with the selection of a cloud migration path is the adoption of a cloud platform. There are a variety of choices available that range from virtual private cloud environments to platform-as-a-service offered by established cloud players such as Amazon Web Services and Microsoft Azure. Four key factors drive the platform choice: commercial terms, such as the up-front cost of onboarding, recurring expenses, and contract flexibility; ease of use, including the ability to onboard quickly and support ongoing management; platform features, such as data complexity, compliance flexibility, and platform architecture; and data-sovereignty considerations based on where data reside.
- **Microservices/container architecture.** It is imperative to maintain a clear architectural road map across the portfolio of products. Successful organizations use data to select containers among open-source, cloud platform, and internal options (for example, J2EE app server).

Product-management practices

Effective product management is vital in the software-development life cycle. The function (and demands from product managers) have dramatically evolved in the cloud and mobile era.

- **Product-management excellence.** Expect product managers to act as the CEO of the products they manage, meaning that they own both the six-month feature road map and the three-year strategic plan. To meet this task, most leading software companies now require that product managers have both deep technical expertise and business acumen. For the cloud era, world-class product managers tend to be deeply technical people who are

business savvy; this is in contrast to the on-premise world, when product managers were tech-savvy businesspeople.

- **Human-centric design.** Design thinking has taken center stage in building products that users love and admire. First, product design is shaped by insights from user research, customer-journey analysis, and storyboarding. The design concepts are then constantly iterated upon with customers. Finally, design execution is made central to the development process, with user-experience designers included as a core part of the development team.

Product-development practices

As software delivery has moved from multiyear releases to daily updates, software-development practices have evolved to focus on building high-quality software at an increasingly fast pace.

- **DevOps.** DevOps is the next frontier in the evolution toward increasingly agile development methodologies. In a DevOps model, engineers have extensive operational responsibilities to enable the release of production code. Companies need to master five core-competence areas to achieve DevOps at scale. These are continuous integration and delivery, automated testing, self-service access to infrastructure, automated performance management, and infrastructure that can scale automatically.
- **Test automation and test-driven development.** By automating testing and integrating it into the development process, teams create high-quality code that meets business requirements and can be deployed quickly. In test-driven development, test cases that describe user requirements are written first and are then applied immediately to test new code. For high-value test cases, particularly all regressions tests, tests are automated to ensure the quality of code in important areas.
- **Architecture based on application programming interfaces (APIs).** Historically, companies have suffered from building and maintaining “spaghetti code,” which is as messy and difficult to manage as overcooked angel-hair pasta. An effective API-based architecture solves this problem and instead provides an extensible framework of building blocks that can be used to compose powerful applications. Like Legos, such blocks are easy to separate, update, and then replace. Effective API management extends beyond the initial design and covers life-cycle management and tracking, which is addressed by emerging providers such as Apigee and MuleSoft.

Productivity and quality

Once thought impossible, measuring software-development productivity is becoming mainstream, with “complexity points” being one of the emerging standards for evaluating software productivity and quality. Robust measurement also enables better forecasting of the effort required for new projects. An analysis of more than 1,600 software teams shows that top-performing teams significantly outperform in all aspects of software development. Top teams beat others to market with fewer people and defects.

Product-delivery practices

Cloud-based development has also enabled a more mature set of product-delivery practices that allow companies to gather more data than ever before, engage users on live experiments, and leverage the open-source community for faster development.

- **Analytics and telemetry.** Cloud-based delivery generates real-time data with deep granularity across the product portfolio, enabling a variety of uses. For example, a rich data set allows product managers to make fact-based decisions on features and capabilities. Performance data can be analyzed to estimate usage trends and predict periods of high activity and stress on the system. Additionally, data-driven insights can help identify sales opportunities that can be delivered to the customer in real time. Finally, anonymized data from multiple users can also be used to create industry benchmarks that would be invaluable to customers.
- **A/B testing.** The capability to test different variants of functionality in real time with end users is now mainstream with cloud-enabled software. Leading companies integrate A/B testing practices into the software-development life cycle to ensure that development teams get feedback from users early in the development process.
- **Community-driven development.** Tesla has created a software platform with more

lines of code than Windows, but with a fraction of Microsoft's software-development capabilities. How did Tesla achieve this without an army of engineers and three decades of experience? Through the extensive use of available and mature open-source software. Companies are now assembling capabilities through available libraries rather than writing code from scratch.

Enablers

To tie it all together, organizations require a set of enabling functions and practices that, while nontechnical in nature, are imperative to building effective software.

- **Portfolio management and product economics.** As the volume of software assets and capabilities explodes, there's an ever-increasing need for better portfolio management. There are five classic elements of portfolio management that should now be applied to software: market attractiveness, strategic positioning, investment analysis, risk assessment, and investment allocation.
- **Talent and governance.** Organizational structure and governance have evolved alongside technology in recent years. Most software-development teams are now structured in “pods” that bring together user experience, product management, DevOps, quality, analytics, and security resources. At the same time, governance now distributes decision rights across the pod, with the product manager acting as the CEO of the product.
- **Product security and risk management.** To build a secure product, security and risk-management thinking must be incorporated across the product-development life cycle. This implies that security transcends secure-coding practices. It includes involving a security champion in the DevOps team from inception, building a secure customer experience, and investing in tools and hackathons to identify security issues early in the development cycle.



Summary

The trends are clear. Over the last 20 years, the number of top-100 product and service companies that are software dependent has doubled to nearly 40 percent. Revenues from digitized products and channels are expected to exceed 40 percent in industries such as insurance, retailing, and logistics.

But the message here is not just that software matters or that it is increasingly found in things where software never existed before. All executives worth their salt already understand this in their daily lives, every time they drive their computer-controlled, high-performance sports sedans or take a fitness-tracking wearable on a run.

The point is that the C-suite has to take a more active role in how software is developed and make investments to build world-class software-development practices in their organizations. A modern company with any intentions toward

industry or category leadership must be a great software company at its heart. Leaders of these firms need to have a secure understanding of how software development works and how to create an enabling organization around it.

It's not too late to get up to speed on software, but time is running short. The arrival of cloud technologies and the fast-cresting Internet of Things wave are two unstoppable forces promoting digital capabilities. Competitors that have already made the digital transformation are busy at work building tough-to-overcome competitive advantages. The next move is up to you.

About the author(s)

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ING's Agile transformation

By Peter Jacobs, Bart Schlatmann, and Deepak Mahadevan

Two senior executives from the global bank describe their recent journey.

Established businesses around the world and across a range of sectors are striving to emulate the speed, dynamism, and customer centricity of digital players. In the summer of 2015, the Dutch banking group ING embarked on such a journey, shifting its traditional organization to an “agile” model inspired by companies such as Google, Netflix, and Spotify. Comprising about 350 nine-person “squads” in 13 so-called tribes, the new approach at ING has already improved time to market, boosted employee engagement, and increased productivity. In this interview with McKinsey’s Deepak Mahadevan, ING Netherlands chief information officer Peter Jacobs and Bart Schlatmann, who, until recently, was the chief operating officer of ING Netherlands, explain why the bank needed to change, how it manages without the old reporting lines, and how it measures the impact of its efforts.

The Quarterly: What prompted ING to introduce this new way of working?

Bart Schlatmann: We have been on a transformation journey for around ten years now, but there can be no let up. Transformation is not just moving an organization from A to B, because once you hit B, you need to move to C, and when you arrive at C, you probably have to start thinking about D.

In our case, when we introduced an agile way of working in June 2015, there was no particular financial imperative, since the company was performing well, and interest rates were still at a decent level. Customer behavior, however,

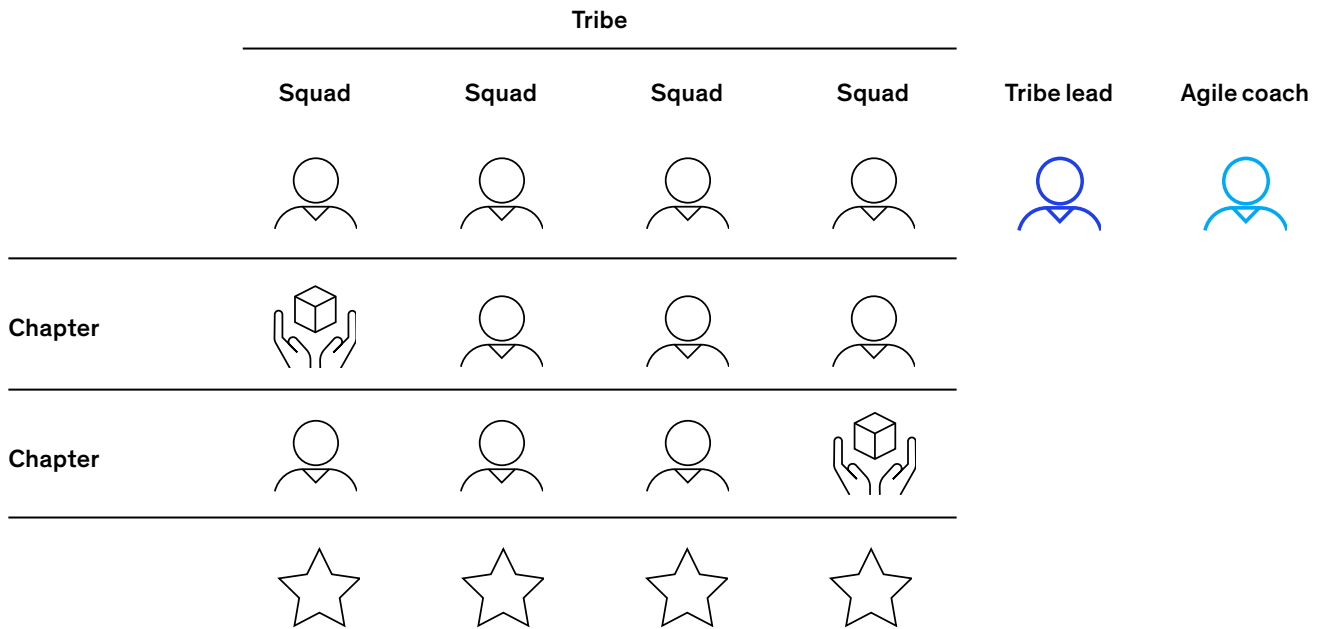
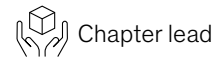
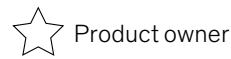
was rapidly changing in response to new digital distribution channels, and customer expectations were being shaped by digital leaders in other industries, not just banking. We needed to stop thinking traditionally about product marketing and start understanding customer journeys in this new omnichannel environment. It’s imperative for us to provide a seamless and consistently high-quality service so that customers can start their journey through one channel and continue it through another—for example, going to a branch in person for investment advice and then calling or going online to make an actual investment. An agile way of working was the necessary means to deliver that strategy.

The Quarterly: How do you define agility?

Bart Schlatmann: Agility is about flexibility and the ability of an organization to rapidly adapt and steer itself in a new direction. It’s about minimizing handovers and bureaucracy, and empowering people. The aim is to build stronger, more rounded professionals out of all our people. Being agile is not just about changing the IT department or any other function on its own. The key has been adhering to the “end-to-end principle” and working in multidisciplinary teams, or squads, that comprise a mix of marketing specialists, product and commercial specialists, user-experience designers, data analysts, and IT engineers—all focused on solving the client’s needs and united by a common definition of success. This model [see exhibit 1] was inspired by what we saw at various technology companies, which we then adapted to our own business.



ING's new agile organizational model has no fixed structure – it constantly evolves



Tribe	Squad	Chapter
(Collection of squads with interconnected missions)	(basic of new agile organization)	(develops expertise and knowledge across squads)
<ul style="list-style-type: none"> – Includes on average 150 people – Empowers tribe lead to establish priorities, allocate budgets, and form interface with other tribes to ensure knowledge/insights are shared 	<ul style="list-style-type: none"> – Includes no more than 9 people; is self-steering and autonomus – Comprises representatives of different functions working in single location – Has end-to-end responsibility for achieving client-related objectives – Can change functional composition as mission evolves – Is dismantled as soon as mission is executed 	<ul style="list-style-type: none"> – Is responsible for one chapter – Represents hierarchy for squad members (re: personal development, coaching, staffing, and performance management)
<p>Agile coach</p> <ul style="list-style-type: none"> – Coaches individuals and squads to create high-performing teams 	<p>Product owner (squad member, not its leader)</p> <ul style="list-style-type: none"> – Is responsible for coordinating squad activities – Manages backlog, to-do lists, and priority setting 	

Source: ING

The Quarterly: What were the most important elements of the transformation?

Peter Jacobs: Looking back, I think there were four big pillars. Number one was the agile way of working itself. Today, our IT and commercial colleagues sit together in the same buildings, divided into squads, constantly testing what they might offer our customers, in an environment where there are no managers controlling the handovers and slowing down collaboration.

Number two is having the appropriate organizational structure and clarity around the new roles and governance. As long as you continue to have different departments, steering committees, project managers, and project directors, you will continue to have silos—and that hinders agility.

The third big component is our approach to DevOps¹ and continuous delivery in IT. Our aspiration is to go live with new software releases on a much more frequent basis—every two weeks rather than having five to six “big launches” a year as we did in the past. The integration of product development and IT operations has enabled us to develop innovative new product features and position ourselves as the number-one mobile bank in the Netherlands.

Finally, there is our new people model. In the old organization, a manager’s status and salary were based on the size of the projects he or she was responsible for and on the number of employees on his or her team. In an agile performance-management model, there are no projects as such; what matters is how people deal with knowledge. A big part of the transformation has been about ensuring there is a good mix between different layers of knowledge and expertise.

The Quarterly: What was the scope of this transformation? Where did you start, and how long did it take?

Bart Schlatmann: Our initial focus was on the 3,500 staff members at group headquarters. We started with these teams—comprising previous departments such as marketing, product management, channel management, and IT development—because we believed we had to start at the core and that this would set a good example for the rest of the organization.

We originally left out the support functions—such as HR, finance, and risk—the branches, the call centers, operations, and IT infrastructure when shifting to tribes and squads. But it doesn’t mean they are not agile; they adopt agility in a different way. For example, we introduced self-steering teams in operations and call centers based on what we saw working at the shoe-retailer Zappos. These teams take more responsibility than they used to and have less oversight from management than previously. Meanwhile, we have been encouraging the sales force and branch network

to embrace agility through daily team stand-ups and other tactics. Functions such as legal, finance, and operational risk are not part of a squad per se, as they need to be independent, but a squad can call on them to help out and give objective advice.

It took about eight or nine months from the moment we had written the strategy and vision, in late 2014, to the point where the new organization and way of working had been implemented across the entire headquarters. It started with painting the vision and getting inspiration from different tech leaders. We spent two months and five board off-sites developing the target organization with its new “nervous system.” In parallel, we set up five or six pilot squads and used the lessons to adapt the setup, working environment, and overall design. After that, we were able to concentrate on implementation—selecting and getting the right people on board and revamping the offices, for example.

The Quarterly: Was agility within IT a prerequisite for broader organizational change?

Peter Jacobs: Agility within IT is not a prerequisite for a broader transformation, but it certainly helps. At ING, we introduced a more agile way of working within IT a few years ago, but it was not organization-wide agility as we understand it today, because it did not involve the business. You can certainly start in IT and gradually move to the business side, the advantage of this being that the IT teams can test and develop the concept before the company rolls it out more widely. But I think you could equally start with one value stream, let’s say mortgages, and roll it out simultaneously in the business and in IT. Either model can work.

What you can’t do—and that is what I see many people do in other companies—is start to cherry pick from the different building blocks. For example, some people formally embrace the agile way of working but do not let go of their existing organizational structure and governance. That defeats the whole purpose and only creates more frustration.

The Quarterly: How important was it to try to change the ING culture as part of this transformation?

Bart Schlatmann: Culture is perhaps the most important element of this sort of change effort. It is not something, though, that can be addressed in a program on its own. We have spent an enormous amount of energy and leadership time trying to role model the sort of behavior—ownership, empowerment, customer centricity—that is appropriate in an agile culture. Culture needs to be reflected and rooted in anything and everything that we undertake as an organization and as individuals.

For instance, one important initiative has been

¹ The integration of product development with IT operations.

a new three-week onboarding program, also inspired by Zappos, that involves every employee spending at least one full week at the new Customer Loyalty Team operations call center taking customer calls. As they move around the key areas of the bank, new employees quickly establish their own informal networks and gain a deeper understanding of the business.

We have also adopted the peer-to-peer hiring approach used by Google. For example, my colleagues on the board selected the 14 people who report to me. All I have is a right of veto if they choose someone I really can't cope with. After thousands of hires made by teams using this approach at every level in the organization, I have never heard of a single veto being exercised—a sure sign that the system is working well. It's interesting to note, too, that teams are now better diversified by gender, character, and skill set than they were previously. We definitely have a more balanced organization.

A lot is also down to the new way we communicate and to the new office configuration: we invested in tearing down walls in buildings to create more open spaces and to allow more informal interaction between employees. We have a very small number of formal meetings; most are informal. The whole atmosphere of the organization is much more that of a tech campus than an old-style traditional bank where people were locked away behind closed doors.

The Quarterly: Was a traditional IT culture an impediment to the transformation?

Peter Jacobs: In IT, one of the big changes was to bring back an engineering culture, so there's now the sense that it's good to be an engineer and to make code. Somehow over the years, success in IT had become a question of being a good manager and orchestrating others to write code. When we visited a Google IO conference in California, we were utterly amazed by what we saw and heard: young people talking animatedly about technology and excitedly discussing the possibilities of Android, Google Maps, and the like. They were proud of their engineering skills and achievements. We asked ourselves, "Why don't we have this kind of engineering culture at ING? Why is it that large enterprises in Holland and Western Europe typically just coordinate IT rather than being truly inspired by it?" We consciously encouraged people to go back to writing code—I did it myself—and have made it clear that engineering skills and IT craftsmanship are what drive a successful career at ING.

The Quarterly: Can you say more about the companies that inspired you?

Peter Jacobs: We came to the realization that, ultimately, we are a technology company operating in the financial-services business. So we asked

ourselves where we could learn about being a best-in-class technology company. The answer was not other banks, but real tech firms.

If you ask talented young people to name their dream company from an employment perspective, they'll almost always cite the likes of Facebook, Google, Netflix, Spotify, and Uber. The interesting thing is that none of these companies operate in the same industry or share a common purpose. One is a media company, another is search-engine based, and another one is in the transport business. What they all have in common is a particular way of working and a distinctive people culture. They work in small teams that are united in a common purpose, follow an agile "manifesto," interact closely with customers, and are constantly able to reshape what they are working on.

Spotify, for example, was an inspiration on how to get people to collaborate and work across silos—silos still being a huge obstacle in most traditional companies. We went to visit them in Sweden a few times so as to better understand their model, and what started as a one-way exchange has now become a two-way exchange. They now come to us to discuss their growth challenges and, with it, topics like recruitment and remuneration.

The Quarterly: Without traditional reporting lines, what's the glue that holds the organization together?

Bart Schlatmann: Our new way of working starts with the squad. One of the first things each squad has to do is write down the purpose of what it is working on. The second thing is to agree on a way of measuring the impact it has on clients. It also decides on how to manage its daily activities.

Squads are part of tribes, which have additional mechanisms such as scrums, portfolio wall planning, and daily stand-ups to ensure that product owners are aligned and that there is a real sense of belonging. Another important feature is the QBR [quarterly business review], an idea we borrowed from Google and Netflix. During this exercise, each tribe writes down what it achieved over the last quarter and its biggest learning, celebrating both successes and failures and articulating what it aims to achieve over the next quarter—and, in that context, which other tribe or squad it will need to link up with. The QBR documents are available openly for all tribes: we stimulate them to offer input and feedback, and this is shared transparently across the bank. So far, we have done four QBRs and, while we are improving, we still have to make them work better.

In the beginning, I think the regulators were at times worried that agile meant freedom and chaos; that's absolutely not the case. Everything we do is managed on a daily basis and transparent on walls around our offices.

The Quarterly: Can traditional companies with legacy IT systems really embrace the sort of agile transformation ING has been through?

Peter Jacobs: I believe that any way of working is independent of what technology you apply. I see no reason why an agile way of working would be affected by the age of your technology or the size of your organization. Google and ING show that this has nothing to do with size, or even the state of your technology. Leadership and determination are the keys to making it happen.

The Quarterly: Are some people better suited to agile operating approaches than others?

Bart Schlatmann: Selecting the right people is crucial. I still remember January of 2015 when we announced that all employees at headquarters were put on “mobility,” effectively meaning they were without a job. We requested everyone to reapply for a position in the new organization. This selection process was intense, with a higher weighting for culture and mind-sets than knowledge or experience. We chose each of the 2,500 employees in our organization as it is today—and nearly 40 percent are in a different position to the job they were in previously. Of course, we lost a lot of people who had good knowledge but lacked the right mind-set; but knowledge can be easily regained if people have the intrinsic capability.

Peter Jacobs: We noticed that age was not such an important differentiator. In fact, many whom you may have expected to be the “old guards” adapted even more quickly and more readily than the younger generation. It’s important to keep an open mind.

The Quarterly: How would you quantify the impact of what has been done in the past 15 months?

Bart Schlatmann: Our objectives were to be quicker to market, increase employee engagement, reduce impediments and handovers, and, most important, improve client experience. We are progressing well on each of these. In addition, we are doing software releases on a two- to three-week basis rather than five to six times a year, and our customer-satisfaction and employee-engagement scores are up multiple points. We are also working with INSEAD, the international business school, to measure some of these metrics as a neutral outsider.

The Quarterly: Do you see any risks in this agile model?

Peter Jacobs: I see two main risks. First, agility in our case has been extremely focused on getting software to production and on making sure that people respond to the new version of what they get. If you are not careful, all innovations end up being incremental. You therefore have to organize yourself for a more disruptive type of innovation—and you can’t always expect it to come out of an individual team.

Second, our agile way of working gives product owners a lot of autonomy to collect feedback from end users and improve the product with each new release. There is a risk that people will go in different directions if you don’t align squads, say, every quarter or six months. You have to organize in such a way that teams are aligned and mindful of the company’s strategic priorities.

The Quarterly: What advice would you give leaders of other companies contemplating a similar approach?

Bart Schlatmann: Any organization can become agile, but agility is not a purpose in itself; it’s the means to a broader purpose. The first question you have to ask yourself is, “Why agile? What’s the broader purpose?” Make sure there is a clear and compelling reason that everyone recognizes, because you have to go all in—backed up by the entire leadership team—to make such a transformation a success. The second question is, “What are you willing to give up?” It requires sacrifices and a willingness to give up fundamental parts of your current way of working—starting with the leaders. We gave up traditional hierarchy, formal meetings, overengineering, detailed planning, and excessive “input steering” in exchange for empowered teams, informal networks, and “output steering.” You need to look beyond your own industry and allow yourself to make mistakes and learn. The prize will be an organization ready to face any challenge.

About the author(s)

Peter Jacobs is the chief information officer of ING Netherlands; **Bart Schlatmann**, who left ING in January 2017 after 22 years with the group, is the former chief operating officer of ING Netherlands. This interview was conducted in October 2016 by **Deepak Mahadevan**, a partner in McKinsey’s Brussels office.



Flip the ratio: taking IT from bottleneck to battle ready

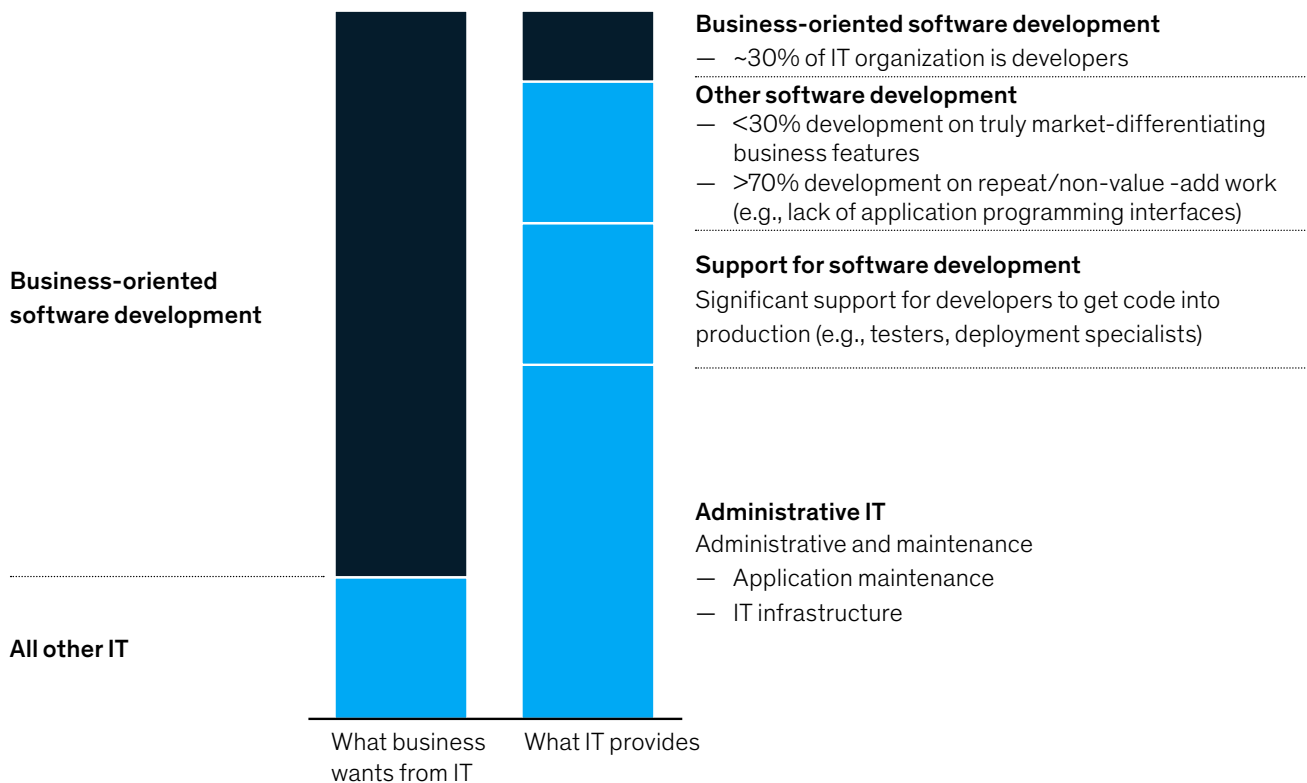
By Nagendra Bommadevara, Steve Jansen, Lauren Klak, and Maneesh Subherwal

A new way to focus on outcomes and results can free IT organizations to spend more time on business priorities.

What if an investor managed your IT? One thing it would likely hit on quickly is an important detail: for many companies, a larger proportion of the IT organization is focused on support and administrative work that's often manual and inefficient—testing, deployment, maintenance, code fixes, and so on. At two financial services organizations we analyzed, a stunning 90 percent of the IT organization was focused on these kinds of tasks. That left just 10 percent of technologists' capacity for business priorities and market-differentiating work (Exhibit 1).

Exhibit 1

Too little of IT's resources go to business– differentiating activities



This state of affairs partly explains why IT is often viewed as a cost center and a bottleneck by the business. It also highlights one of the reasons that incumbents are struggling to keep up with tech companies. With just 10 percent of IT allocated to generating new business value, incumbents are not battle ready when it comes to contending with nimble tech players.

As any investor would tell you, place your resource bets where you believe there is value. For IT, that means flipping the ratio, so that the great majority of IT resources are working on products that build value for the business. As simple as that may sound, few IT organizations have been able to do it. Some companies have managed to pull it off, however, by following a specific recipe that allows them to work better and smarter. Typical payback in making this shift—freeing as much as 30 to 40 percent of IT labor costs—occurs within 18 to 24 months. Flipping the ratio can improve time to market and quality. The framework also allows organizations to quickly evaluate the business value of new technologies (cloud, microservices, automation, AI) and then rapidly scale adoption.

How to escape the trap

IT leaders have been trying to increase the productivity of their teams, and many have made good progress. But too often, cloud and other solutions languish in proof-of-concept stages with little funding and, in many situations, no business case. Meanwhile, the day-to-day pressure of running an IT shop—improving service levels while lowering costs for existing systems—continues.

To flip the ratio, four things need to happen.

1. Extend agile to back-end IT

One of the main reasons back-end systems demand so many resources is that they do not take advantage of agile ways of working that have become second nature to most software developers. Either back-end teams confuse “doing” agile rather than actually “being” agile, running waterfall projects using the scrum method but not working in small teams rapidly iterating on small chunks of code, or agile doesn’t even make it to the back-end teams. Even application maintenance and IT infrastructure can benefit from agile principles, which is significant, since these areas often make up 40 to 60 percent of the IT organization. By introducing true agile methods—small, cross-functional teams or squads working in rapid iterations—to relevant enterprise IT work, companies can radically reduce the resources needed to support those systems while substantially improving service quality and the potential for automation.

One midsize US-based financial services company discovered just how much value using agile for back-end IT functions could be realized. At first, application-maintenance and IT-infrastructure functions—about 40 percent of the organization—did not use agile. Making matters worse, most of the demand on this group was reactive, handling incidents—data fixes and batch updates, for example—that required handoffs across multiple product teams and caused frequent interruptions, significantly reducing productivity.

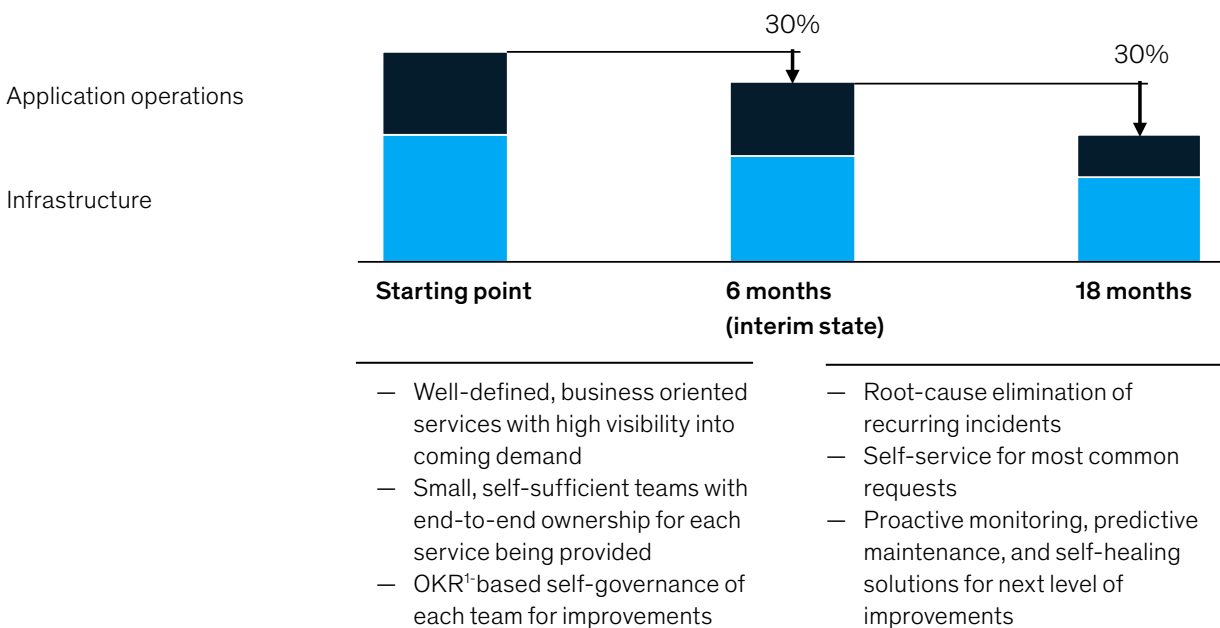
The company decided to move to an agile operating model. It started by rigorously quantifying demand to improve transparency and looking at products based on how they fit into the end-to-end value chain, which allowed the company to better understand the dependencies across multiple products.

With better insight into demand, the company created small, self-sufficient teams to not just meet demand but figure out how to reduce it. By better understanding business needs, teams eliminated some demand by providing self-service options. Cross-functional teams had the people needed to not only identify the root cause of incidents but correct them immediately. They also focused on preventive maintenance and predictive monitoring to address issues before they became significant problems (Exhibit 2).

Exhibit 2

An agile operating model can reduce IT administration

Headcount focused on administrative IT



¹ Objectives and key results

Within six months, the company had reduced application operations spend by more than 30 percent and improved system stability (reduced incident volume and elimination of false alerts) by more than 20 percent. Further, the company was on track to reduce capacity dedicated to administrative IT by another 20 to 30 percent and improve system stability by 30 to 50 percent over the following six months.

2. Measure the things that create value

You are what you measure. That old adage still applies, and it is one of the keys to improving how IT works. IT collects an overwhelming volume of data and metrics but often struggles to use them to drive business value. For example, the common metrics of product-delivery time and budget incentivize teams to release products quickly and under budget. There's nothing wrong with that, of course, except that it can mask a very real issue: a product could perform well against these metrics but still be a bad product that demands lots of time to fix its defects or maintain it.

IT leaders need instead to measure the performance and health of the organization based on the desired outcomes. In the case of the financial services company's application-operations team, elimination of reactive demand was the desired outcome, and percentage of false alerts was a key metric. The best metrics not only show progress but also are specific and useful enough to be tracked every day, easy to measure, and highlight what changes are needed. YouTube, for example, realized that the amount of time people viewed a video (viewed hours) was the most important determinant of increasing revenue, so it focused all activities on improving that metric.^[1] The right metrics can also be measured at the squad, tribe, and organizational level, which allows for higher levels of self-governance through objectives and key results (OKRs) while providing the transparency that leadership needs (Exhibit 3).^[2]

Exhibit 3

Use the right metrics to measure what matters

	Key question(s) being addressed	Likely top-level metric(s)
Business relevance	Are the stories/features being worked on by IT considered "business relevant" or "market differentiating"?	Percentage and volume of stories/features that are considered "market differentiating" by the business
Flexibility	How flexible is IT in changing directions with changes in the market/business needs?	Percentage and volume of stories that can be deployed into production standalone
Technology debt	How much technology debt (currency, defects, etc.) can be a business risk or preclude IT from working on business-relevant stories/features?	Indexed technology debt of the applications underlying a service/product, e.g., <ul style="list-style-type: none"> • Currency of the technology stack • Defect backlog
Customer satisfaction	How satisfied are the business users/owners with the stories/features being delivered?	One-click surveys to the business users/owners after deploying story/feature
Team-member engagement	How excited are the team members (employees or contractors) to be part of the team?	Anonymized pulse survey conducted at the team level

¹ John Doerr, *Measure What Matters: How Google, Bono, and the Gates Foundation Rock the World with OKRs*, New York: Portfolio/Penguin, 2018.

² For a good introduction to OKRs, see John Doerr, *Measure What Matters: How Google, Bono, and the Gates Foundation Rock the World with OKRs*, New York: Portfolio/Penguin, 2018.

3. Harness market dynamics to develop ‘IT for IT’ solutions and drive their adoption

There are typically multiple improvement opportunities that cut across many teams or products in IT—for example, a platform for the creation of application programming interfaces (APIs). These “IT for IT” solutions can help teams work more efficiently and effectively by standardizing processes and making code easy to reuse, for example. However, one of the big issues contributing to IT administrative bloat is that these sorts of IT-for-IT solutions often end up languishing unused. Not only are resources tied up in developing them, but further work is often needed because they don’t work as expected.

At one insurance company, this became a glaring issue. The API enablement team had done what it was asked to do: establish an API platform to let developers build new APIs more efficiently. Yet after investing in the platform, fewer than 100 APIs had been created on it, and worse, fewer than ten of those had been referenced more than five times—and this was in an organization of 500 developers. Why weren’t they using the platform? It turned out that it was just too difficult to use. Developers had to submit a manual request, which took a week to fulfill, so they found it easier to just write new code.

A better solution relies more on market-demand mechanisms. Agile teams create demand for tools and solutions they need to help hit their OKRs. As developers spot these needs, they propose a solution (such as developing a platform for API development or a portal for developers to find existing code) to meet the demand, which is quickly reviewed and funded (or rejected) by an oversight team. If approved, an enablement team is formed, made up of people with the right skills. IT organizations provide incentives for enablement teams to form, such as bonuses and recognition. The key difference, however, is that enablement teams have specific OKRs for not just delivering the product but showing that it works and is adopted. Developed tools and solutions need to solve the problem, be easy to use, and easily deployed (Exhibit 4).

Exhibit 4

Enablement teams can be set up to design and drive the adoption of solutions common to multiple agile squads

Typical goals for an enablement team

- Lay out the strategy, design, and impact of the technology innovation
- Create guardrails and tool kits (“backpack”) needed by the other IT teams to adopt the technology
- Act as evangelists, promoting the solutions to other teams
- Self-govern the enablement team through OKRs focused on adoption of the technology

Illustrative example: API enablement team

Rational for setting up the API team

APIs (and their reuse) free up developer capacity to focus more on new, market-differentiating features; in addition, reuse reduces the potential for rework

Elements of API solution

1. Self-service platform to create APIs
2. Portal to search for existing APIs

Evangelism with other teams

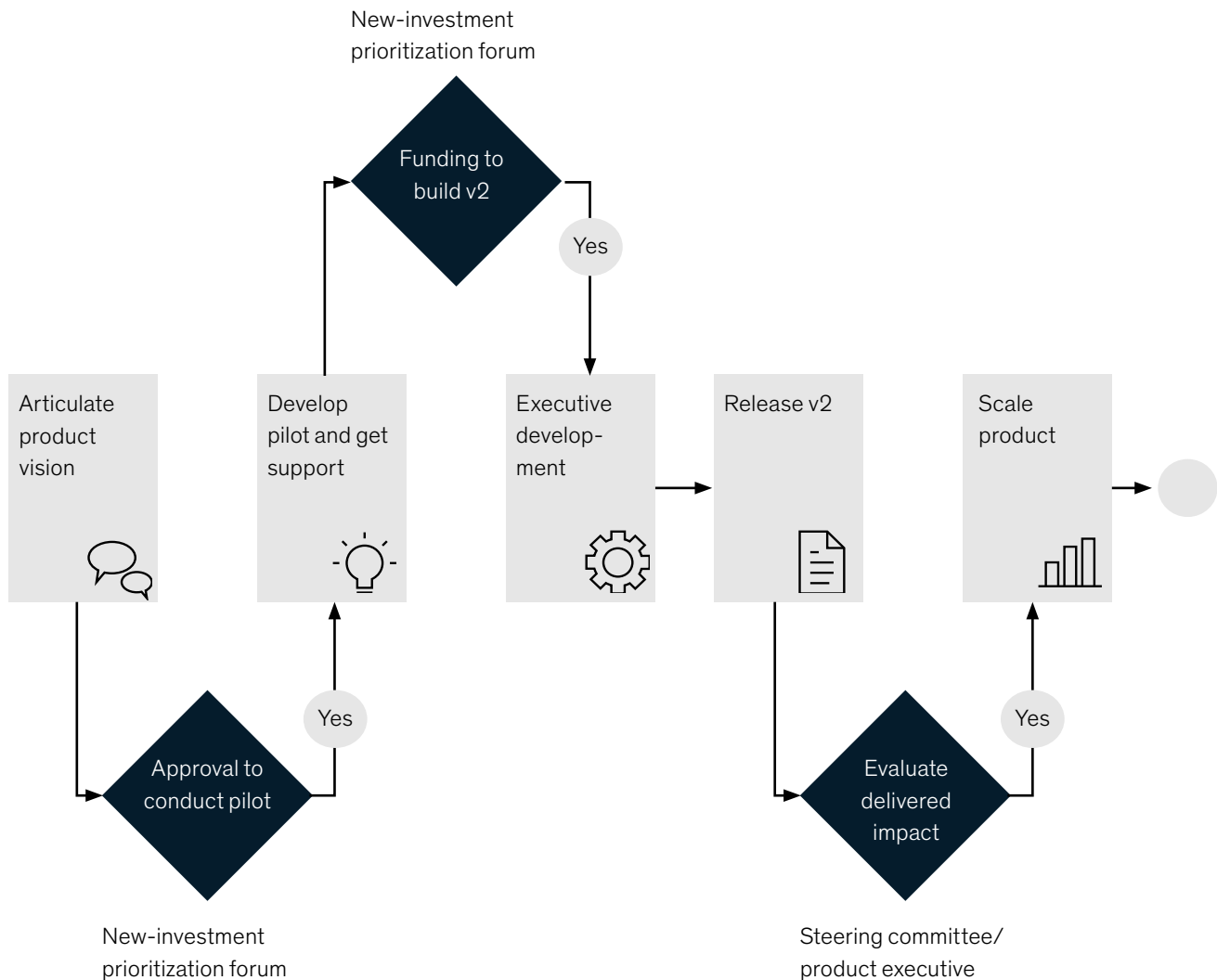
1. “Dojo” sessions with teams to learn and launch
2. Community channels for cross-learning and celebrating success
3. Connecting with other enablement teams (e.g., APIs in cloud)

Metrics for measuring success and driving OKRs

1. Number of (static) references per API

We have found that a venture-capital (VC) funding model, in which IT leadership acts as the venture capitalist, works well to fund IT-for-IT solutions. In this system, anyone in the IT organization can submit an idea for creating a new enablement team; if an idea is deemed attractive, IT leadership provides seed funding and sets OKRs. Quarterly assessments show progress, and leadership decides whether to allocate another round of funding to that enablement team and what OKRs to pursue next (Exhibit 5).

A VC-style funding mechanism ensures that enablement teams' OKRs are aligned with the goal – to flip the ratio



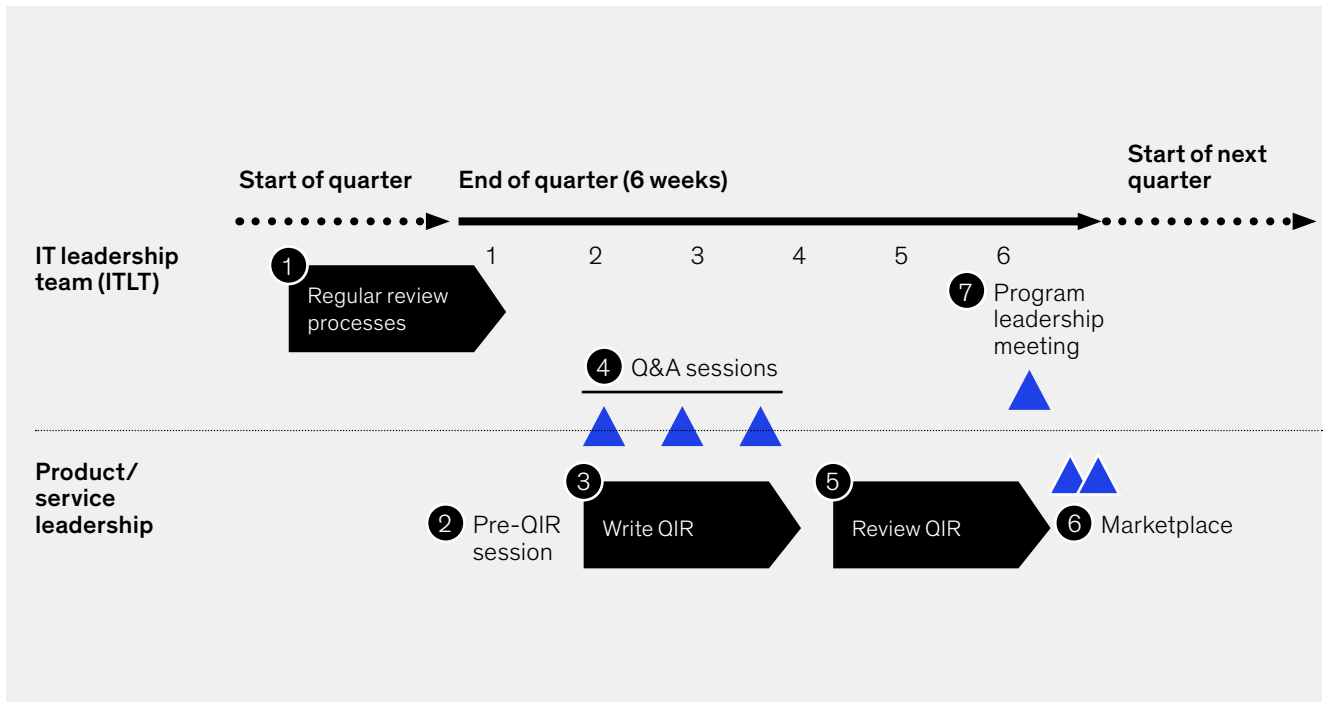
In this model, the company's executive committee acts as investors in a VC fund, so IT leadership goes to them annually (or more often, depending on the need) to demonstrate impact from the enablement teams and request VC funds for the next year. The effect is to force the teams in the tribe to behave like start-ups, moving quickly to demonstrate the value of their work.

4. Stay focused on driving the program

As in any transformation, time is the enemy. After an initial set of wins, progress often bogs down because teams run into problems, issues become more complex, or leadership simply loses interest. Without firm leadership and guidance, the full value potential of the resource allocation isn't met, or—worse—the organization slides back to the old way of working. But too much leadership control stifles enthusiasm and the sense of autonomy that's necessary for teams to be successful.

We have found that a thoughtful and disciplined quarterly IT review (QIR) process can be helpful (Exhibit 6). Similar to the quarterly business review (QBR) at most highly mature, agile organizations, the QIR process allows IT leaders to take stock of the progress, resolve issues, reallocate budgets as needed, and provide guidance on the next quarter's priorities for pushing forward to flip the ratio. For their part, each agile squad/tribe assesses its progress on its top-level metrics, sets aspirational OKRs for the next quarter, and submits them to their peers and leadership for review.

A quarterly IT review governs the journey to flip the ratio



- 1 ITLT, with support from the executive committee, sets the “enablement” budget on a yearly basis and adapts quarterly within the QIR
- 2 ITLT sets the “what needs to be accomplished next quarter” by providing tribe leads with priorities
- 3 Tribes leads draft and publish a 5-10 page QIR memo, which includes a retrospective of last quarter as well as the OKRs for the next quarter
- 4 Q&A sessions with ITLT are set up to provide tribe leads the opportunity to receive extra guidance on their objectives, road map, or impediments
- 5 Tribe leaders read and comment on the QIR memo drafts of other tribe leaders
- 6 A 1-day QIR marketplace event resolves dependencies and finalizes QIR memos
- 7 A joint meeting with ITLT and tribe leaders resolves constraints/dependencies and validates that the current budget (resource) level is adequate

To be sure, flipping the ratio is not easy. But if IT organizations want to help build business value, they can only do so if their resources are allocated to value-creating activities.

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Transforming IT infrastructure organizations using Agile

By Santiago Comella-Dorda, Peter Dean, Vito Di Leo, Nick McNamara, and Pankaj Sachdeva

Traditional ways of managing IT infrastructure can impede the fast-paced delivery of digital solutions. Agile methods can be used to boost efficiency, speed, and quality.

Many companies have accelerated application development by adopting agile principles and modern software-engineering best practices, such as automated testing. Yet it remains uncommon to apply these methods and tools to IT infrastructure and operations, even though doing so presents opportunities to increase productivity and the pace at which digital products and services are brought to market. The typical IT infrastructure organization continues to emphasize stability over speed. Requests for infrastructure services still often go through an assembly line-style process involving many handoffs, long delays, and frequent misunderstandings.

Traditional IT infrastructure processes made sense in the past. But now that the latest technology advances have eliminated the need for manual configuration work and consumers expect to interact with companies digitally, it has become essential for companies to modernize their IT infrastructure organizations, thereby accelerating IT deployments and shortening time to market for technology projects. Four shifts can enable IT infrastructure organizations to operate in a more agile and efficient manner. The first of these shifts involves managing infrastructure much as application developers manage code, by using software to configure environments in a swift, reliable way. The other three are organizational: forming cross-functional teams (or “squads”) of well-rounded infrastructure engineers that work using agile methods, simplifying processes for delivering infrastructure service offerings, and improving how infrastructure teams and development teams work together.

Using an agile transformation to modernize an IT infrastructure organization isn't easy, but it is worthwhile. In our experience, agile approaches can enable IT infrastructure groups to boost their productivity by 25 to 30 percent in six to 18 months, depending on the size of the organization. The gains can increase further as automated solutions are built and fully adopted. Additional benefits often include improved infrastructure service delivery and shortened time to market for digital products and features. In this article, we explore how infrastructure organizations can modernize themselves using agile methods, starting with a glimpse of what the shift looked like at three companies. We also provide a look at the four shifts described above, along with practical recommendations for how to get the transition under way.

Three transitions to agile IT infrastructure

Three companies demonstrate how unique approaches to agile transformation, based on

similar principles and tailored to their needs, can help modernize their IT infrastructure organizations while improving performance significantly. At a large provider of software and services, the infrastructure staff of several thousand people managed a global footprint capable of handling millions of active users and thousands of log-ins a second. The processes that the company had used to provide infrastructure services had grown more complex and labor intensive as the company grew, so it could take months to bring new products and features to market.

When the company's IT infrastructure leaders modeled the effects of applying agile methods to their organization, they saw an opportunity to improve productivity by 20 to 25 percent in 12 to 18 months. Given the scale of the infrastructure group, the leadership team chose to roll out agile ways of working over that span of time iteratively, launching about 150 agile teams to bring new methods and technologies to the entire company. The leadership had teams focus first on improving the infrastructure department's internal operations by simplifying and automating processes and then on developing self-service tools and application programming interfaces (APIs) that could be used more broadly.

A European financial-services company with a far smaller IT infrastructure organization also recognized that traditional processes for building and managing infrastructure were slowing the release of digital products and services, as well as the adoption of more efficient, sophisticated application-development practices and tools. This company too set out to introduce agile methods and to implement highly automated infrastructure service offerings within its organization. However, its approach was to roll out a new agile operating model to its entire infrastructure organization at once instead of iteratively, as the software-and-services company did. The company also chose to focus from the start on building an operating model and tools that would empower developers to manage the operations of their applications directly.





Another business—a large US-based financial-services company—also adopted an agile approach in its 250-person IT infrastructure & operations group. Like the European financial-services company, it rolled out a new agile operating model to its entire infrastructure organization at once. However, the company chose to focus initially on improving its processes. In six months, it completed a transformation that cut IT costs by more than 35 percent and doubled overall productivity. With the new operating model in place, the company now plans to focus on automating up to 80 percent of its operations work.

Principles for agile transformation

Despite the differences between their transformation approaches, these companies followed many of the same principles. In the sections below, we'll explore those principles in four areas: technology, organization and talent, processes, and collaboration with developers (exhibit 1).

Exhibit 1

A modern agile IT infrastructure organization relies on well-rounded engineers to work closely with developers and deliver solutions efficiently, making extensive use of automation

	Traditional organization	Agile organization
Technology 	<ul style="list-style-type: none"> Highly customized infrastructure, provisioned on request Significant manual effort required from infrastructure teams 	<ul style="list-style-type: none"> Standardized infrastructure service offerings with largely automated delivery Self-service tools let application developers configure and control infrastructure on their own, with appropriate guardrails
Organization and talent 	<ul style="list-style-type: none"> Technology- or function-specific teams Staff with highly specialized skill sets focused on operations and administration 	<ul style="list-style-type: none"> Integrated, cross-functional teams (or squads) build well-defined infrastructure service offerings Infrastructure engineers with sophisticated development skills
Processes 	<ul style="list-style-type: none"> Rigidly sequenced processes, with many handoffs among groups of specialists Repetitive tasks (such as deployment and incident resolution) performed manually 	<ul style="list-style-type: none"> Squads responsible for end-to-end delivery of service offerings Processes in which repetitive work is automated and stream lined
Collaboration with application development 	<ul style="list-style-type: none"> Infrastructure requests submitted as 'tickets' Relationship and service managers deal primarily with application developers on behalf of the infrastructure function Developers not accountable for application code after it is put into production 	<ul style="list-style-type: none"> Application-development and operations responsibilities become more integrated Self-service tools let developers handle more operations directly

Technology: Defining infrastructure with software

One reason traditional infrastructure organizations operate slowly is that their technology systems require teams to configure infrastructure manually for each new application. To bring agility to the infrastructure function, companies can not only eliminate manual work by building automated systems that allow infrastructure to be defined by software but also provide "guardrails" that enable application-development teams to manage more of their own operations safely. And while it's possible to build such systems with existing infrastructure, automation becomes easier as a company moves more of its infrastructure onto modern platforms, especially cloud platforms offering a wide array of enabling tools and technologies.

At the software-and-services company, even though the infrastructure team had standardized much of the hardware and virtualization architecture, it still spent a lot of time creating custom virtual-machine and operating-system configurations for product-development teams. Solution engineers reviewed the needs of each application with its developers and then set up the necessary environments, which often involved performing many steps manually.

As part of the company's agile transformation, agile infrastructure teams implemented automated solutions to streamline the provisioning and configuration of servers. One agile team built and maintained a centralized platform that automated the provisioning of servers and could be accessed through self-service tools. Other agile infrastructure teams, each aligned with specific software-as-a-service (SaaS) products, automated the configuration of those servers for the products they supported, using a configuration-management tool to define the servers' configurations entirely in code. This change reduced build times for environments from several months to about ten minutes. After

these solutions were implemented, whenever a cluster of servers had to be updated or expanded, teams could make the necessary changes rapidly, with minimal manual effort and risk of error.

The European financial-services company chose to automate its IT infrastructure offerings using similar technologies. As part of a broad push to adopt DevOps principles, it also sought to empower application developers to manage their own operations as much as possible. IT infrastructure squads built automated, self-service infrastructure solutions for application developers and taught them how to use those solutions. Developers could then, for instance, produce code to tell the system how to configure or update servers given the unique requirements of their applications.

Organization and talent: Building cross-functional teams

At traditional companies, infrastructure organizations have long been structured around teams with narrowly defined responsibilities for specific technical functions (for example, managing relational databases or operating systems) or stages of the plan-build-run IT service life cycle. Neither this structure nor the specialization it promotes is conducive to efficiency or agility, because multiple teams must typically work on each service request. To become more agile, infrastructure organizations can organize their staffs into small cross-functional teams focused on providing well-defined services. They can also develop modern workforces of well-rounded engineers who can learn new skills rapidly and work across multiple functional domains to carry out the end-to-end delivery of infrastructure services, as we describe below.

CIOs and technology leaders should bear in mind that engineers in agile infrastructure organizations typically need more diverse skill sets than application developers do. For infrastructure, that makes agile transformations more challenging. The infrastructure organization at the European financial-services company found some of the well-rounded infrastructure engineers it needed by carefully screening existing employees. The most capable ones were offered roles on infrastructure squads charged with building the highly automated self-service solutions described above.

At the software-and-services company, the leaders of the infrastructure group chose to organize their staff into skill-focused “chapters” to help with capability building, professional development, and standard setting. Chapter leaders determined which new skill sets their areas needed and were asked to develop training or hiring plans to meet those needs. For working purposes, the company organized everyone from those chapters into two types of cross-functional agile squads led by product owners who

defined and prioritized the backlog of activities that their squads would work on. Infrastructure squads focused on developing highly automated foundational infrastructure solutions (such as server provisioning) that other teams could use to set up, manage, and decommission infrastructure. Product squads were aligned closely with specific SaaS product-development teams and worked to engineer and automate hosting and operations for their applications, leveraging services from infrastructure squads when available.

Processes: Simplifying and integrating activities to minimize delays

The traditional IT infrastructure organization’s functionally oriented structure imposes a particular working style—specialized resources complete tasks in a prescribed order, with many handoffs between groups. This working style causes innumerable delays: every time a request is passed to a new group, it goes to the bottom of that group’s task list, where it might languish for days. Frequently, tasks are sent back to previous groups for clarification, increasing wait times even further.

Companies can eliminate many of these delays by creating small cross-functional teams as described in the previous section. Such teams can minimize or even eliminate process handoffs by managing the end-to-end delivery of specific service offerings. They should be empowered not only to deliver service offerings but also to improve their delivery by streamlining processes and engineering fully automated solutions.

The processes of the software-and-services company’s infrastructure group had become increasingly complex as the company grew and added new customer-facing products. That led to the use of project coordinators to help push service requests through the organization. After the company grouped its infrastructure engineers into agile squads, however, the waiting periods that had previously followed handoffs among functional groups vanished. That change alone halved the amount of time required to provide many core service offerings. The company’s squads also redesigned common processes to simplify workflows or eliminate unnecessary steps, such as certain approvals. The number of steps in virtual-server provisioning, for example, was cut by more than two-thirds, and the remaining steps were then largely automated through better engineering.

By contrast, the US-based financial services company mentioned earlier took a different approach to compensate for the limited development skills of its infrastructure organization. First, it set up cross-functional squads to simplify processes without automation. The resulting productivity gains bought employees enough time to learn more advanced engineering

skills. Then they began planning the development of automated capabilities to address common requests.

Collaboration with application development: Fostering understanding and accountability

Traditional infrastructure organizations have minimal interaction with application-development teams. Collaboration between the two camps is normally limited to the initial setting up of systems for new applications and the resolution of critical incidents. As a result, typical infrastructure engineers know too little about each of the applications they support to help improve the stability of those applications. Moreover, developers lack the awareness of operational issues they would need to engineer robust, easy-to-support applications. Modern agile organizations, by contrast, make a point of increasing the level of collaboration between their application-development and infrastructure functions.

The European financial-service company described earlier exemplifies one collaboration style: making developers accountable for operating their applications. Involving developers in the incident-response and postoutage follow-up processes for their applications makes them more aware of issues in their application code. Involving developers in operations also encourages them to write code easy to manage and support—they can be awakened in the middle of the night if incidents occur.

The large software-and-services company demonstrates a contrasting approach. Its infrastructure organization continued to support operations for application-development teams but found a new way of doing so: closely aligning agile product squads and application-development teams. The alignment greatly increased coordination and collaboration. Many of the product squads were co-located, at least in part, with the application-development teams they partnered with. Core members of each product squad would attend some of the agile ceremonies of the application-development teams. In addition, the close alignment helped infrastructure engineers to gain familiarity with the applications they managed, so they had a stronger attachment to the success of those applications, which could now be better monitored and supported.

An approach to transforming infrastructure using agile

In our experience, the challenges of modernizing IT infrastructure using agile can be overcome using a structured approach to designing, launching, monitoring, and enabling agile teams. (At larger organizations, applying that kind of approach in waves can help the transformation get

under way quickly.) This can be effective as part of a broader effort to transform a company with agile methods, or as an effort that is solely focused on the IT infrastructure group. Either way, the key steps in structuring an agile transformation of an IT infrastructure function are as follows.

1. Create a vision for the new infrastructure organization, particularly how the organization should operate and how quickly it should evolve. Several key questions will help IT and business leaders to define their vision for the organization.

What infrastructure service offerings should the organization provide to application developers and business users? Establishing a catalog of infrastructure service offerings helps companies to design and define the scope of agile teams and to decide which of them should own the tasks of delivering and improving those services.

How should the infrastructure organization collaborate with application developers and how should the interaction model evolve over time? Teams that are closely aligned with application-development teams can be beneficial if the infrastructure organization has responsibilities related to operating applications (for example, deploying code).

How quickly should the organization push to engineer automated solutions and adopt cloud technologies? The structures, processes, and skills of agile teams that focus on operations can be very different from those that focus on engineering infrastructure offerings.

How will infrastructure leaders and business executives gauge the efficacy of the transformation? Going into an agile transformation of the infrastructure organization, business and IT leaders should set clear objectives for improving performance and value creation, so that they can track progress and results with well-defined measurements.

2. Segment and prioritize opportunities with respect to the potential to create value for the organization. It is important to assess demand for infrastructure by developing a data-driven understanding of past consumption patterns and projected future needs. Knowing how much work is involved in delivering specific infrastructure offerings helps with organizing the work into scopes appropriate for an agile team. If, for instance, demand for storage-related work calls for a workforce of 24 people—too many for a single team—the effort might be divided among two teams: one focused on block storage and another on file storage services.

Analyzing demand can also help with identifying the greatest opportunities for improving efficiency and with prioritizing the rollout of teams accordingly. For example, a company can realize a great deal of value in a transformation by assigning the first agile infrastructure teams to handle and improve frequently performed labor-intensive services.

3. Design each agile infrastructure team to match the focus of each team with the working methods it will use. Teams focused on developing automated infrastructure service offerings tend to be relatively small—typically with eight to 12 people. They usually find that they work best using the scrum methodology, developing solutions in two- to three-week development sprints. Teams focused mainly on operations (such as level-one support teams) might benefit from longer rosters of up to a couple of dozen people. These teams often use the kanban or scrumban methodologies, which are more appropriate for managing a continuous flow of unplanned or event-driven work.

Over the long term, it is often preferable to have the same infrastructure team own both the planned development work and the unplanned operational work for a specific offering. This approach encourages teams to identify operational issues and fix them. However, at the beginning of an agile transformation, separating out unplanned operational work can help newly established infrastructure teams to focus on engineering highly automated solutions.

4. Create a structured process for rolling out agile infrastructure teams. The process should give all the people involved enough time to prepare for the launch of their teams. Our experience shows that it is critical to provide time and guidance to train team members, develop a strong team charter, align key stakeholders, and build out an initial backlog.

At the software-and-services company, for example, before each agile squad launched, its product owner and scrum master received two days of role training on how to perform their new roles. They then completed a six-week self-organized program, facilitated by agile coaches, in which they designed their teams' vision, scope, objectives, performance metrics, minimum viable product for improving delivery, and composition. Product owners also had to identify their key stakeholders up front and to review their plans with them and with the sponsors of the transformation so that everyone was aligned. Once the product owner and scrum master had finished these steps, the agile coach would lead the full team through a one-week "sprint zero," when it received training on agile and built out an initial backlog of work. After the sprint zero, the

agile coach attended key ceremonies during the first several sprints of the team to make sure it was stable.

5. Focus on the sustainability of the transformation. Soon after agile infrastructure teams have been launched, governance bodies (such as a committee composed of senior IT leaders) will probably be needed to ensure that the teams are advancing toward their goals, refreshing their objectives as the organization's priorities change, and improving their use of agile practices. In addition, many infrastructure organizations quickly discover a range of opportunities to build on the agile transformation's initial improvements. These include revising career models to support new agile roles, adopting more flexible budgeting processes, and making strategic planning more agile.

Addressing these improvement opportunities will take time, but senior IT infrastructure leaders can handle the work by using the same methods their newly launched teams do. They can organize themselves as a team, create a backlog of opportunities, determine priorities, assign owners, and carry out the work in sprints.

Legacy IT infrastructure processes common at companies that weren't "born digital" can impede the rapid delivery of new digital products and features. Agile methods can speed up the process significantly, and the benefits often start to materialize within the first six months of an agile transformation. A modern IT infrastructure organization that collaborates closely with developers and uses automation to accelerate configuration and maintenance can greatly boost its own performance, along with that of the wider company. For incumbents facing the threat of disruption from digital challengers, this can help make the difference between success and obsolescence.

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Next-generation core banking platforms: A golden ticket?

By Xavier Lhuer, Phil Tuddenham, Sandhosh Kumar, and Brian Ledbetter

Incumbent banks are concerned about the limitations of their core architecture platforms. Newly available tools make the challenge less daunting.

Competition in the banking industry is intensifying. Neo-banks are winning market share and serving customers at around one third of the cost of traditional banks. Fintechs are targeting lucrative niches in the value chain. Big tech players, with their large customer bases, pose a real threat and a few incumbents are investing heavily in innovation, putting laggards in the shade.

Attackers are growing their businesses and attracting customers with the help of modern core technology architecture, which enables them to innovate faster and operate more efficiently. Not surprisingly, incumbent banks are increasingly concerned about the limitations of their own core architectures and their relatively slow pace of change. As a result, some 70 percent of banks are reviewing their core banking platforms, according to a McKinsey survey of 37 banking executives in May 2019.

We see four key areas in which legacy platforms inhibit performance:

Cost. Cost is more important than ever given low industry return on equity (ROE). Yet technical debt in legacy systems consumes large chunks of IT spend—one mid-sized bank spent two-thirds of its digitization budget on this alone. Clunky legacy systems are associated with manual software delivery (manual regression testing and deployment) and low straight-through-processing rates (accumulated layers of complexity leading to fragmented and manual operational processes), which conspire to keep costs higher than necessary.

Time to market. Being able to launch products quickly is a critical competitive differentiator in the current crowded marketplace. However, faster product delivery is restrained by monolithic architectures (leading to multiple interdependencies and bottlenecks), poorly documented legacy code (causing over-reliance on a small number of subject matter experts), and manual delivery processes.

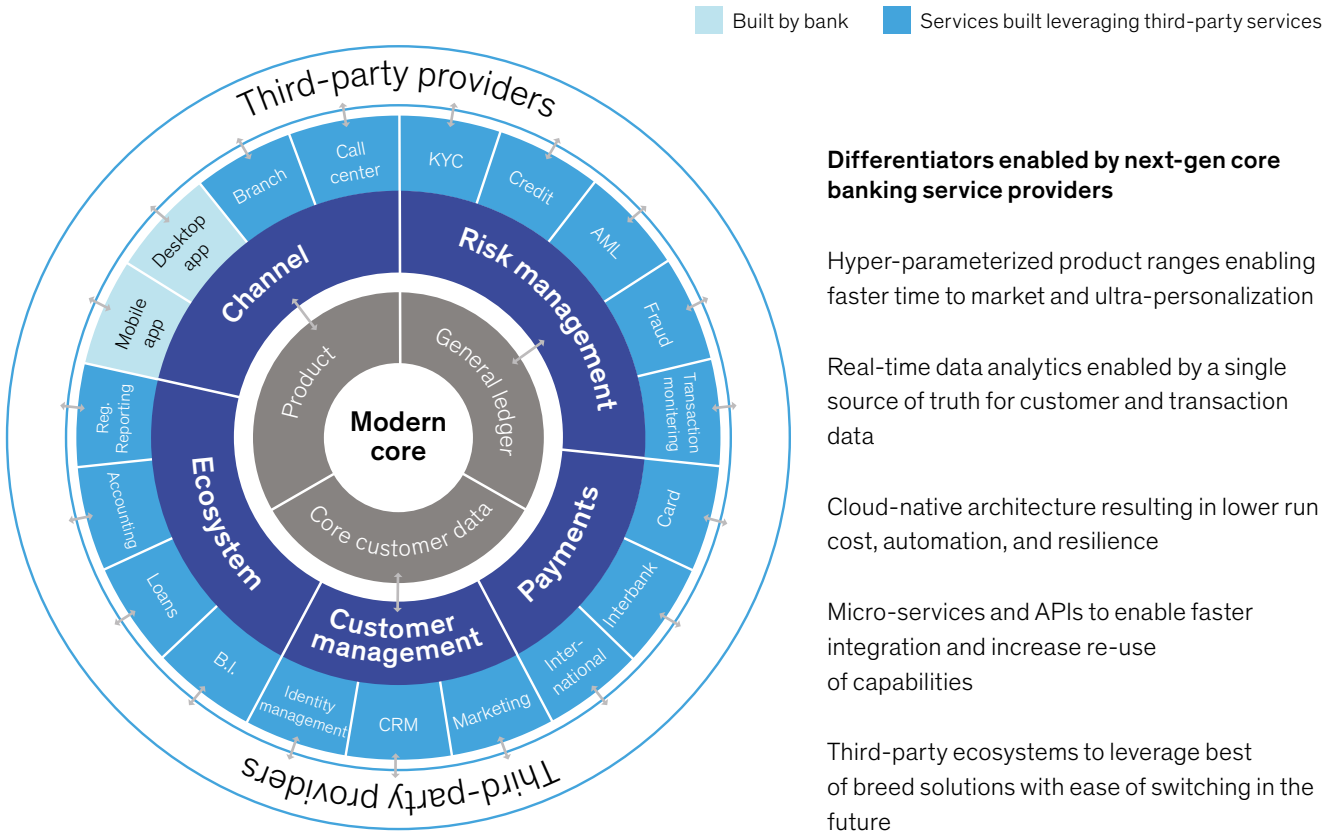
Personalization. Customers increasingly expect a personalized experience. But banks often store data in multiple product-aligned core systems, which inhibits catering to individual needs. For instance, one major bank had to invest in a major two-year program just to offer customers a combined view of savings accounts and investment products.

Ecosystems. Partnerships are becoming critical to creating the products and services of the future. Yet current architectures lack the connectivity to third parties that would enable innovation (e.g., property related services for mortgage buyers).

The good news for incumbents is that the tools are at hand to address these challenges. In particular, a new generation of cloud-native core banking platforms is emerging, including Mambu, 10X, Thought Machine, and FinXact, alongside offerings from the traditional core platform vendors. These promise to help banks radically modernize and bring the possibility of benefits including (Exhibit 1):



Bank anatomy based on a next-generation core banking platform



Source: McKinsey analysis

Reduced IT costs. Banks can cut spending through higher developer productivity and removal of technical debt. They can achieve further efficiencies by leveraging cloud-based services (which enable them to deploy new products and scale infrastructure quickly) and by using development tools that support automation (DevSecOps).

Accelerated time to market. Banks can more easily and speedily develop new products and services, aided by hyper-parameterized configuration capabilities. Higher levels of standardization make it simpler to leverage modern tools such as automated testing and therefore to implement more frequent deployment cycles.

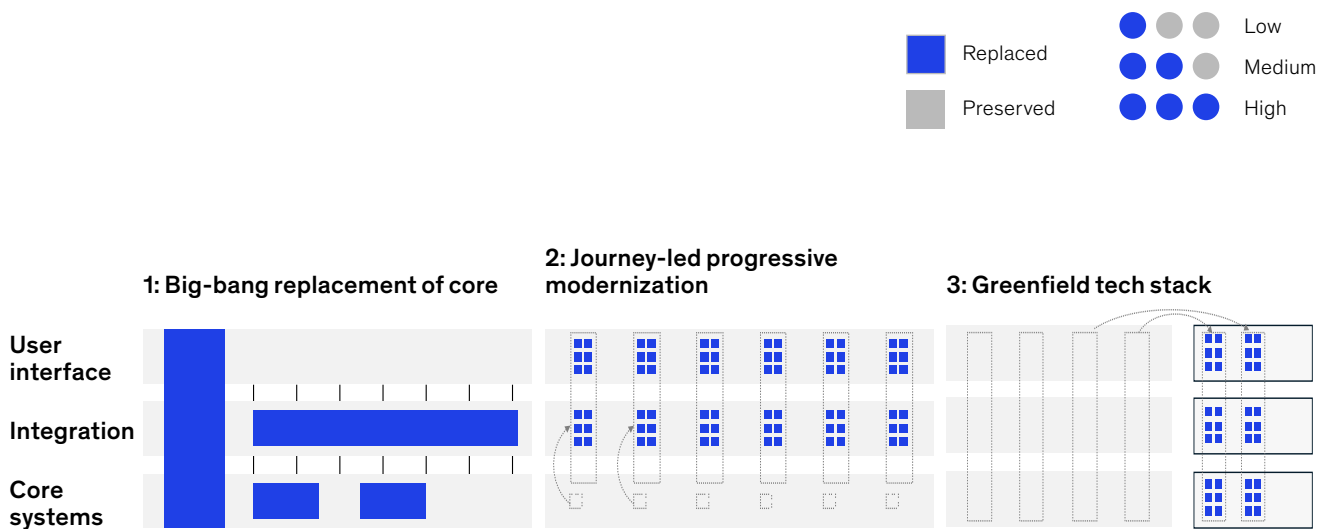
Data and a customer-centric proposition. Data capabilities are set to become a critical differentiator. Modern platforms support integrated data sets and a single source of truth. These in turn create the ability, in real time, to offer personalized experiences and run advanced analytics for sharper decision-making (e.g., for front-line staff).

The ability to scale through partnerships and innovate. New platforms enable rapid scaling and less expensive development of ecosystems and ancillary services. Integration is easier with modular architectures and communication via APIs.

Given these benefits, it's not surprising that more than 65 percent of the banks we surveyed are exploring the potential of next-generation platforms. Indeed, around the world, several have announced partnerships and are on the way to realizing significant benefits.

As attackers and some incumbents move forward, banking leaders remaining on the sidelines have three practical options (Exhibit 2)

Banks have three options to replacing the core



Description	<ul style="list-style-type: none"> — “Big bang” approach with monolithic system upgrades every few years — Selected systems upgraded or replaced according to architecture roadmap (through “buy” or “build” approach) 	<ul style="list-style-type: none"> — Top customer journeys reinvented end-to-end through zero-based design — New business logic built iteratively as modular microservices (and selectively “hollowed out” from existing systems) with shared utilities 	<ul style="list-style-type: none"> — Greenfield tech stack leveraging cloud-native architecture (e.g., hyper-parametrized, real time, modular, API first) — New customer onboarded on the new platform; existing customers migrated (e.g., cancel and re-enroll, recreate accounts)
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What bank needs to believe	<ul style="list-style-type: none"> — Current core is dated or out of support and there is an urgent need to replace 	<ul style="list-style-type: none"> — Current core has support and is usable for the next 5 to 10 years — Lower appetite for risk of data migration required than for big-bang or greenfield option — Highly complex product setup or legacy customers making migration a challenge 	<ul style="list-style-type: none"> — Risk appetite and budget to experiment with a technology hedge — Speed of product innovation over risk of data migration challenge for legacy customers
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Risk profile	● ● ●	● ● ●	● ● ●
Speed	● ● ●	● ● ●	● ● ●
Investment	\$100 million to \$500 million+	\$50 million to \$200 million	\$50 million to \$100 million

Note: Based on flash survey conducted in 2019 during a banking conference with over 100 banks
 Source: McKinsey analysis; annual reports

Full replacement of the core with a new tech stack. Banks often pursue this course of action when they urgently need to replace their core platforms because of obsolescence or regulatory imperatives. However, it can be risky. It requires extensive data migration and the benefits are typically only realized when the final customer is migrated and the legacy systems are decommissioned. Banks generally choose a traditional platform as the replacement, reflecting concerns that next-generation platforms are not yet fully proven or focused on a subset of products and features.

Progressive modernization. Most banks have pursued this strategy. It comprises retaining the legacy platform but progressively minimizing it as they build a modern architecture around it. It is often seen as a safe option if the current architecture is viable for the next five to ten years.

Most advanced banks start with the most critical customer journeys and a “strangler pattern”— hollowing out frequently-used functionalities and rebuilding them as microservices. Still, while the approach is lower risk than the first option, transition timelines are generally slow and banks may not achieve the desired levels of efficiency and time-to-market.

A greenfield banking proposition built on a new tech stack. CXOs focused on staying ahead of the curve often pick the greenfield option because it enables them to launch new offerings and deliver value quickly. It is often considered less expensive than the other options and safer because the existing customer base is not exposed until the proposition and technology are proven. With many banks exploring next-gen core platforms, this option arguably provides the best way to elicit the most value.



A few institutions are also exploring the possibility of migrating a large incumbent customer base using a “reverse takeover” approach.

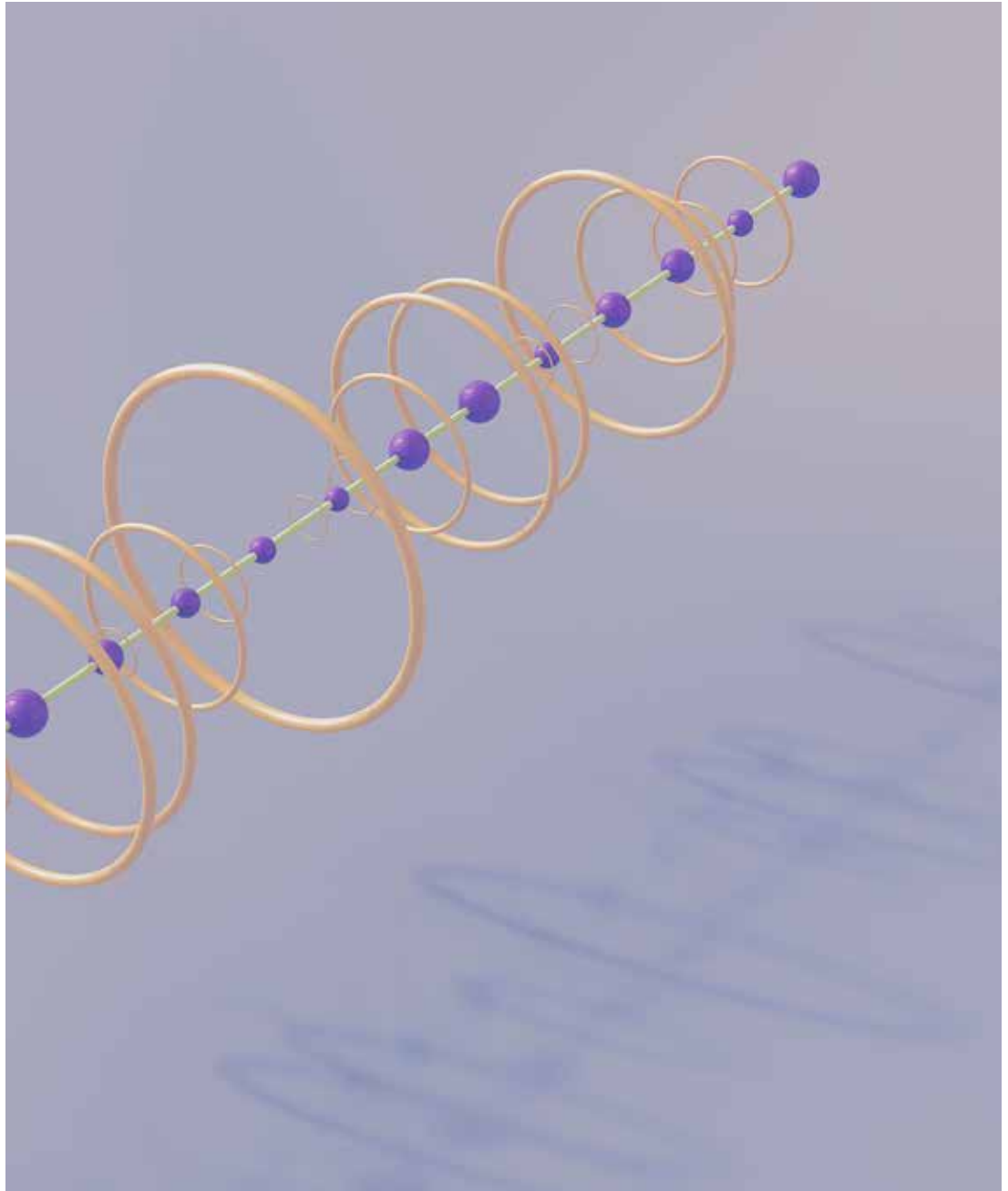
In terms of budget, the majority have earmarked \$10 million or more over the coming year (sufficient for experimentation), with around 20 percent planning to invest \$20 to \$40 million, according to our survey.

The platform decisions leaders make now will set their direction of travel for the next five years or more. They need to think carefully about their next move. Still, there is scant opportunity for delay. The industry is approaching an inflection point, at

which technology leaders will put clear blue water between themselves and the competition. The bottom line? CXOs need a clear strategy to avoid being left behind.

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Cutting through the noise: How banks can unlock the potential of APIs

By Harald Kube, Timo Mauerhoefer, and Nik Tavakoli

API-driven products and services represent both a competitive threat to incumbent banks and a significant opportunity.

Application programming interfaces (APIs) are shortcuts that make it easier for software developers to build new applications. In the banking context, however, they are something more. APIs enable easy access to banking services, products, and data. This transforms them into keys, capable of unlocking a range of business opportunities. Add the impact of regulation and they change again, becoming agents of disruption with transformative potential.

APIs are in effect multipurpose tools, enabling compliance with open banking regulation such as Europe's Payment Services Directive 2 (PSD2), access to ecosystems of related businesses, and simplification of legacy IT systems. They represent a significant opportunity to innovate, work more efficiently, and develop new products and services.

When it comes to API implementation, progress is patchy. Many banks have taken initial steps, and have seen positive returns in terms of technology development, customer engagement, and business expansion. In China, for example, various ecosystem models are bringing together fintechs, companies, banks, and other financial services providers to buy and sell products, share technology, and expand their networks. Banks in Europe and the US are also starting to get involved, often working with, or investing in, fintechs to create new revenue streams and more tailored customer experiences. Some have launched aggregator apps, bringing together account information from a number of institutions, or have created online marketplaces in which partners can pick and choose products and services, sometimes to integrate into their own platforms.

Still, while some banks are ahead of the curve, the majority have work to do. Most are in the development phase, and few fully understand how a data-driven business model will work for them.

McKinsey estimates that the value at stake across global banking is significant — approximately 50 percent of revenues or 65 percent of profits (the money banks make from distribution rather than manufacturing) over the coming decade. On that basis, efforts to date represent the tip of the iceberg.

Three basic models, but no big bang

As API-driven financial services expand, individual institutions are developing applications based on their own priorities. These are aligned with three generic API models, which most banks apply in combination. One is focused on internal processes, systems, services, and data and two are external-facing and oriented either to commercial partners or the general public.

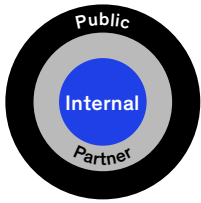
Each model is associated with a distinct set of business priorities. Internal APIs are designed primarily to streamline software development and simplify systems and operational processes. These currently represent the vast majority of use cases. Partner APIs, meanwhile, allow external firms to access data that can enhance products and services or create new ones. Finally, public APIs open up bank data, products, and services to communities of developers, with the aim of encouraging rapid development and commercialization. One example of this kind of innovation is integration of a credit application on a real-estate website.

For now, most banks are focused on internal API development. A McKinsey survey conducted in late 2018 shows that more than 91 percent of APIs are internal (Exhibit 1). Just 7 percent are partner APIs (mostly arising from regulation such as PSD2). Partners are mainly fintechs and customers. Less than 2 percent are public.



Most banks focus on internal APIs to cut costs and boost efficiency

Overview of different API types



API type	Attributes	Share of total APIs	For which partners do you provide services via APIs?
Public/open APIs used by external developers to build innovative apps and products	Innovation through engaging developer community Extended market reach	2%	Share of responses, multiple selection possible New players (e.g., fintechs) 33%
Partner/B2B APIs used by business partners, including suppliers, providers, resellers, and others, for tighter partner integration	Reduce partnering costs API monetization Enhanced security	7%	Customers (e.g., large corporates) 28% Incumbent partners (e.g., insurers) 17%
Internal APIs used by developers within enterprise	Cost reduction Operational efficiency Enhanced security	91%	Government 17% Other 6%

Source: McKinsey Global API Banking Survey

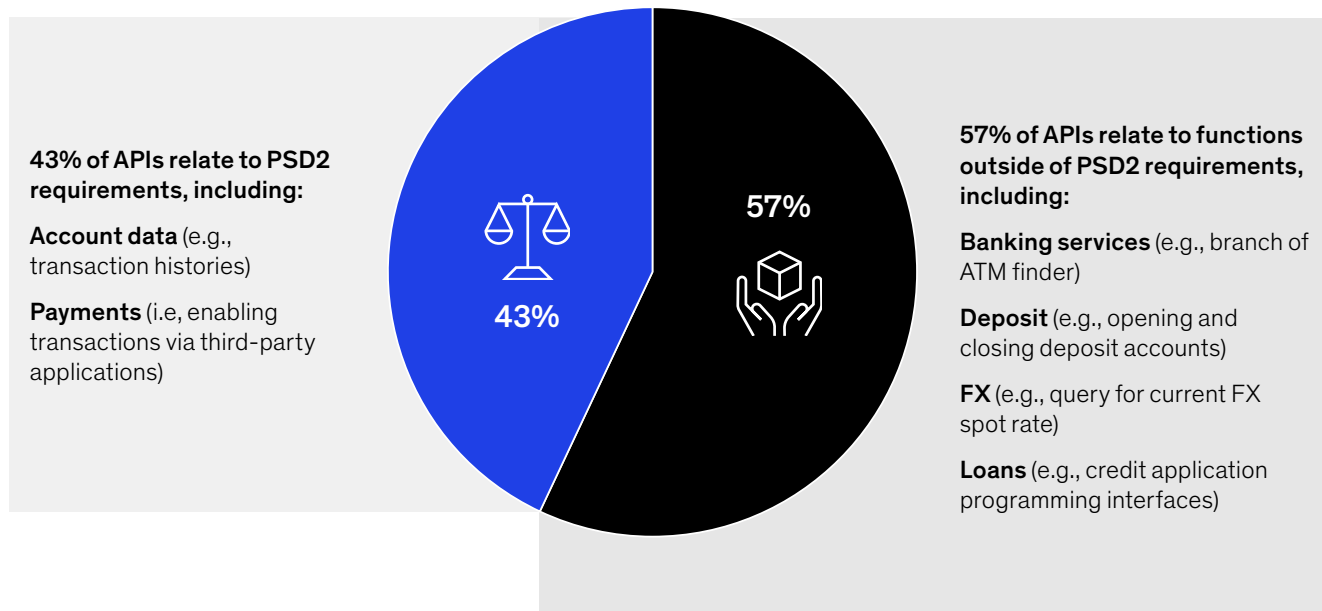
Where they are building external models, many banks are providing banking-as-a-service to fintechs, aiming to use existing assets to construct new products and services. Another powerful use case is to integrate offerings into customer IT platforms. One large European bank, for example, is developing a “treasury cockpit,” which can be integrated with customer systems to enhance transparency and enable faster interactions.

While the majority of APIs by number are internally focused, most banks have some kind of outward-looking program. According to a McKinsey survey and publicly available data, some 65 percent of the 40 European institutions among the 100 leading global banks (ranked by balance-sheet assets) have a developer portal to share APIs externally. On a global level, 47 percent of the top 100 do the same thing. Regulation is often a primary driver, but equally banks are seeking to innovate where they see an opportunity.

Where banks have externally facing portals, some 43 percent of APIs are focused on complying with PSD2. These may, for example, offer access to account data or enable third-party payments. The rest relate to functions outside PSD2 requirements, including services such as branch/ATM finders, account opening and closing, FX, and loan applications (Exhibit 2). In fact, some 57 percent of external APIs are not required under PSD2 compliance.

Banks are increasingly implementing APIs in areas other than regulatory compliance

APIs offered by the top 100¹ global banks by function, in % of total number of APIs released externally



¹ Measured by balance-sheet assets
Source: Publicly available API developer portals of top 100 global banks

Banks' willingness to innovate beyond regulation is usually a reflection of strategic objectives. Respondents to our survey say their most important rationale for API investment is reduction of IT complexity. Next come revenues and cost cutting, followed by regulatory requirements and to enable partners. Of course, API development also represents an opportunity to boost fee income, a welcome benefit in a low-interest-rate environment.

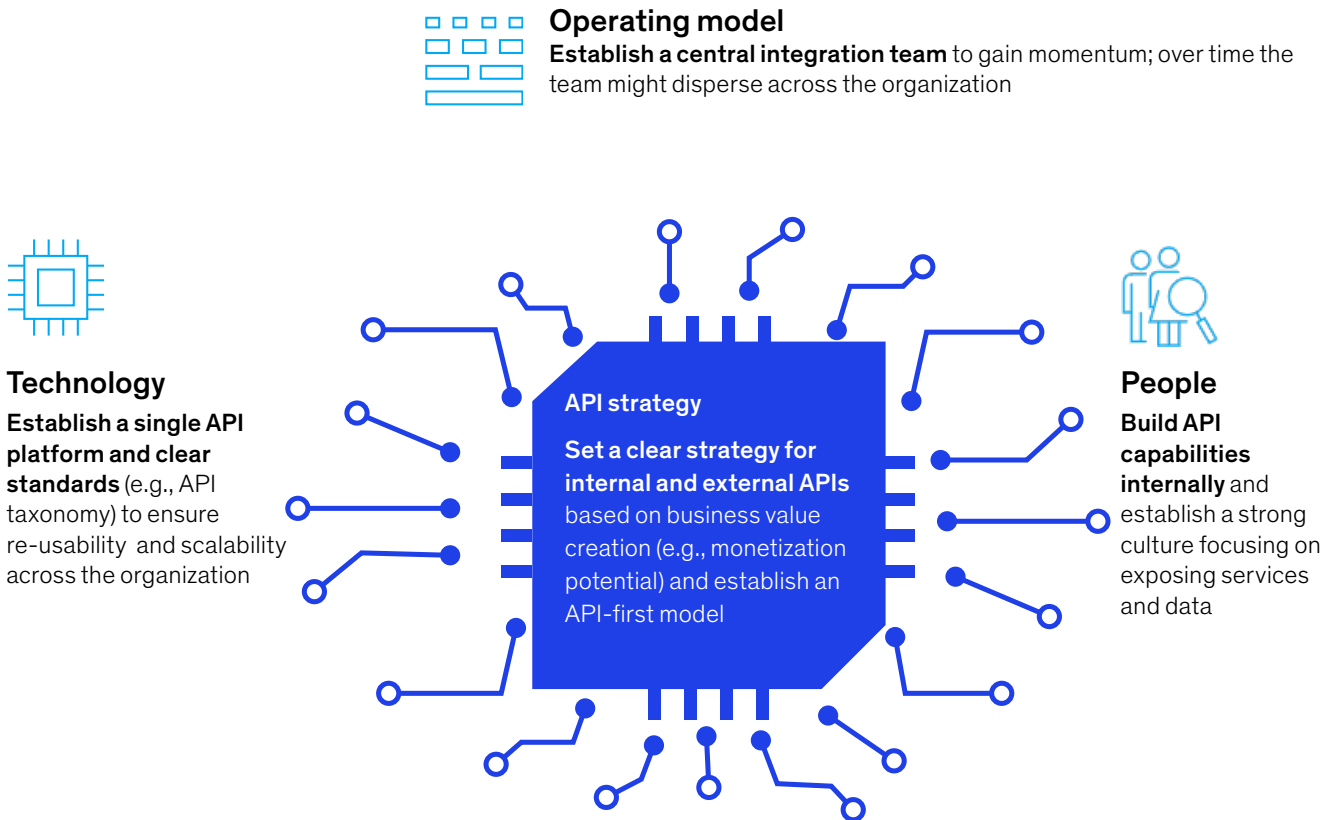
Despite this wide range of motivations, the API "revolution" is still in its infancy. One reason is that many banks suffer from a strategic deficit. Executives understand the principles, but are unsure of how they create a material impact on the bottom line. As a result, there is little sign of a "big bang" in API-based propositions.

What does it take to unlock the potential?

Based on our work with financial institutions and insights from our survey, McKinsey has developed a standardized framework for building a cutting-edge API capability. The framework comprises four key elements: strategy, operating model, technology, and people (Exhibit 3).

What it takes to become an API leader

Key elements of an API program



Source: McKinsey analysis

One core underlying principle is that API development must be business-value focused. This means for external APIs, banks need a well-thought-through API monetization model, potentially including a combination of schemes such as freemium and pay-per-use. Internal APIs should add value through factors such as costs savings, speedier time to market, and increased quality of products and services.

From an operating model perspective, there are two basic steps, starting with a centralized model and progressively moving to a decentralized approach. Centralized models, with a single team developing APIs, can create critical mass and act as a focal point for learning. A decentralized version, meanwhile, suits more mature scenarios. It most often comprises agile teams working across the business. Funding strategy may echo this approach, with funding initially provided centrally but later shared between teams.

From a technology perspective, it makes sense to build a central API management platform, which can act as a single source of truth for developers. A single platform is also an antidote to duplication and supports the use of monitoring tools. In addition, principles of recycling should apply. APIs should be designed to be reusable, and over time should become first choice for delivering new business features.

Equally, in a dynamic marketplace, banks should aim to develop API capabilities quickly and to focus on continuing to innovate, even as they reach maturity.

Finally, talent is crucial. Banks need to recruit the best people and hold onto them. This is a sure route to competitive advantage. A related point is the necessity of senior level buy-in. The most successful API initiatives are supported by senior management, in most cases directly by CXOs—ensuring a strong focus on business value. Still, senior executives may require education on the relevance and potential of APIs—it makes sense to develop ways of talking about APIs that are not too technical. Once engaged, leaders should adopt an API-first mentality, so that every product initiative is gauged in terms of its API potential. Incentivization schemes should also reflect this priority.

API-driven products and services represent both a competitive threat to incumbent banks and a

significant opportunity. Most management teams understand the potential and are starting to roll out projects to streamline internal processes and reach out to third parties. Some are already realizing significant benefits. Still, as digitization accelerates, the competitive temperature is rising. Banks that have made a slow start need to accelerate and focus more intently on turning innovation into real impact on the bottom line.

More information on our API transformation approach, case examples, and the API survey results can be requested via Global-API-Survey@mckinsey.com.

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Unlocking business acceleration in a hybrid cloud world

By Arul Elumalai, and Roger Roberts

Companies that have moved operations to the cloud still aren't achieving the desired operational agility. A renewed focus on people, processes, and policies can unlock the cloud's full potential.

Digital technologies continue to transform every facet of business. Across industries, CEOs have a consistent top priority—harness technology to jump-start growth, speed time to market, and foster innovation. Several factors are ratcheting up pressure: investors are valuing top-line revenue growth; rising customer expectations for simple cross-channel experiences are compelling companies to systematically tear down silos; and an organization’s ability to respond to market shifts is becoming a core differentiator. Meanwhile, digital leaders across sectors have changed the competitive landscape by demonstrating that agility and velocity can beat scale.

Senior technology leaders are feeling this pressure. In recent McKinsey research, when chief information officers (CIOs) or equivalent tech leaders were asked about their CEO’s top priorities (see sidebar, “About the research”), 71 percent pointed to agility in reacting to changing customer needs and faster time to market, while 88 percent of respondents cited revenue acceleration (Exhibit 1).

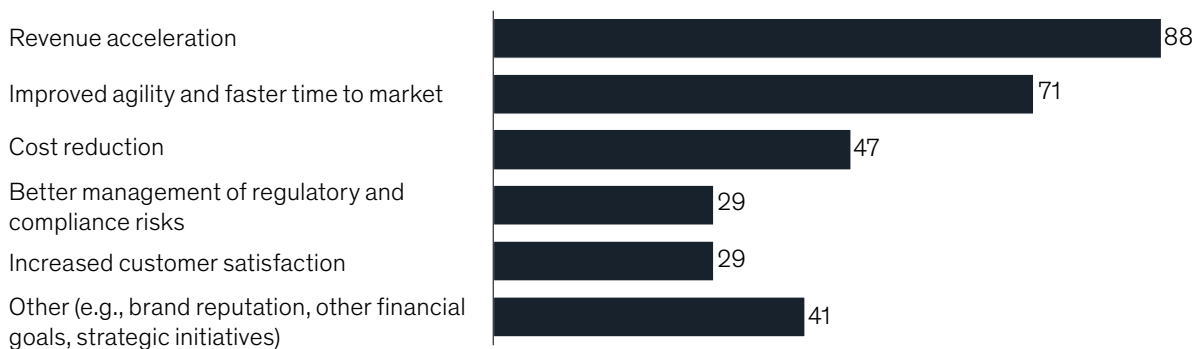
Exhibit 1

To stay relevant and ahead of the competition, CEOs across industries are prioritizing growth and speed of innovation over cost

“What would you say are the top 3 priorities for your CEO?”

Chief information officers who mentioned this as a top 3 CEO priority, %

CEO priorities



Source: McKinsey expert interviews (N=52)

These priorities are playing out across every industry, with huge implications for business models.

- A clothing company, for example, traditionally had several weeks between the introduction of a new product line in stores and when competitors could get their cheaper versions to market. That cushion has dropped significantly thanks to digital channels: the company indicates that it now has just 48 hours to launch a new design and gain buyers through digital, direct-to-consumer routes, and rapid (sometimes same-day) delivery.
- A digital-media company regularly saw spikes in viewership upon releasing new content, so its need to ramp up infrastructure in order to accommodate increases in demand has suddenly become critical to satisfy its subscribers.
- In financial services, a line-of-business leader at a large retail bank cited tremendous pressure to shorten product-development cycles. The industry’s average product release time has ranged from nine to 24 months—a glacial pace compared with that of fintech companies, which can deploy code daily and run dozens of A/B tests a month.

The common thread running through these examples is the ongoing, urgent need to gain market advantage through business acceleration.

Role of digital and the ever-increasing reliance on technology leaders

IT strategy has long been part of business strategy, but C-suite executives (CxOs) are increasingly seeking a larger impact from investments in digital technologies. Digital innovation has become central to the full range of business transformation initiatives and is no longer just one category among many.

Since technology is integral to a company's performance and competitiveness, identifying prudent investments in IT modernization becomes even more critical. CEOs recognize the importance of getting it right: good choices establish a favorable course, and the business soars; however, poor choices will siphon away much-needed organizational energy and resources and undermine competitiveness.

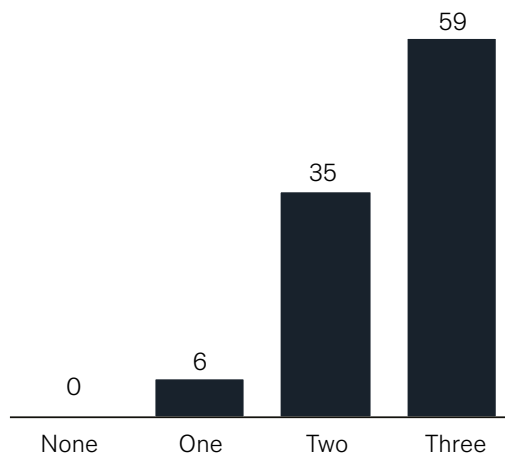
The task of translating ambitious tech-driven strategies into accelerated performance falls to CIOs and chief technology officers (CTOs). Nearly 60 percent of CIOs indicated that their CEO depends on them to achieve the organization's top three business priorities (Exhibit 2).

Exhibit 2

IT leaders clearly realize CxOs' dependence on them to deliver on growth priorities and agility expectations

"Which of the top 3 CxO priorities depend on you?"

CIOs who indicated that at least 2 of CxOs' top 3 priorities depend on them, %



Source: McKinsey expert interviews (N=52)

As a CTO at a large US insurance company points out, "I think all CEO priorities depend on the office of the CTO. It is all about bringing products to market faster. We have to innovate on new policies and change our business model rapidly." And the CIO of a retailer indicates that the IT team is mutually accountable with the chief marketing officer (CMO) to achieve the growth objective: "The CIO and CMO will have to work together. We have common metrics to track. If a campaign fails, both of us are on the hook. So to say that the CMO is dependent on me to deliver the objectives is an understatement. It's our joint responsibility."

The IT infrastructure modernization imperative

To meet CxO and board expectations, IT modernization is critical. According to our research, CIOs believe that the organization cannot capture agility benefits by simply shifting applications to cloud platforms. Instead, they recognize the need to reassess the infrastructure stack and the way it works.

Emphasizing agility while managing cost and risk

When asked about the principal benefits of infrastructure modernization, CIOs prioritize increased agility and better quality of service to customers. They are also looking to reduce costs and improve their security posture (Exhibit 3).

Exhibit 3

CIOs believe that business benefits cannot be achieved by lifting and shifting applications and need to rethink the infrastructure stack

CIO reasons for pursuing infrastructure modernization

100 points allocated across

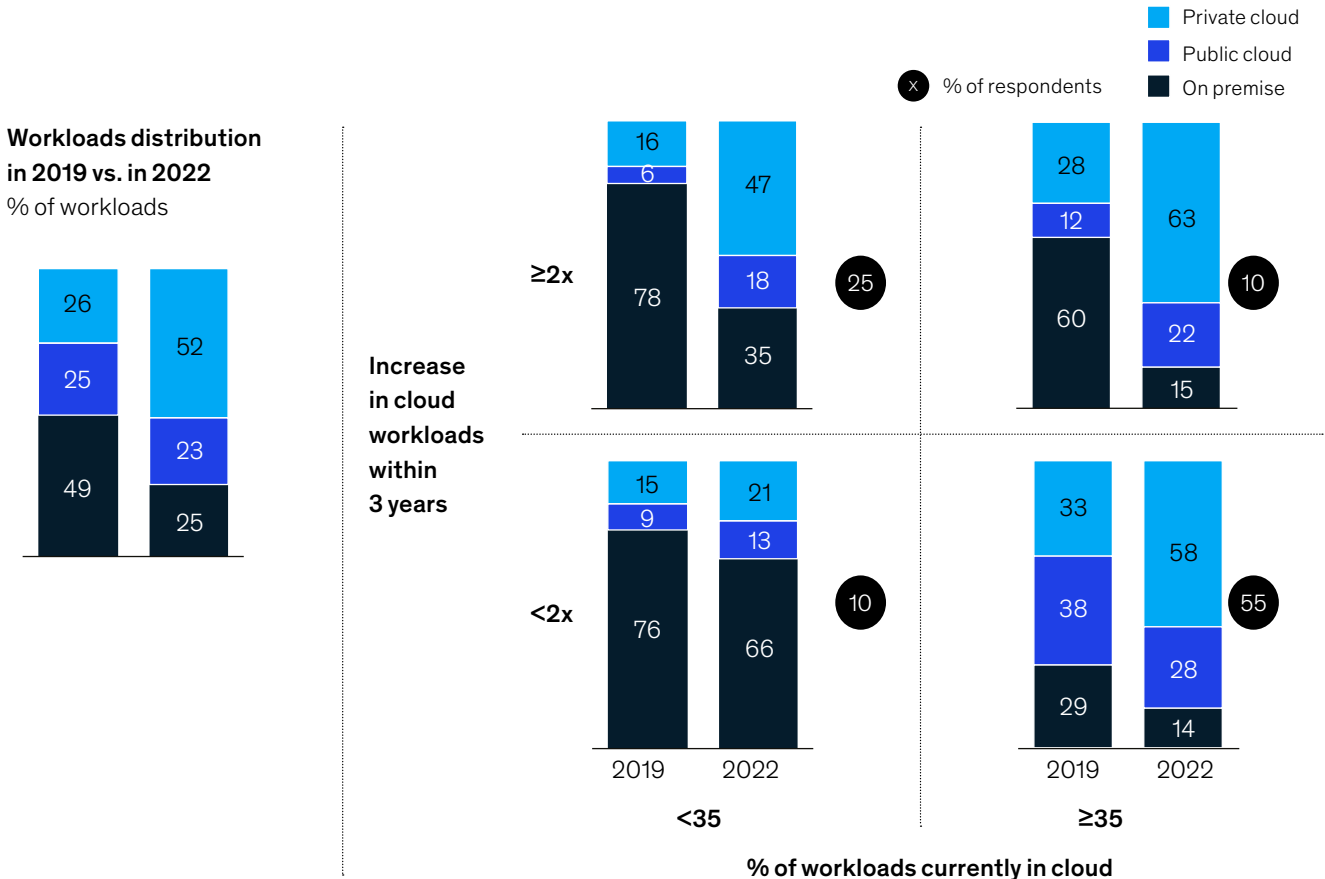


Source: McKinsey expert interviews (N=52)

CIOs see the cloud as a predominant enabler of IT architecture and its modernization. They are increasingly migrating workloads and redirecting a greater share of their infrastructure spending to the cloud. The companies we surveyed currently have around 50 percent of all workloads running on public- and private-cloud platforms. By 2022, that share is projected to rise to 75 percent, with roughly two-thirds of that workload housed in shared public platforms within data centers built out by the major cloud-service providers (Exhibit 4).

Exhibit 4

CIOs see cloud as crucial to modernizing technology and are increasingly migrating workloads to cloud



Source: McKinsey expert interviews (N=52)

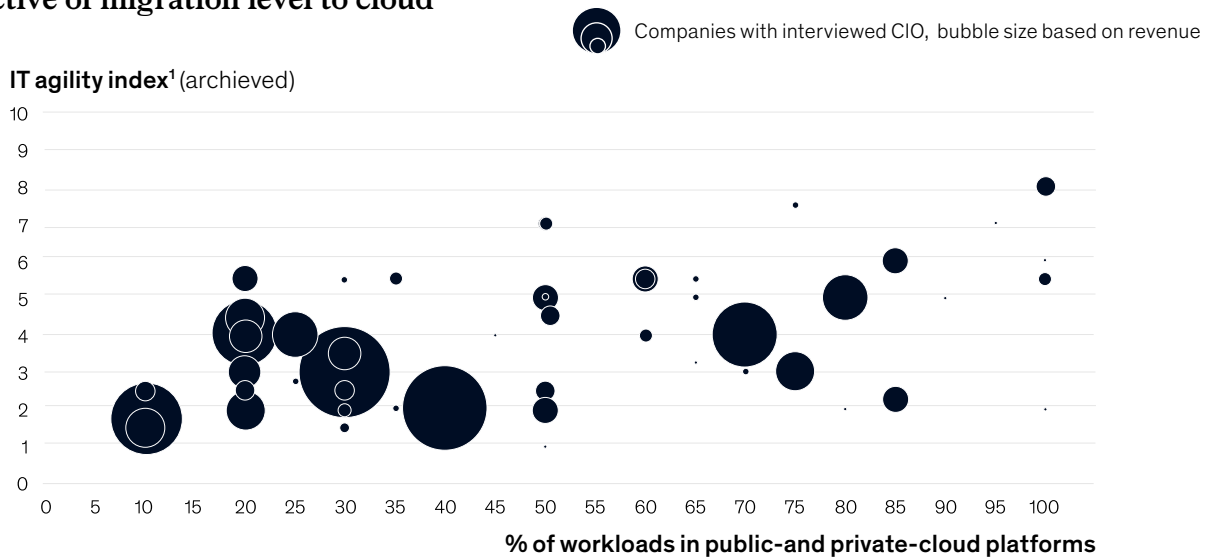
While this migration represents a dramatic technology overhaul, astute tech executives also view it as a trigger to reevaluate how the IT function works. One large retail chain's CIO notes, "I need a forcing device to jolt my organization out of its old ways of working. I see cloud as that catalyst. Our current tools enable the old ways, not the new. Until we implement the tools and data, we can't reap the full benefits."

Identifying key challenges

Thus far, modernization efforts have largely failed to generate the expected benefits. Despite migrating a portion of workloads to the cloud, around 80 percent of CIOs report that they have not attained the level of agility and business benefits that they sought through modernization. Further analysis indicates that companies are falling short of their IT agility expectations, regardless of their level of cloud migration (Exhibit 5). Even organizations that have transitioned the majority of workloads to the cloud remain within the same range of IT agility as their slower-moving counterparts.

Exhibit 5

Analysis indicates that companies are falling short of their IT agility expectations, irrespective of migration level to cloud



¹ Parameters used to calculate IT agility score are the following, self-reported and rated on a scale of 0 to 10; speed of application and feature development, maturity of IT operation, and agile application-development capabilities
Source: McKinsey expert interviews (N=52)

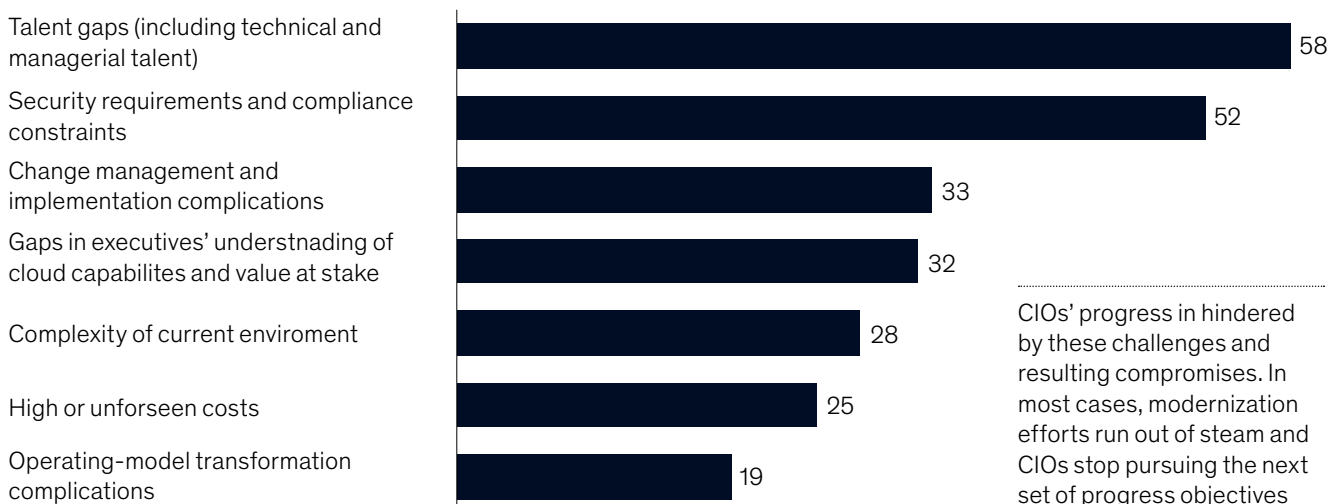
Our research found that CIOs face several entrenched challenges when pursuing IT modernization: survey respondents indicated talent gaps were their top barrier, followed by security and compliance requirements (Exhibit 6).

Exhibit 6

CIOs' inability to deliver on agility objectives is due to valid constraints and challenges

Top challenges CIOs are facing in infrastructure modernization

CIOs who indicated this as a challenge, %



Source: McKinsey expert interviews (N=52)

The CIO of an automaker reflects on the struggle of hiring candidates with the requisite cloud expertise: “Finding someone with skills similar to engineers who are attracted by large cloud providers and software as a service (SaaS) companies is too difficult.”

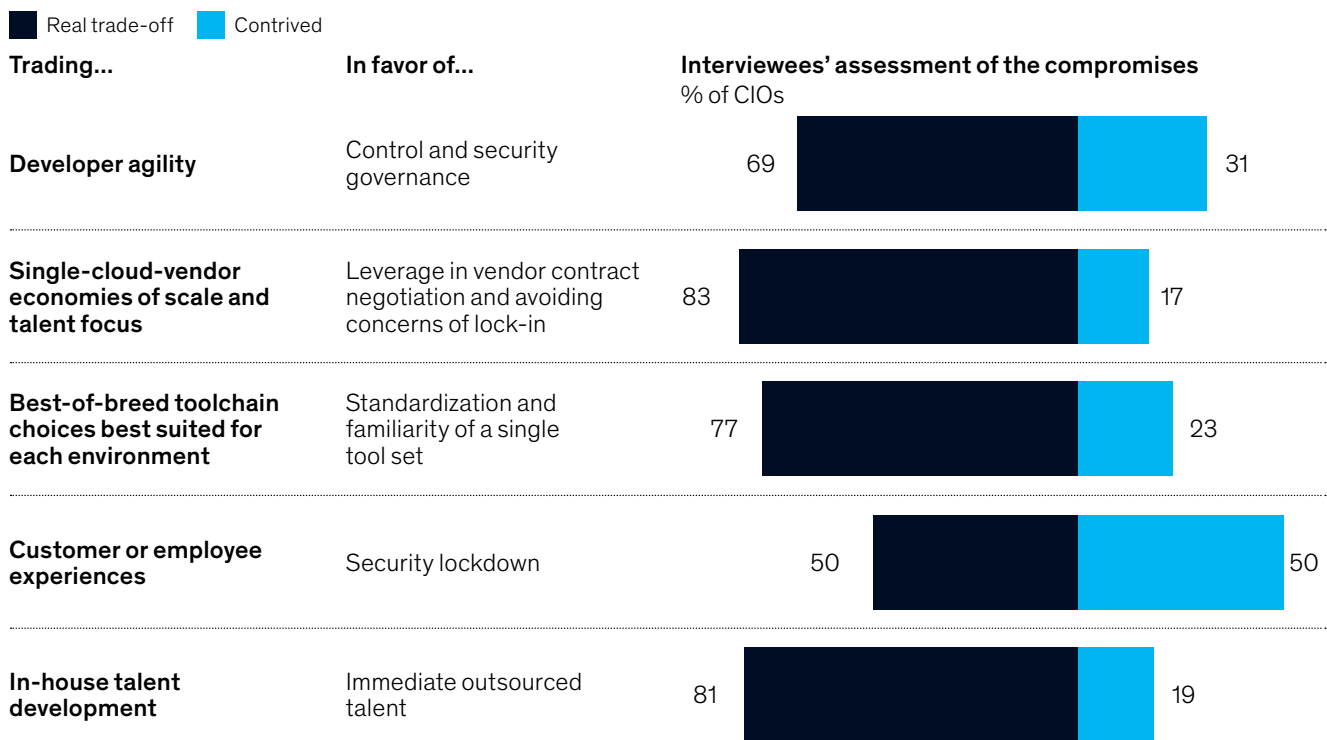
Notably, 28 percent of respondents cited the complexity of their current environment. The technology leader in financial services notes, “We were surprised by the hidden complexity, dependencies and hard-coding of legacy applications, and slow migration speed.” Thus, it becomes critical for many applications to refactor for modern architecture. This approach—characterized by microservices and containerization—enables companies to balance the projected cost to run against cost to modernize, focus on the pace of innovation and enhancements, and improve responsiveness to fast-changing needs and dynamic markets. We have seen CEOs seek this guidance from their IT leaders and teams.

Managing trade-offs on the IT modernization journey

The inability of CIOs to achieve greater agility is in part due to valid constraints (such as gaps in skills and training), but our research finds that avoidable compromises also hinder progress. Few organizations have the luxury of starting with a clean-sheet approach to IT infrastructure, and so CIOs are making trade-offs in the name of balancing the ideal with the practical. Our analysis identified five common compromises that IT leaders feel they are frequently forced into and that negatively affect agility (Exhibit 7). Furthermore, some CIOs debate whether such compromises are valid or not. Some say these responses reflect real constraints, while others say that adopting new technology and operating-model innovations can easily address these constraints—hence, these are not trade-offs at all.

Exhibit 7

Some cases of compromise prove to be avoidable, according to CIOs’ assessments



Source: McKinsey expert interviews (N=52)

While a majority of CIOs indicate that they are living with these suboptimal choices, deeper analysis of companies that have successfully navigated these trade-offs highlights best practices to avoid these compromises and, in turn, increase business agility.

Giving up developer agility for the sake of control and governance. One of the top benefits of transitioning operations from legacy infrastructure to cloud-native solutions is the speed at which developers can work. However, 69 percent of organizations indicate that implementing stringent security guidelines and code review processes can slow developers significantly. According to the chief information security officer of a multinational cloud-based solutions provider, “In the old world, when a developer checks in bad code, I can find it and control the blast radius. But in cloud, it happens too fast—I still have those codes go through manual reviews and sign-offs.” Some leaders have found a way to work around this compromise through the following approaches:

- **Acquiring and upgrading talent.** Leading companies hire developers with security architecture expertise and entrust them to design secure architectures from a project's inception.
- **Provisioning process improvements.** DevOps engineers use application programming interfaces (APIs) for environment creation, which include functions that specify secure configuration.
- **Changing development processes.** By bringing security teams more deeply into agile development and DevOps processes, companies have avoided the added complexity of cross-team coordination and alignment across development and security teams.
- **Investing in toolchain and technology.** CIOs are integrating the right set of DevOps toolchains that can automate security policies.
- **Automating code reviews.** Security-code scanners are used to conduct automated code reviews for common vulnerability.
- **Automating test suites for code elevation.** Development teams are investing in test-driven development, and test suites are foundational to automate the elevation of code from development to test, sandbox, and production environments.
- **Implementing developer self-service.** Standardizing the service catalog for infrastructure, implementing cost guardrails, and enabling self-service can speed infrastructure procurement approval processes for developers.

Forgoing single-vendor benefits in the name of avoiding vendor lock-in. Companies can realize economies of scale and build deeper expertise (especially given the cited talent shortages) if they use fewer vendors or deploy technology to allow them to scale across multiple vendors with common controls. For 83 percent of CIOs, the potential loss of flexibility from vendor lock-in can loom large, forcing them to choose multiple vendors and thereby split their focus, divide their talent to learn and work on different vendor solutions, and reduce their speed of execution. The CIO of a North American retailer notes that when it comes to picking public-cloud providers to migrate applications, "This is a true debate. Without multiple vendors, you run into technical and financial lock-in."

CIOs can also accelerate application development by using native services offered by providers. However, in some cases developers are being discouraged from creating new dependencies on native services because of concerns that it will be harder to move away from the platform if needs evolve in the future. As a CIO for a professional services company explains, "We don't see

concerns of vendor lock-in with public-cloud providers by betting on a single vendor. This is not a new concept for us. However, some of our stakeholders take a different view. They hear about outages and want us to source from two or more providers." Help is coming in the form of emerging solutions that work across cloud-service-provider platforms, enabling enterprises to avoid this compromise. In the meantime, leaders are working around vendor lock-in through the following methods:

- **Abstracting infrastructure.** Seasoned architects are choosing technologies such as containerization to abstract infrastructure and to enable portability across disparate environments.
- **Minimizing dependencies on infrastructure or platforms as a service (IaaS or PaaS).** Developers at leading companies build applications that are not tied to platforms by avoiding using proprietary cloud services offered in the PaaS layer. And in cases that necessitate dependencies, developing modular code enables services to be easily swapped out when companies move from one cloud provider to another.
- **Safeguarding contracts.** Companies concerned about future price increases from cloud providers draft and negotiate contracts that both set boundaries and offer downside protection from escalation of costs.
- **Educating executives and the board on vendor strategy.** CIOs and CTOs who prefer using a single cloud provider are making the effort to educate board members and collaborate with them to come up with solutions for vendor lock-in or service disruptions.

Missing out on the benefits of best-of-breed tool kits for the sake of standardization and familiarity. Toolchains optimized for different environments— and those with which developers and operators are most familiar—help boost productivity. In our research, 77 percent of CIOs expressed concern over having to standardize a lowest-common-denominator solution. Consequently, this trade-off means accepting reduced functionality and fit for the work at hand. Modern developers need to be free to choose combinations of languages, libraries, and frameworks that enable accelerated delivery. Leading companies are working around this trade-off in the following ways:

- **Adopting open, vendor-agnostic solutions.** Emerging cross-platform open-architecture and open-source solutions provide coverage for hybrid and multicloud environments.
- **Continuously upskilling talent.** IT organizations are adopting best-of-breed tools and investing in upskilling for developers and operators on multiple solutions.

Trading customer and employee experience for the sake of security. Providing reliable “anytime-anywhere access” of applications to users (developers or agile teams in marketing, for example) allows organizations to rapidly innovate, respond to customer needs, and scale up tests and experiments. It also enables employees to be more productive and complete tasks from anywhere. In our research, we observed leaders pursuing the following strategies to improve customer experience without compromising security:

- **Adopting a DevSecOps approach.** IT organizations are pursuing a DevSecOps style of management for high-velocity code and model-development pipelines. Doing so not only combines the security and DevOps functions—it also blurs lines across formerly distinct roles in “waterfall” software development life cycles, simplifying the end-to-end application development and delivery process.
- **Adding layers of security.** Leaders are implementing multiple layers of security, especially for identity and access management. They are using multifactor authentication and refreshing end-point security for applications that are accessed remotely or use mobile devices.
- **Investing in data security.** IT organizations are investing to not only secure their data, the perimeter, and applications, but also to encrypt at-rest and in-motion data.
- **Remediating applications.** Companies are remediating applications opened up for external access to employees and end users.
- **Assessing security automatically and more frequently.** Leaders have increased the frequency of application scanning and penetration testing (against apps and source code).
- **Ensuring application version compliance.** Automating patch scheduling for external-facing apps ensures compliance with the latest, most secure versions.

Delaying talent development and upskilling and augmenting talent with contractors. A shortfall of tech talent is a recurring challenge for CIOs. Companies often feel they face two options: develop in-house capabilities slowly or rely on external vendors to get initiatives done quickly. Despite the best intentions to build capabilities, IT teams often compromise by outsourcing projects to contractors or partners to patch holes in their talent pipelines. The challenge is that a short-term solution often leads to long-term dependence—without a parallel focus on promoting skills transfer, retraining current staff, and systematically backfilling contractors. Leading companies tackle this issue in several ways:

- **Hiring new talent.** IT functions are investing

in the cloud operations talent and developers who bring modern full-stack skills and mindsets. These workers represent a truly strategic resource, assuring that any cloud modernization effort accounts for skill building—even if organizations need a boost from contractors to get rolling quickly.

- **Building capabilities with external help.** Companies are bringing in external expertise for skill building (such as agile team facilitators, DevOps coaches, and analytics and data science practitioners) to augment in-house talent.
- **Offering employee-education programs.** Companies are providing their employees with tuition and external-training expenses for selected continuing education, such as AI and machine-learning programs, accelerated software engineering reskilling programs, and DevOps training.
- **Partnering with technology vendors.** IT collaborates with vendors such as cloud service providers and other partners to gain expertise and educate in-house talent.
- **Freeing up capacity to invest in new skills.** Automating routine monitoring, reporting, and troubleshooting tasks can create capacity for operators to develop new skills and take on additional responsibilities.

Unlocking the full range of business benefits through an operating-model transformation

Technology leaders can avoid making these trade-offs by harnessing the right combination of IT solutions in their hybrid environment—ranging from on-premise platforms, edge nodes, and cloud services. But no matter how powerful, technology on its own is insufficient to achieve acceleration. So CIOs must transform their operating model to see material benefits, including shorter time to value, improved business agility, and reduced business risk. Business acceleration is best achieved by extending IT modernization efforts to encompass far-reaching changes in the operating model along three dimensions: people, processes, and policies.

People

Many enterprises have IT workforces with specialized skill sets and knowledge developed over years (for example, about custom legacy systems and platform configurations). But this expertise is increasingly outdated—even if the knowledge of a business or functional domain is not. In such cases, organizations must make significant investments to retrain, upskill, or reskill their employees. In addition,

the IT function typically covers a range of roles: networking engineers, capacity planners, system administrators and operators, data storage and security specialists, analysts, developers, quality-assurance engineers, database administrators, data architects, and many more.

We see an opportunity for organizations to radically simplify their IT team structures. Specifically, they can consolidate positions to a smaller set of critical roles that bring together skills formerly divided across jobs. These roles will move from structured tasks (likely to be replaced by increasingly powerful IT-management tools) toward more fulfilling ones (adapted to a world of increasing automation). Instead of supplying more resources or convening cumbersome investigations over a system instability, the best companies will develop the talent to address root problems (for example, going under the hood and changing how code consumes infrastructure resources).

Processes

Many organizations depend on ad hoc manual operations and adopt a reactive stance, building excess capacity to provide reliability. Design decisions are marked by a lack of transparency and coordination across different functions in IT, resulting in more expensive custom solutions that still underperform. And when incidents arise, they are often funneled to technology silos. These functions either are slow to respond or depend on orchestrating numerous internal and vendor resources to manage escalated incidents and resolve problems.

The ideal organization does little to no infrastructure planning and instead uses a DevOps approach and self-service to expedite the development and implementation of solutions. In other words, rather than estimating demand and planning for worst-case scenarios, a company can simply be agile in ramping up resources as needed. The IT function focuses on customer-centric journeys rather than product- or service-centered processes. After setting a course, IT automation delivers the necessary service levels to optimize the user experience despite changing conditions and surprises. For example, self-driving cars hold the potential to automate travel on even chaotic roads; however, no “IT drivers” are ready to take their hands off the wheel just yet. So the tremendous potential of process automation must be designed to complement judgment and the uniquely human capabilities needed to assure reliability, scalability, and security.

Policies

Typical organizations have policies for a wide range of issues—such as security, information access, and data management. These are often manually enforced, increasing the cost of compliance and reducing effectiveness.

As such, companies can struggle to maintain consistency across existing environments and extend established policies to new environments. Slow response times to evolving internal rules and external regulations result in increased business risk. Furthermore, many of these policies were developed for older IT paradigms, serving to reinforce legacy ways of working and hindering agility and speed.

Leading organizations are characterized by policies that engage technology for automatic distribution of change as well as for monitoring and enforcement. Standard policies across hybrid environments (for example, on-premise and cloud) lead to better compliance at lower cost. These companies can quickly respond to and mitigate emerging business risks by consistently pushing policy changes out across their hybrid operating environments.

An IT modernization journey will vary, depending on an organization’s starting point and its aspirations for agility. Companies may seek to shift the bulk of their operations into hybrid or public-cloud operating environments, move discrete parts of their application portfolio, or eliminate particular legacy infrastructure platforms. Some prefer building applications based on their skills and competitive context over buying them, while others are highly selective in their build strategies and focus on integrating third-party SaaS solutions. Additional factors include a company’s industry, level of maturity, tolerance for risk, and organizational readiness for pursuing agility.

Overall, we see tremendous opportunities to accelerate progress on business agility—if organizations are ready to take the right steps across all these elements to transform the way they work.

Central questions for IT leaders to consider as they plan their journey

Chief information officers can overcome the perceived trade-offs in modernization efforts and maximize the business acceleration from these investments. No matter where they start, a few primary issues must be addressed. To set the best path forward, IT leaders should consider five central questions:

1. Do we have the right talent to support the technology transformation and needed operating-model shifts?

Exemplary organizations view IT as a business-acceleration partner that proactively identifies opportunities—such as those from digital, data-driven decision making, and AI—to encourage growth. These IT functions have shifted skill profiles: from project managers to

product managers, from operations engineers to automation engineers. They have upskilled developers with security expertise and recruited cloud architects, security engineers, and full-stack engineers. More advanced organizations have in-house DevOps or site reliability engineer (SRE) talent. Organizations are beginning to add data scientists and AI or machine-learning specialists to integrate more data-driven intelligence into IT operations.

2. Have we implemented the right metrics tied to business strategy so that IT can prioritize business building over just keeping the lights on?

IT organizations with an effective talent engine have successfully created performance metrics and commitments aligned with business targets rather than technical objectives. Objectives and key results (objectives and key results) methodology has proven effective in conjunction with agile teams, and these metrics need to be leading indicators that link to the key objectives of modernization. Organizations are increasingly using metrics such as APIs published, test scripts created, and configuration scripts automated as metrics to improve automation. They are also implementing metrics to track how much time is spent by individuals in building new features as opposed to routine monitoring and troubleshooting tasks.

3. Are we automating IT to the fullest?

Leaders that have achieved agility differ dramatically from laggards in their rate of automation. The most successful companies are increasingly adopting DevOps or SREs as part of their operations approach. As a foundation, companies are implementing test-driven development and aiming to achieve full automation of unit and integration tests. They are also baking in standardized configurations as part of deployment automation. They are then providing the setup of develop-and-test environments to developers through self-service mechanisms, eliminating wait times and enabling “one-click” deployments. Application performance tracking and troubleshooting are supported by heavily instrumented code and telemetry. Furthermore, these organizations are incorporating automation into service-request management and incidence response. They are also beginning to use machine learning and data to inform and accelerate decision making, ultimately leading with policy-based operations and control.

4. How are we building security by design?

Leading IT organizations have integrated security into every aspect of planning, building, and operating. They have managed to incorporate secure thinking and design earlier in the process and automated security enforcement based on policy. DevSecOps and API-based security are core enablers in such organizations. This effort starts with hiring developers with knowledge of security architecture. In the implementation phase, developers create modular security components that can be easily reused, thereby eliminating the need for separate design and implementation. During the review phase, automatic code scanners are used for code reviews to detect vulnerabilities. In the testing phase, security tests are automated and integrated into the functional testing process. Last, during the deployment phase, APIs for environment creation include functions to enforce secure configurations. By taking this approach, leading organizations have accelerated—rather than slowed—developer agility and innovation. In parallel, they have also created delightful customer and employee experiences.

5. What architectural approaches are we implementing to dramatically accelerate time-to-release features?

Approaches that increase flexibility, abstract the infrastructure, and let organizations focus on applications in line with business use cases are the hallmarks of leading IT organizations. They have adopted containerized and serverless architectures and built applications dependent on open standards. When using proprietary platforms, decisions are based on the clear time-to-market advantage and technical superiority. Fast-moving IT organizations have heavily invested in API-based approaches and meticulously plan for code reuse. They also have a clear migration path in mind should a superior platform emerge.

We see exciting innovations coming faster and faster from technology providers. These innovations hold the potential to overcome the compromises and constraints that have held back enterprise IT. The pace by which organizations can accelerate business change through these cloud platform capabilities will be set by the pace at which they can change the way they work.

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Designing a data transformation that delivers value right from the start

By Chiara Brocchi, Davide Grande, Kayvaun Rowshankish, Tamim Saleh, and Allen Weinberg

While most companies understand the importance of analytics, fewer than 20 percent have maximized the potential and implemented AA at scale.

The CEOs of most financial institutions have had data on their agenda for at least a decade. However, the explosion in data availability over the past few years—coupled with the dramatic fall in storage and processing costs and an increasing regulatory focus on data quality, policy, governance, models, aggregation, metrics, reporting, and monitoring—has prompted a change in focus. Most financial institutions are now engaged in transformation programs designed to reshape their business models by harnessing the immense potential of data.

Leading financial institutions that once used descriptive analytics to inform decisionmaking are now embedding analytics in products, processes, services, and multiple front-line activities. And where they once built relational data warehouses to store structured data from specific sources, they are now operating data lakes with large-scale distributed file systems that capture, store, and instantly update structured and unstructured data from a vast range of sources to support faster and easier data access. At the same time, they are taking advantage of cloud technology to make their business more agile and innovative, and their operations leaner and more efficient. Many have set up a new unit under a chief data officer to run

their data transformation and ensure disciplined data governance.

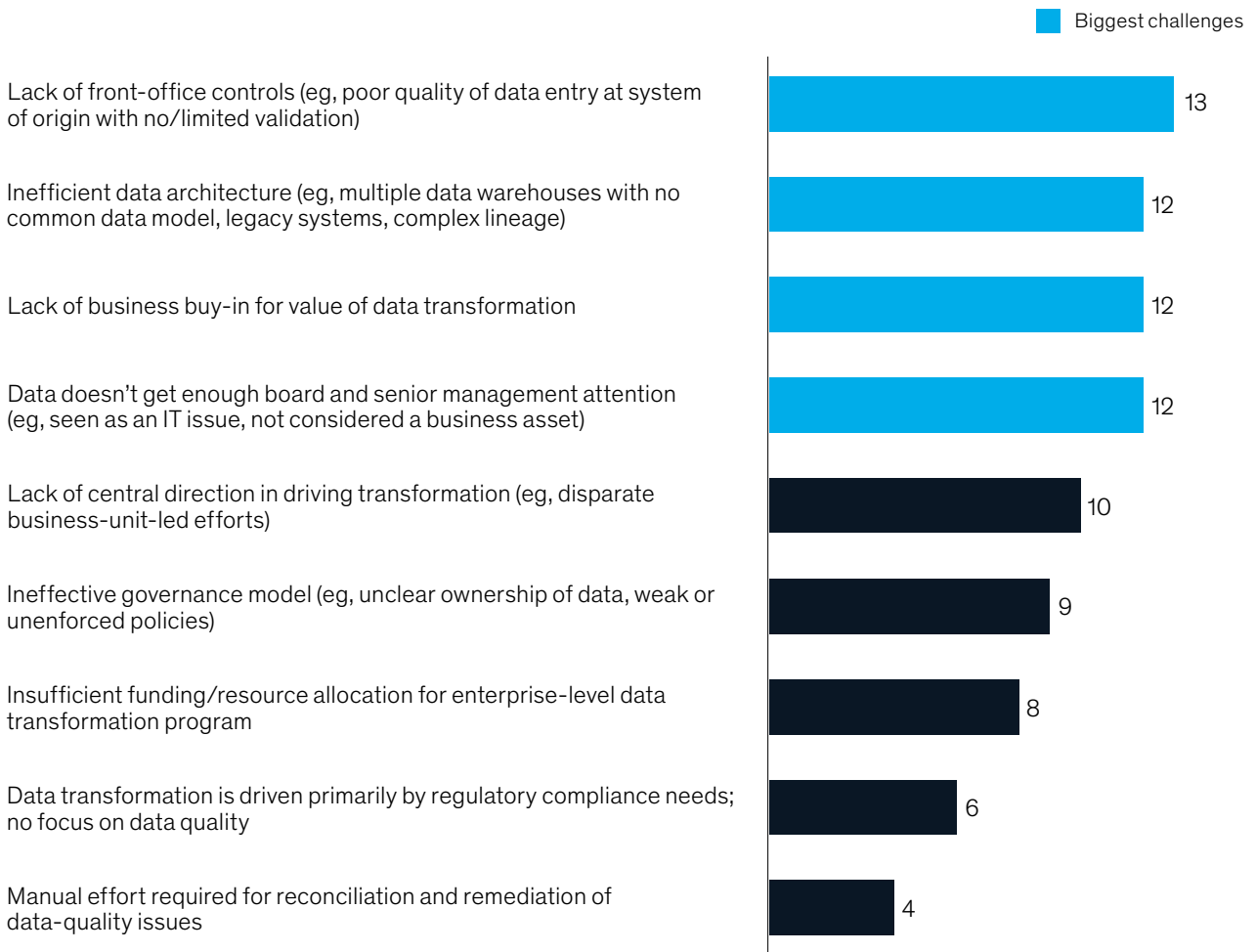
Successful data transformations can yield enormous benefits. One US bank expects to see more than \$400 million in savings from rationalizing its IT data assets and \$2 billion in gains from additional revenues, lower capital requirements, and operational efficiencies. Another institution expects to grow its bottom line by 25 percent in target segments and products thanks to data-driven business initiatives. Yet many other organizations are struggling to capture real value from their data programs, with some seeing scant returns from investments totaling hundreds of millions of dollars.

A 2016 global McKinsey survey found that a number of common obstacles are holding financial institutions back: a lack of front-office controls that leads to poor data input and limited validation; inefficient data architecture with multiple legacy IT systems; a lack of business support for the value of a data transformation; and a lack of attention at executive level that prevents the organization committing itself fully (Exhibit 1). To tackle these obstacles, smart institutions follow a systematic five-step process to data transformation.



Here are typical challenges in data transformations at banks

Challenges faced in improving data quality at the enterprise level, ranked by perceived importance, number of respondents ranking the challenge in 1st or 2nd place (n = 43)



1. Define a clear data strategy

Obvious though this step may seem, only about 30 percent of the banks in our survey had a data strategy in place. Others had embarked on ambitious programs to develop a new enterprise data warehouse or data lake without an explicit data strategy, with predictably disappointing results. Any successful data transformation begins by setting a clear ambition for the value it expects to create.

In setting this ambition, institutions should take note of the scale of improvement other organizations have achieved. In our experience, most of the value of a data transformation flows from improved regulatory compliance, lower costs, and higher revenues. Reducing the time it takes to respond to data requests from the supervisor can generate cost savings in the order of 30 to 40 percent, for instance. Organizations that simplify their data architecture, minimize data fragmentation, and decommission redundant systems can reduce their IT costs and investments by 20 to 30 percent. Banks that have captured benefits across risk, costs, and revenues have been able to boost their bottom line by 15 to 20 percent. However, the greatest value is unlocked when a bank uses its data transformation to transform its entire business model and become a data-driven digital bank.

Actions: Define the guiding vision for your data transformation journey; design a strategy to transform the organization; establish clear and measurable milestones

2. Translate the data strategy into tangible use cases

Identifying use cases that create value for the business is key to getting everyone in the organization aligned behind and committed to the transformation journey. This process typically comprises four steps.

In the first step, the institution breaks down its data strategy into the main goals it wants to achieve, both as a whole and within individual functions and businesses.

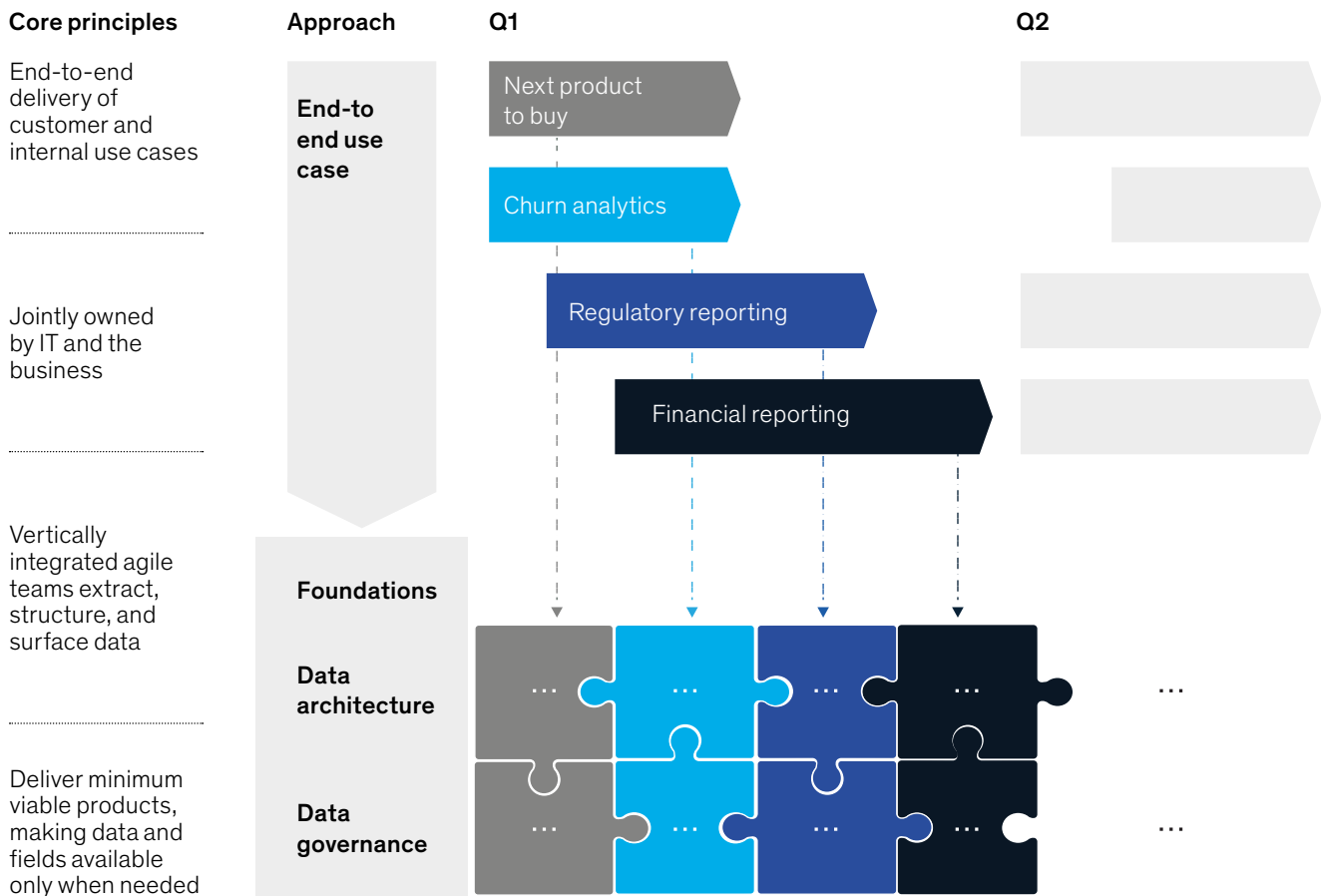
Next it draws up a shortlist of use cases with the greatest potential for impact, ensures they are aligned with broader corporate strategy, and assesses their feasibility in terms of commercial, risk, operational efficiency, and financial control. These use cases can range from innovations such as new reporting services to more basic data opportunities, like the successful effort by one European bank to fix quality issues with pricing data for customer campaigns, which boosted revenues by 5 percent.

Third, the institution prioritizes the use cases, taking into account the scale of impact they could achieve, the maturity of any technical solutions they rely on, the availability of the data needed, and the organization's capabilities. It then launches pilots of the top-priority use cases to generate quick wins, drive change, and provide input into the creation of a comprehensive business case to support the overall data transformation. This business case includes the investments that will be needed for data technologies, infrastructure, and governance.

The final step is to mobilize data capabilities and implement the operating model and data architecture to deploy the use cases through agile sprints, facilitate scaling up, and deliver tangible business value at each step (Exhibit 2). At one large European bank, this exercise identified almost \$1 billion in expected bottom-line impact.

Exhibit 2

Banks can deliver end-to-end use cases at speed via agile sprints



Actions: Select a range of use cases and prioritize them in line with your goals; use top-priority use cases to boost internal capabilities and start laying solid data foundations.

3. Design innovative data architecture to support the use cases

Leading organizations radically remodel their data architecture to meet the needs of different functions and users and enable the business to pursue data-monetization opportunities. Many institutions are creating data lakes: large, inexpensive repositories that keep data in its raw and granular state to enable fast and easy storage and access by multiple users, with no need for pre-processing or formatting. One bank with data fragmented across more than 600 IT systems managed to consolidate more than half of this data into a new data lake, capturing enormous gains in the speed and efficiency of data access and storage. Similarly, Goldman Sachs has reportedly consolidated 13 petabytes of data into a single data lake that will enable it to develop entirely new data-science capabilities.

Choosing an appropriate approach to data ingestion is essential if institutions are to avoid creating a “data swamp”: dumping raw data into data lakes without appropriate ownership or a clear view of business needs, and then having to undertake costly data-cleaning processes. By contrast, successful banks build into their architecture a data-governance system with a data dictionary and a full list of metadata. They ingest into their lakes only the data needed for specific use cases, and clean it only if the business case proves positive, thereby ensuring that investments are always linked to value creation and deliver impact throughout the data transformation.

However, data lakes are not a replacement for traditional technologies such as data warehouses, which will still be required to support tasks such as financial and regulatory reporting. And data-visualization tools, data marts, and other analytic methods and techniques will also be needed to support the business in extracting actionable insights from data. Legacy and new technologies will coexist side by side serving different purposes.

The benefits of new use-based data architecture include a 360-degree view of consumers; faster and more efficient data access; synchronous data exchange via APIs with suppliers, retailers, and customers; and dramatic cost savings as the price per unit of storage (down from \$10 per gigabyte in 2000 to just 3 cents by 2015) continues to fall.

In addition, the vast range of services offered by the hundreds of cloud and specialist providers—including IaaS (infrastructure as a service), GPU (graphics-processing unit) services for heavy-duty computation, and the extension of PaaS (platform as a service) computing into data management

and analytics—has inspired many organizations to delegate their infrastructure management to third parties and use the resulting savings to reinvest in higher-value initiatives.

Consider ANZ’s recently announced partnership with Data Republic to create secure data-sharing environments to accelerate innovation. The bank’s CDO, Emma Grey, noted that “Through the cloud-based platform we will now be able to access trusted experts and other partners to develop useful insights for our customers in hours rather than months.”

Actions: Define the technical support needed for your roadmap of use cases; design a modular, open data architecture that makes it easy to add new components later.

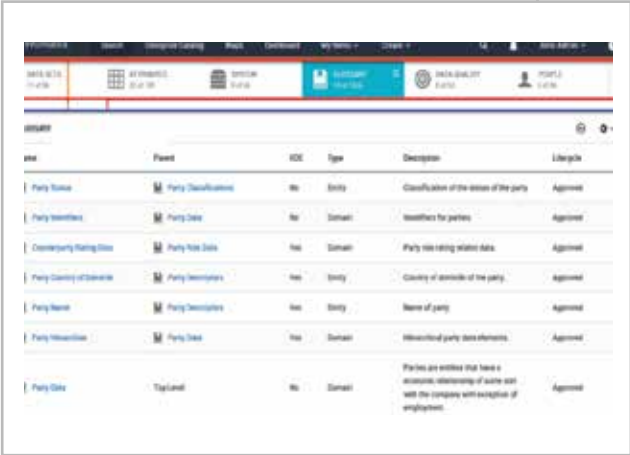
4. Set up robust data governance to ensure data quality

The common belief that problems with data quality usually stem from technology issues is mistaken. When one bank diagnosed its data quality, it found that only about 20 to 30 percent of issues were attributable to systems faults. The rest stemmed from human error, such as creating multiple different versions of the same data.


Robust data governance is essential in improving data quality. Some successful financial institutions have adopted a federal-style framework in which data is grouped into 40 to 50 “data domains,” such as demographic data or pricing data. The ownership of each domain is assigned to a business unit or function that knows the data, possesses the levers to manage it, and is accountable for data quality, with metadata management (such as mapping data lineage) typically carried out by “data stewards.” A central unit, typically led by a chief data officer, is responsible for setting up common data-management policies, processes, and tools across domains. It also monitors data quality, ensures regulatory compliance (and in some cases data security), supports data remediation, and provides services for the business in areas such as data reporting, access, and analytics.


Best-in-class institutions develop their own tools to widen data access and support self-service data sourcing, like the search tool one bank created to provide users with key information about the definition, owner, lineage, quality, and golden source of any given piece of data (Exhibit 3). Organizations with readily accessible information and reliable data quality can deliver solutions much more quickly and with greater precision. They can also create enormous efficiencies along the whole data lifecycle from sourcing and extraction to aggregation, reconciliation, and controls, yielding cost savings that can run as high as 30 to 40 percent.


A custom-designed search tool provides users with key information on data elements

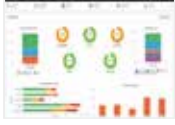



Name	Parent	SID	Type	Description	Lifecycle
Party Status	Party Classification	Yes	Entity	Classification of the status of the party	Approved
Party Identifiers	Party Data	Yes	Domain	Identifiers for parties	Approved
Counterparty Rating Class	Party Risk Data	Yes	Domain	Party risk rating related data	Approved
Party Country of Residence	Party Identifiers	Yes	Entity	Country of residence of the party	Approved
Party Name	Party Identifiers	Yes	Entity	Name of party	Approved
Party Relationship	Party Data	Yes	Domain	Hierarchical party data elements	Approved
Party Date	TopLevel	No	Domain	Parties are entities that have a historical relationship of some sort with the company with exception of employment.	Approved

A Basic definition  Definition of the term being searched

B Data owner  Details of the data owner and history of ownership

C Data lineage  Navigation of the data tree to trace the search term's components

D Data quality  Indicator of quality: red, amber, or green

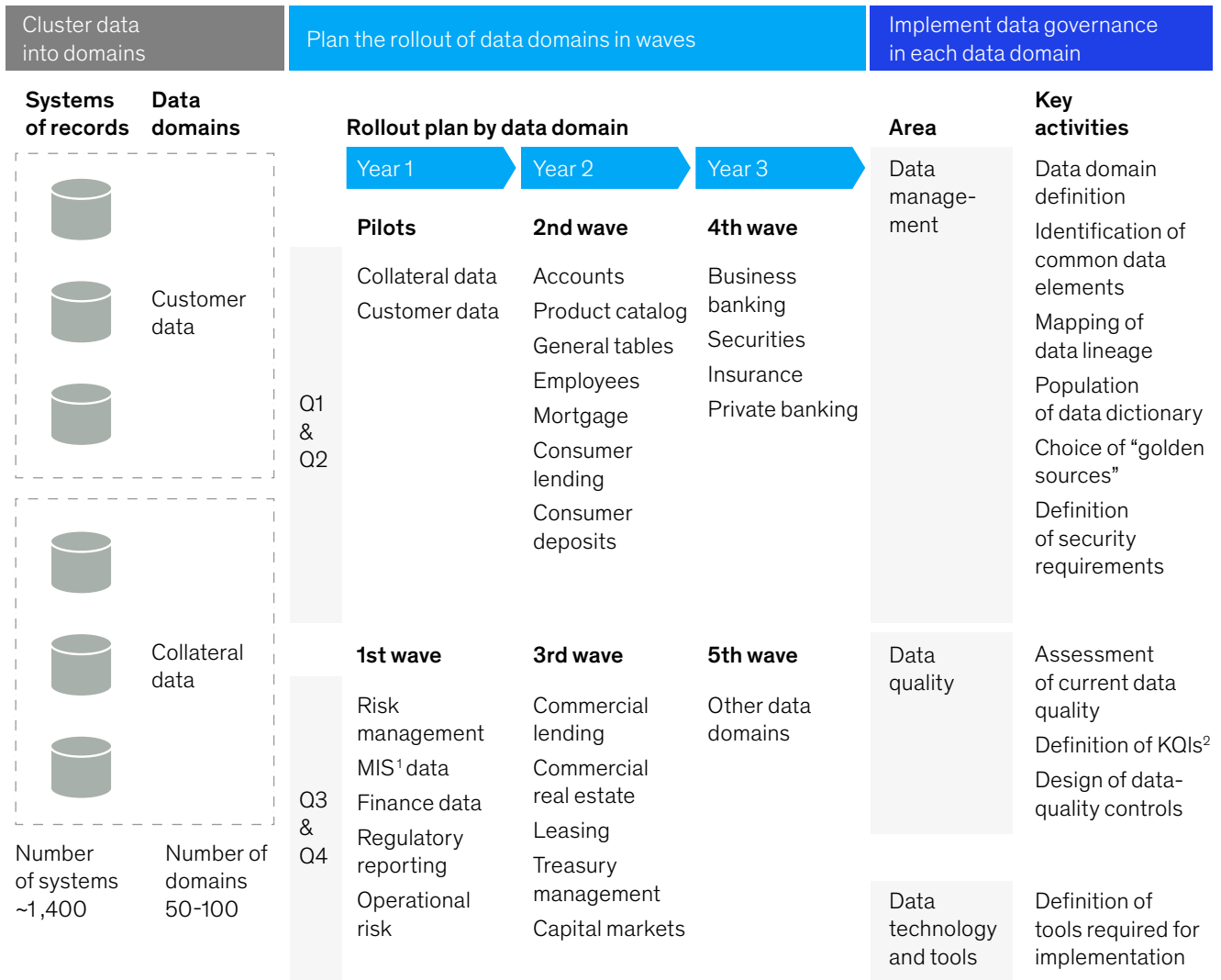
E Golden source  Good-quality source of the data

Actions: Assess data quality; establish robust data governance with clear accountability for data quality; provide self-service tools to facilitate data access across the whole organization.

5. Mobilize the organization to deliver value

Successful data transformations happen when a company follows an approach driven by use cases, promotes new ways of working, and mobilizes its whole organization from the beginning. Adopting a use-case-driven approach means developing target data architecture and data governance only when it is needed for a specific use case. One European bank implemented this approach in three steps (Exhibit 4):

Data governance is rolled out domain by domain



1 Management information system
 2 Key quality indicators

First, it identified the data it needed for key use cases and prioritized those data domains that included it. Typically, 20 percent of data enables 80 percent of use cases. Second, the bank developed a rollout plan for implementing data architecture and governance in three to four data domains per quarter.

Third, the bank set up a cross-functional team for each data domain, comprising data stewards, metadata experts, data-quality experts, data architects, data engineers, and platform engineers. Before data was ingested into the data lake, these teams worked to identify key data elements, select golden sources, assess data quality, carry out data cleansing, populate the data dictionary, and map data lineage. Each team worked in agile sprints in a startup-like environment for three to four months. A central team took care of value assurance and defined common standards, tools, and policies.

This approach delivered numerous benefits for the bank, including rapid implementation, capability building, and the creation of tangible business value at every stage in the journey. During any transformation, calling out and celebrating such achievements is critical. As the CDO of JPMorgan Chase, Rob Casper, observed, “The thing that achieves buy-in and builds momentum better than anything is success . . . trying to deliver in small chunks incrementally and giving people a taste of that success [is] a very powerful motivator.”

More broadly, senior executives need to champion their data transformation to encourage widespread buy-in, as well as role-modeling the cultural and mindset changes they wish to see. Formal governance and performance-management systems, mechanisms, and incentives will need to be rethought to

support new ways of working. At the same time, most organizations will need to develop new capabilities; only 20 percent of the banks we surveyed believe they already have adequate capabilities in place. Given the scarcity of external talent, in particular for key roles such as business translators, organizations will need to provide on-the-job training for employees involved in the transformation, and complement this effort with a data and analytics academy to build deep expertise in specialist roles (Exhibit 5).

Exhibit 5

Banks need new roles to compete effectively in a data-driven market



Actions: Adopt a use-case approach to the whole journey; establish central governance to ensure cross-functional working, the use of standard methods, and clear role definition; build new data capabilities through hiring and in-house training.

In the past few years data has been established as a fundamental source of business value. Every financial institution now competes in a world characterized by enormous data sets, stringent regulation, and frequent business disruptions as innovative ecosystems emerge to break down the barriers between and across industries. In this context, a data transformation is a means not only to achieve short-term results, but also to embed data in the organization for long-term success.

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Cybersecurity: Linchpin of the digital enterprise

By James Kaplan, Wolf Richter, and David Ware

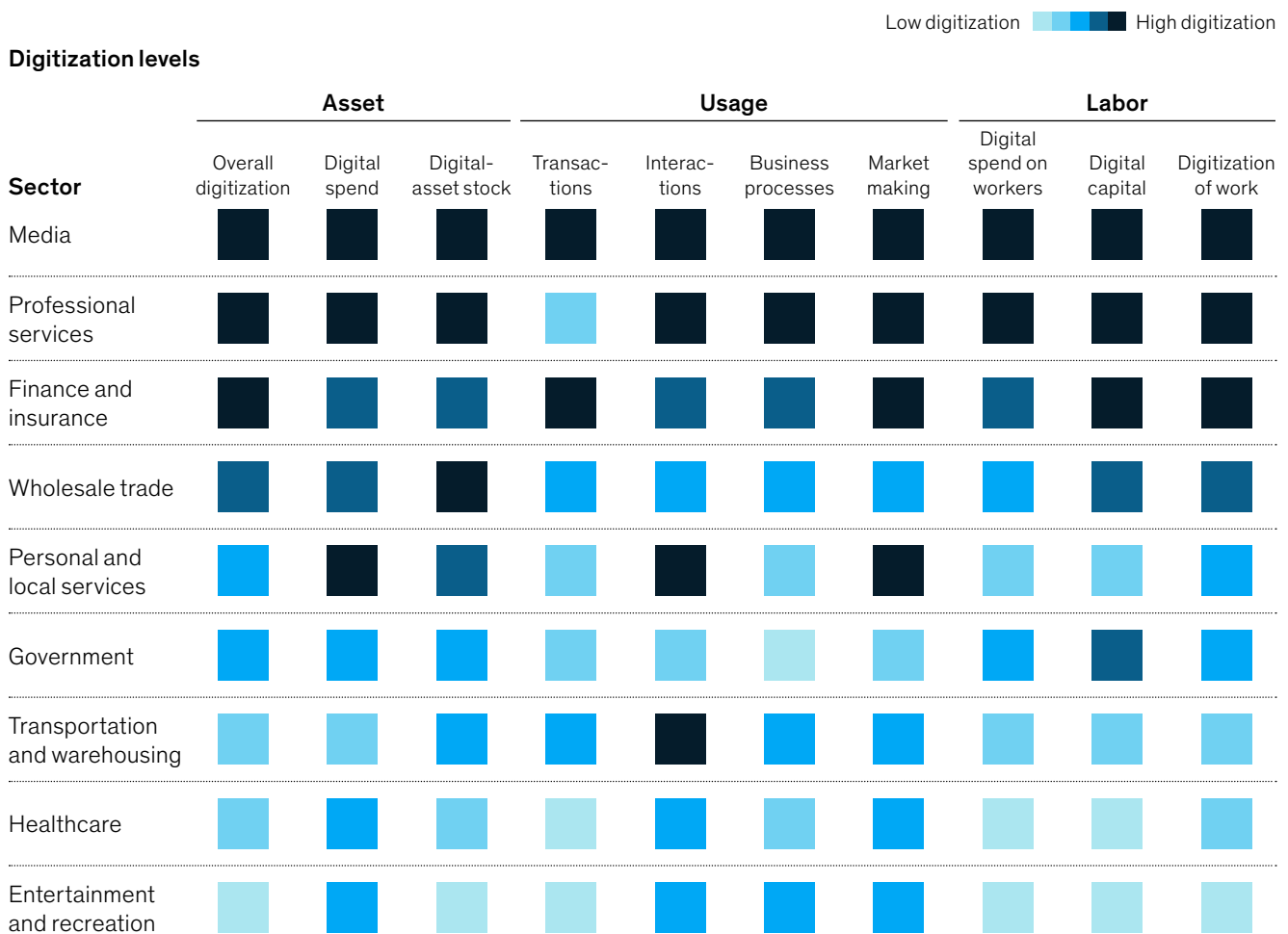
As companies digitize businesses and automate operations, cyberrisks proliferate; here is how the cybersecurity organization can support a secure digital agenda.

Two consistent and related themes in enterprise technology have emerged in recent years, both involving rapid and dramatic change. One is the rise of the digital enterprise across sectors and internationally. The second is the need for IT to react quickly and develop innovations aggressively to meet the enterprise’s digital aspirations.

Exhibit 1 presents a “digitization index”—the results of research on the progress of enterprise digitization within companies, encompassing sectors, assets, and operations.

Exhibit 1

Across sectors, companies are digitizing, with profound implications for cybersecurity functions



Source: Appbrain; Blue Wolf; ContactBabel; eMarketer; Gartner; IDC; LiveChat; US Bureau of Economic Analysis; US Bureau of Labor Statistics; US Census Bureau; Global Payments Map by McKinsey; McKinsey Social Technology Survey; McKinsey analysis; McKinsey Global Institute analysis

As IT organizations seek to digitize, however, many face significant cybersecurity challenges. At company after company, fundamental tensions arise between the business’s need to digitize and the cybersecurity team’s responsibility to protect the organization, its employees, and its customers within existing cyber operating models and practices.

If cybersecurity teams are to avoid becoming barriers to digitization and instead become its enablers, they must transform their capabilities along three dimensions. They must improve risk management, applying quantitative risk analytics. They must build cybersecurity directly into businesses’ value chains. And they must support the next generation of enterprise-technology platforms, which include innovations like agile development, robotics, and cloud-based operating models.

Cybersecurity's role in digitization

Every aspect of the digital enterprise has important cybersecurity implications. Here are just a few examples. As companies seek to create more digital customer experiences, they need to determine how to align their teams that manage fraud prevention, security, and product development so they can design controls, such as authentication, and create experiences that are both convenient and secure. As companies adopt massive data analytics, they must determine how to identify risks created by data sets that integrate many types of incredibly sensitive customer information. They must also incorporate security controls into analytics solutions that may not use a formal software-development methodology. As companies apply robotic process automation (RPA), they must manage bot credentials effectively and make sure that “boundary cases”—cases with unexpected or unusual factors, or inputs that are outside normal limits—do not introduce security risks.

Likewise, as companies build application programming interfaces (APIs) for external customers, they must determine how to identify vulnerabilities created by interactions between many APIs and services, and they must build and enforce standards for appropriate developer access.¹⁾ They must continue to maintain rigor in application security as they transition from waterfall to agile application development.

Challenges with existing cybersecurity models

At most companies, chief information officers (CIOs), chief information-security officers (CISOs), and their teams have sought to establish cybersecurity as an enterprise-grade service.

What does that mean? They have consolidated cybersecurity-related activities into one or a few organizations. They have tried to identify risks and compare them to enterprise-wide risk appetites to understand gaps and make better decisions about closing them. They have created enterprise-wide policies and supported them with standards. They have established governance as a counterweight to the tendency of development teams to prioritize time to market and cost over risk and security. They have built security service offerings that require development teams to create a ticket requesting service from a central group before they can get a vulnerability scan or a penetration test.

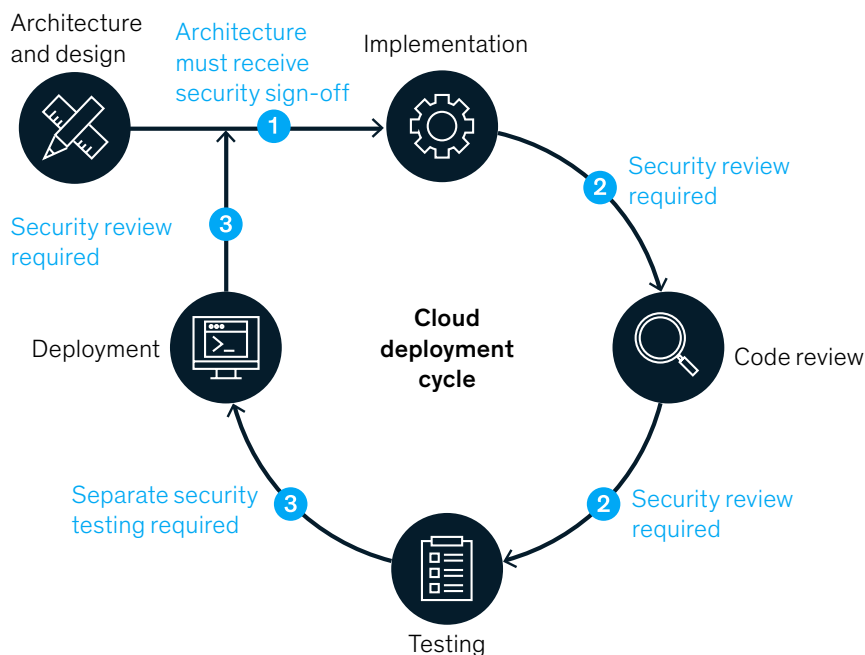
All these actions have proven absolutely necessary to the security of an organization. Without them, cybersecurity breaches occur more frequently—and often, with more severe consequences. The needed actions, however, exist in tension with the emerging digital-enterprise model—the outcome of an end-to-end digital transformation—from the customer interface through the back-office processes. As companies seek to use public cloud services, they often find that security is the “long pole in the tent”—the most intractable part of the problem of standing applications on public cloud infrastructure.

At one financial institution, development teams were frustrated with the long period needed by the security team to validate and approve incremental items in their cloud service provider’s catalog for production usage. Developers at other companies have puzzled over the fact that they can spin up a server in minutes but must wait weeks for the vulnerability scan required to promote their application to production. IT organizations everywhere are finding that existing security models do not run at “cloud speed” and do not provide enough specialized support to developers on issues like analytics, RPA, and APIs (Exhibit 2).



¹ An API is software that allows applications to communicate with each other, sharing information for a purpose.

Current cybersecurity operating models do not operate at ‘cloud speed’



Stage gates

- 1 Designing secure architecture requires special knowledge
- 2 Secure code review, test design, and implementation require specially trained developers not available to many teams
- 3 Cloud environments must be configured to security standards and instrumented with monitoring before deployment into production

Activities

Architecture and design	Implementation	Code review	Testing	Deployment
Analyze resource availability from cloud service provider	Instantiate development and testing environments	Review code	Develop test cases	Instantiate cloud infrastructure
Analyze capacity requirements	Begin solution implementation	Conduct automated code scanning	Do continuous testing	Establish cloud services
Develop initial solution design		Accept code into code base	Fix bugs and errors; make changes	Deploy production application
Design interfaces			Do regression testing	Do final testing

The misalignment between development and cybersecurity teams leads to missed business opportunities, as new capabilities are delayed in reaching the market. In some cases, the pressure to close the gap has caused increased vulnerability, as development teams bend rules to work around security policies and standards.

Cybersecurity for the digital enterprise

In response to aggressive digitization, some of the world’s most sophisticated cybersecurity functions are starting to transform their capabilities along the three dimensions we described: using quantitative risk analytics for decision making, building cybersecurity into the business value chain, and enabling the new technology operating platforms that combine many innovations. These innovations include agile approaches, robotics, cloud, and DevOps (the combination of software development and IT operations to shorten development times and deliver new features, fixes, and updates aligned with the business).

Using quantitative risk analytics for decision making

At the core of cybersecurity are decisions about which information risks to accept and how to mitigate them. Traditionally, CISOs and their business partners have made cyberrisk-management decisions

using a combination of experience, intuition, judgment, and qualitative analysis. In today's digital enterprises, however, the number of assets and processes to protect, and the decreasing practicality and efficacy of one-size-fits-all protections, have dramatically reduced the applicability of traditional decision-making processes and heuristics.

In response, companies are starting to strengthen their business and technology environments with quantitative risk analytics so they can make better, fact-based decisions. This has many aspects. It includes sophisticated employee and contractor segmentation as well as behavioral analysis to identify signs of possible insider threats, such as suspicious patterns of email activity. It also includes risk-based authentication that considers metadata—such as user location and recent access activity—to determine whether to grant access to critical systems. Ultimately, companies will start to use management dashboards that tie together business assets, threat intelligence, vulnerabilities, and potential mitigation to help senior executives make the best cybersecurity investments. They will be able to focus those investments on areas of the business that will yield the most protection with the least disruption and cost.

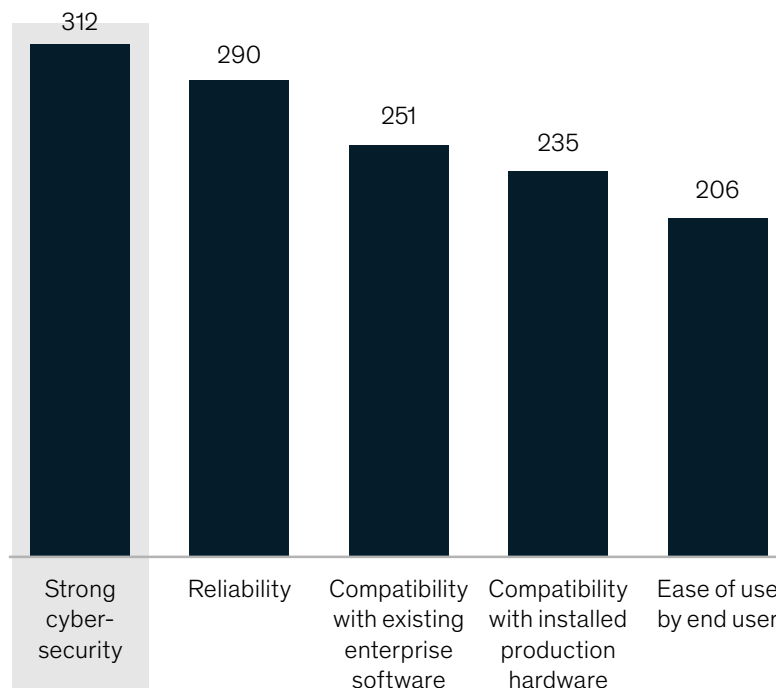
Building cybersecurity into the business value chain

No institution is an island when it comes to cybersecurity. Every company of any complexity exchanges sensitive data and interconnects networks with customers, suppliers, and other business partners. As a result, cybersecurity-related questions of trust and the burden of mitigating protections have become central to value chains in many sectors. For example, CISOs for pharmacy benefit managers and health insurers are having to spend significant time figuring out how to protect their customers' data and then explaining it to those customers. Likewise, cybersecurity is absolutely critical to how companies make decisions about procuring group health or business insurance, prime brokerage, and many other services. It is the single most important factor companies consider when purchasing Internet of Things (IoT) products (Exhibit 3).

Exhibit 3

Priority requirements have changed for acquiring Internet of Things products: Cybersecurity has moved to the top

Top 5 priorities when buying IOT products,¹
number of survey responses



¹IoT = Internet of Things. Besides basic functionality.

Source: McKinsey 2019 IOT Pulse Survey of more than 1,400 IOT practitioners (from middle managers to C-suite) who are executing IOT at scale (beyond pilots).

Composition was 61% from US, 20% from China, and 19% from Germany, with organizations of \$50 million to more than \$10 billion in revenue. This question on IoT-product purchases received 1,161 responses.

Leading companies are starting to build cybersecurity into their customer relationships, production processes, and supplier interactions. Some of their tactics include the following:

- Use design thinking to build secure and convenient online customer experiences. For example, one bank allowed customers to customize their security controls, choosing simpler passwords if they agreed to two-factor authorization.
- Educate customers about how to interact in a safe and secure way. One bank has a senior executive whose job it is to travel the world and teach high-net-worth customers and family offices how to prevent their accounts from being compromised.
- Analyze security surveys to understand what enterprise customers expect and create knowledge bases so that sales teams can respond to customer security inquiries during negotiations with minimum friction. For instance, one software-as-a-service (SaaS) provider found that its customers insisted on having particularly strong data-loss-prevention (DLP) provisions.
- Treat cybersecurity as a core feature of product design. For instance, a hospital network would have to integrate a new operating-room device into its broader security environment. Exhibit 4 presents an example of how security is embedded in a product-development process.
- Take a seamless view across traditional information security and operational technology security to eliminate vulnerabilities. One autoparts supplier found that the system holding the master version of some of its firmware could serve as an attack vector to the fuel-injection systems it manufactured. With that knowledge, it was able to put additional protections in place. Pharma companies have found that an end-to-end view of information protection across their supply chains was needed to address certain key vulnerabilities (Exhibit 5).
- Use threat intelligence to interrogate supplier technology networks externally and assess risk of compromise.



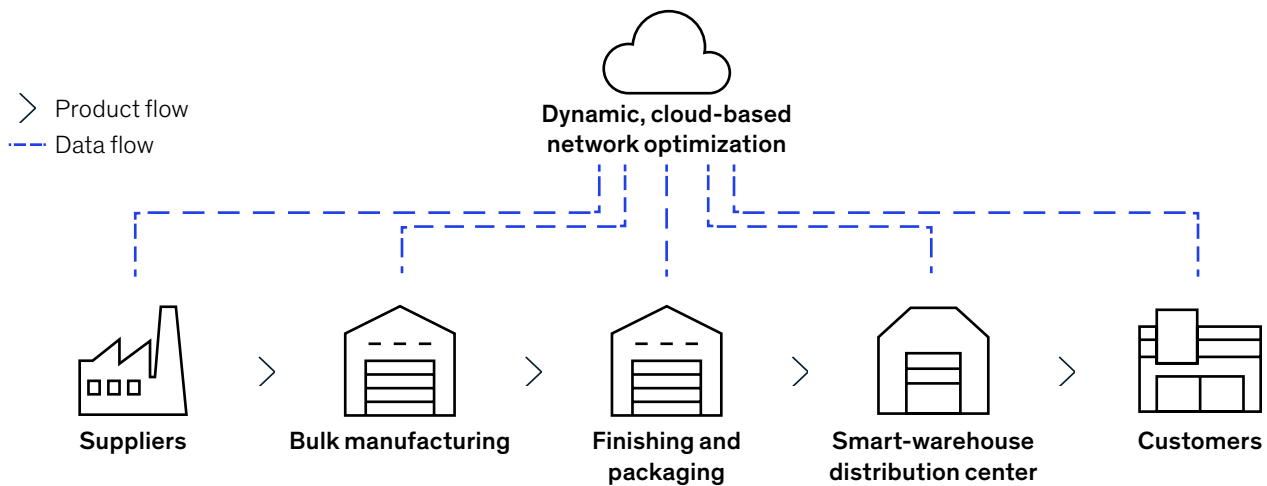
How to embed security into a product-development process

From treating security and privacy as after-thoughts...

...to incorporating them by designing and building an agile security-and-privacy model

<p>Developers are unclear when security and privacy requirements are mandatory</p>	<p>Product owners don't consider security and privacy tasks during sprint planning</p>	<p>Requirements</p>	<p>Prioritize security and privacy tasks according to product risk level</p>	<p>Make product owners aware of need to prioritize security and privacy tasks and be accountable for their inclusion in releases</p>
			<p>Design</p>	
<p>Unclear how to handle distribution of tasks within development team</p>	<p>Chief information-security and privacy officers (CISPOs) have limited capacity to support development teams</p>	<p>Development</p>	<p>Security and privacy champions (tech leads) assist teams in distributing tasks</p>	<p>Add capacity through CISPOs, who clarify security and privacy requirements with champions and product owners</p>
			<p>Testing</p>	<p>Product-assessment dashboards give developers real-time views of security and privacy within products</p>
		<p>Deployment</p>	<p>Launch delays eliminated as security and privacy tasks are executed across life cycles</p>	<p>Simplified predeployment activities with CISPOs only for releases meeting risk criteria</p>
<p>Security and privacy needs are often dealt with before deployment, causing launch delays</p>	<p>Teams unclear how often to engage CISPOs</p>			
		<p>Throughout process</p>	<p>Define and communicate roles and responsibilities during agile ceremonies</p>	<p>Integrate and automate security- and privacy-related testing and tracking tools</p>
<p>Unclear accountability for security and privacy in product teams</p>	<p>Lack of integration in security and privacy tool sets introduces complexity</p>			

An end-to-end view of information across the pharma supply chain in needed to address vulnerabilities



● Advanced business capability ● Resulting cyber risks

Suppliers

- Predictive supplier risk protection
- Risk of exposed vendor details and trade secrets

Bulk manufacturing

- Yield optimization through advanced analytics and digitized operations
- Hacking of legacy equipment
- Unauthorized changes in safety or compliance regulations
- Loss of intellectual property and competitive advantage

Finishing and packaging

- Fully integrated and automated production
- Attack on process, leading to shutdowns or errors
- Transition from closed to open systems prompts new security risks

Customers

- No-touch order management
- Leak of customer data, leading to loss of customer trust and competitive data

Overarching technologies

- Machine-learning forecasting and integrated production planning
- Inaccurate business decisions and bad-actor access
- Real-time monitoring
- Unauthorized monitoring of processes and leakage of business decisions

Done in concert, these actions yield benefits. They enhance customer trust, accelerating their adoption of digital channels. They reduce the risk of customers or employees trying to circumvent security controls. They reduce friction and delays as suppliers and customers negotiate liability and responsibility for information risks. They build security intrinsically into customer-facing and operational processes, reducing the “deadweight loss” associated with security protections.

Enabling an agile, cloud-based operating platform enhanced by DevOps

Many companies seem to be trying to change everything about IT operations. They are replacing traditional software-development processes with agile methodologies. They are repatriating engineering talent from vendors and giving developers self-service access to infrastructure. Some are getting rid of their data centers altogether as they leverage cloud services. All of this is being done to make technology fast and scalable enough to support an enterprise’s digital aspirations. In turn, putting a modern technology model in place requires a far more flexible, responsive, and agile cybersecurity operating model. Key tenets of this model include the following:

- Move from ticket-based interfaces to APIs for security services. This requires automating every possible interaction and integrating cybersecurity into the software-development tool chain. That will allow development teams to perform vulnerability scans, adjust DLP rules, set up application security, and connect to identify and gain access to management services via APIs (Exhibit 6).

- Organize security teams into agile scrum or scrumban teams that manage developer-recognizable services, such as identity and access management (IAM) or DLP. Also, recruiting development-team leaders to serve as product owners for security services can help, just as business managers are product owners for customer journeys and customer-oriented services.
- Tightly integrate security into enterprise end-user services, so that employees and contractors can easily obtain productivity and collaboration tools via an intuitive, Amazon-like portal.
- Build a cloud-native security model that ensures developers can access cloud services instantly and seamlessly within certain guardrails.
- Collaborate with infrastructure and architecture teams to build required security services into standardized solutions for massive analytics and RPA.
- Shift the talent model to incorporate those with “e-shaped” skills—cybersecurity professionals with several areas of deep knowledge, such as in integrative problem solving, automation, and development—as well as security technologies.

Exhibit 6

Automation, orchestration technology, and application programming interfaces can eliminate manual security processes and interactions

Automation opportunities in a notionally secure DevOps model



Architecture and design



Implementation



Code review



Testing



Deployment

	Architecture and design	Implementation	Code review	Testing	Deployment
App application programming interfaces (APIs)	API-configurable application-level controls designed into new applications	APIs for configuration and debugging (eg., test instrumentation) added during implementation phase	Automated code review systems modified to search for application-specific threat scenarios	Automated and configurable security test cases added to nightly testing regime	Fully configured, production-ready application possible via API calls alone
Process APIs	New application level API options added to deployment configuration process	Configurable security tests added to nightly testing regime	Configurable automated code reviews added to precommit/preacceptance process for newly written code	Nightly testing results collected and curated for individual developers/teams via configurable test-management system	Predeployment security-review process replaced by automated tests and configuration checks
Infrastructure APIs	API for deployment and instantiation processes rearchitected to accommodate new applications	Configuration options for instantiation of automated, project-specific development environment made available	Automated code scanning implemented for deployed web applications to maintain quality and code integrity	Cloud environments regularly tested for security via automated vulnerability assessment and identification tools	Security tools and configuration options applied via API to new environments at deployment time

Security-trained developers and engineers enable automation and orchestration throughout cloud-development, -deployment, and -operations phases

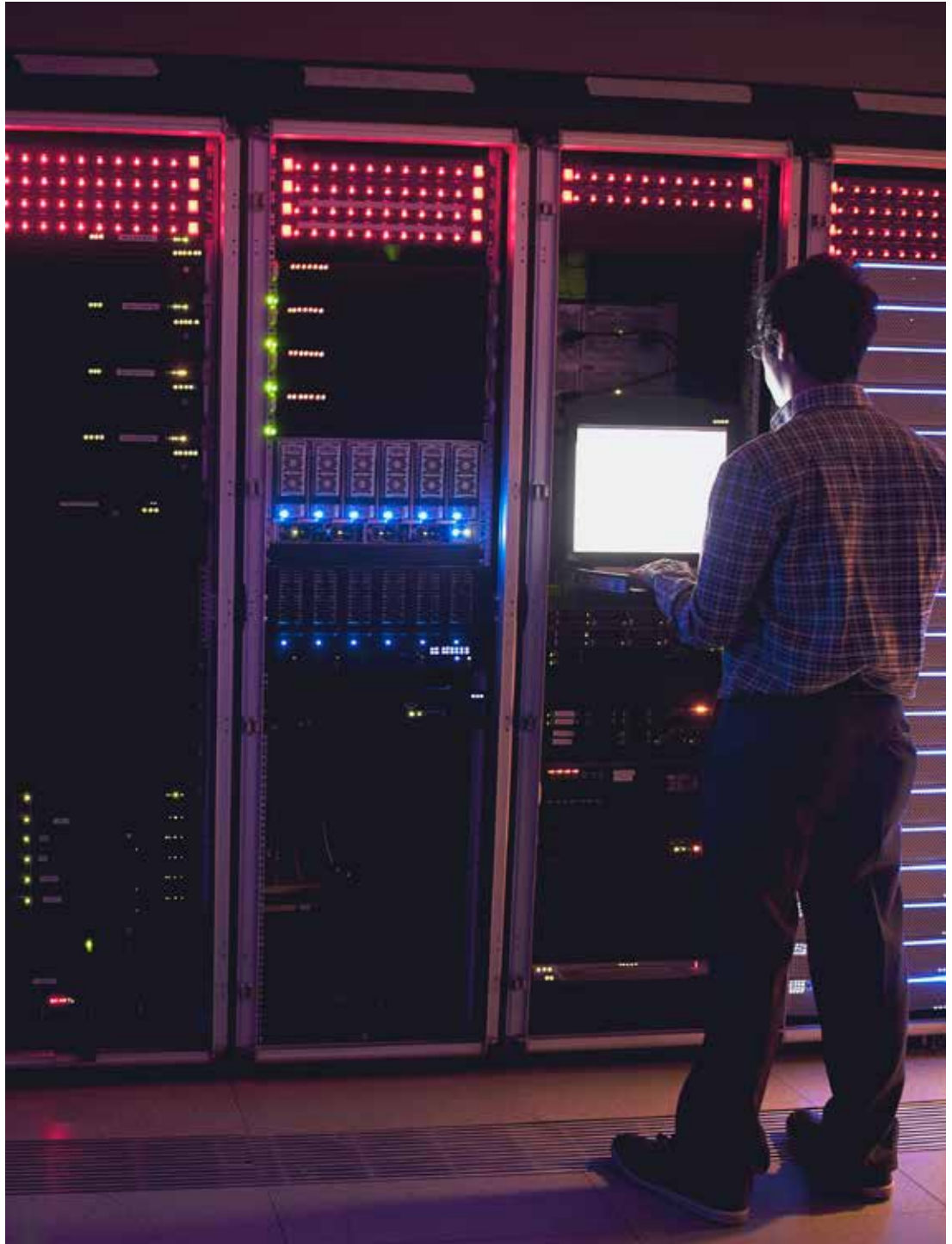
Taken together, these actions will eliminate roadblocks to building digital-technology operating models and platforms. Perhaps more importantly, they can ensure that new digital platforms are inherently secure, allowing their adoption to reduce risk for the enterprise as a whole (see sidebar, “How a large biopharma company built cybersecurity capabilities to enable a digital enterprise”).

With digitization, analytics, RPA, agile, DevOps, and cloud, it is clear that enterprise IT is evolving rapidly and in exciting and value-creating ways. This evolution naturally creates tension with existing cybersecurity operating models. For organizations to overcome the tension, they will need to apply quantitative risk analytics for decision making, create secure business

value chains, and enable operating platforms that encompass the latest innovations. These actions will require significant adaptation from cybersecurity organizations. Many of these organizations are still in the early stages of this journey. As they continue, they will become more and more capable of protecting the companies while supporting the innovative goals of the business and IT teams.

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Cybersecurity tactics for the coronavirus pandemic

By Jim Boehm, James Kaplan, Marc Sorel, Nathan Sportsman, and Trevor Steen

The pandemic has made it harder for companies to maintain security and business continuity. But new tactics can help cybersecurity leaders to safeguard their organizations.

The COVID-19 pandemic has presented chief information security officers (CISOs) and their teams with two immediate priorities. One is securing work-from-home arrangements on an unprecedented scale now that organizations have told employees to stop traveling and gathering, and government officials in many places have advised or ordered their people to stay home as much as possible. The other is maintaining the confidentiality, integrity, and availability of consumer-facing network traffic as volumes spike—partly as a result of the additional time people are spending at home.

Recent discussions with cybersecurity leaders suggest that certain actions are especially helpful to fulfill these two priorities. In this article, we set out the technology modifications, employee-engagement approaches, and process changes that cybersecurity leaders have found effective.

Securing work-from-home arrangements at scale

The rapid, widespread adoption of work-from-home tools has put considerable strain on security teams, which must safeguard these tools without making it hard or impossible for employees to work. Conversations with CISOs in Asia, Europe, and North America about how they are securing these new work-at-home arrangements highlight the changes these executives are making in three areas: technology, people, and processes.

Technology: Make sure required controls are in place

As companies roll out the technologies that enable employees to work from home and maintain business continuity, cybersecurity teams can take these actions to mitigate cybersecurity risks:

- **Accelerate patching for critical systems.** Shortening patch cycles for systems, such as virtual private networks (VPNs), end-point protection, and cloud interfaces, that are essential for remote working will help companies eliminate vulnerabilities soon after their discovery. Patches that protect remote infrastructure deserve particular attention.
- **Scale up multifactor authentication.** Employees working remotely should be required to use multifactor authentication (MFA) to access networks and critical applications. Scaling up MFA can be challenging: the protection it will add calls for a surge in short-term capacity. Several practices make the rollout of MFA more manageable. One is to prioritize users who have elevated privileges (such as domain and sys admins, and application developers) and work with critical systems (for instance, money transfers). Targeting those users in pilot rollouts of modest scale will allow cybersecurity teams to learn from the experience and use

that knowledge to shape more extensive implementation plans. Cybersecurity teams can also benefit from using MFA technologies, such as the application gateways offered by several cloud providers, that are already integrated with existing processes.

- **Install compensating controls for facility-based applications migrated to remote access.** Some applications, such as bank-teller interfaces and cell-center wikis, are available only to users working onsite at their organizations' facilities. To make such facility-based applications available to remote workers, companies must protect those apps with special controls. For example, companies might require employees to activate VPNs and use MFA to reach what would otherwise be facility-based assets while permitting them to use MFA alone when accessing other parts of the corporate environment.
- **Account for shadow IT.** At many companies, employees use so-called shadow IT systems, which they set up and administer without formal approval or support from the IT department. Extended work-from-home operations will expose such systems because business processes that depend on shadow IT in the office will break down once employees find themselves unable to access those resources. IT and security teams should be prepared to transition, support, and protect business-critical shadow assets. They should also keep an eye out for new shadow-IT systems that employees use or create to ease working from home, to compensate for in-office capabilities they can't access, or to get around obstacles.
- **Quicken device virtualization.** Cloud-based virtualized desktop solutions can make it easier for staff to work from home because many of them can be implemented more quickly than on-premises solutions. Bear in mind that the new solutions will need strong authentication protocols—for example, a complex password, combined with a second authentication factor.

People: Help employees understand the risks

Even with stronger technology controls, employees working from home must still exercise good judgment to maintain information security. The added stress many people feel can make them more prone to social-engineering attacks. Some employees may notice that their behavior isn't monitored as it is in the office and therefore choose to engage in practices that open them to other threats, such as visiting malicious websites that office networks block. Building a "human firewall" will help ensure that employees who work from home do their part to keep the enterprise secure.

- **Communicate creatively.** A high volume of crisis-related communications can easily drown out warnings of cybersecurity risks. Security teams will need to use a mix of approaches to get their messages across. These might include setting up two-way communication channels that let users post and review questions, report incidents in real time, and share best practices; posting announcements to pop-up or universal-lock screens; and encouraging the innovative use of existing communication tools that compensate for the loss of informal interactions in hallways, break rooms, and other office settings.
- **Focus on what to do rather than what not to do.** Telling employees not to use tools (such as consumer web services) they believe they need to do their jobs is counterproductive. Instead, security teams must explain the benefits, such as security and productivity, of using approved messaging, file-transfer, and document-management tools to do their jobs. To further encourage safe behavior, security teams can promote the use of approved devices—for example, by providing stipends to purchase approved hardware and software.
- **Increase awareness of social engineering.** COVID-19–themed phishing, vishing (voice phishing), and smishing (text phishing) campaigns have surged. Security teams must prepare employees to avoid being tricked. These teams should not only notify users that attackers will exploit their fear, stress, and uncertainty but also consider shifting to crisis-specific testing themes for phishing, vishing, and smishing campaigns.
- **Identify and monitor high-risk user groups.** Some users, such as those working with personally identifiable information or other confidential data, pose more risk than others. High-risk users should be identified and monitored for behavior (such as unusual bandwidth patterns or bulk downloads of enterprise data) that can indicate security breaches.

Processes: Promote resilience

Few business processes are designed to support extensive work from home, so most lack the right embedded controls. For example, an employee who has never done high-risk remote work and hasn't set up a VPN might find it impossible to do so because of the in-person VPN-initiation requirements. In such cases, complementary security-control processes can mitigate risks. Such security processes include these:



- **Supporting secure remote-working tools.** Security and IT help desks should add capacity while exceptionally large numbers of employees are installing and setting up basic security tools, such as VPNs and MFA. It might be practical to deploy security-team members temporarily at call centers to provide added frontline support.
- **Testing and adjusting IR and BC/DR capabilities.** Even with increased traffic, validating remote communications and collaboration tools allows companies to support incident-response (IR) and business-continuity (BC)/disaster-recovery (DR) plans. But companies might have to adjust their plans to cover scenarios relevant to the current crisis. To find weak points in your plans, conduct a short IR or BC/DR tabletop exercise with no one in the office.
- **Securing physical documents.** In the office, employees often have ready access to digital document-sharing mechanisms, as well as shredders and secure disposal bins for printed materials. At home, where employees might lack the same resources, sensitive information can end up in the trash. Set norms for the retention and destruction of physical copies, even if that means waiting until the organization resumes business as usual.
- **Expand monitoring.** Widening the scope of organization-wide monitoring activities, particularly for data and end points, is important for two reasons. First, cyberattacks have proliferated. Second, basic boundary-protection mechanisms, such as proxies, web gateways, or network intrusion-detection systems (IDS) or intrusion-prevention systems (IPS), won't secure users working from home, off the enterprise network, and not connected to a VPN. Depending on the security stack, organizations that do not require the use of a VPN or require it only to access a limited set of resources may go largely unprotected. To expand monitoring, security teams should update security-information-and-event-management (SIEM) systems with new rule sets and discovered hashes for novel malware. They should also increase staffing in the security operations center (SOC) to help compensate for the loss of network-based security capabilities, such as end-point protections of noncompany assets. If network-based security capabilities are found to be degraded, teams should expand their IR and BC/DR plans accordingly.
- **Clarify incident-response protocols.** When cybersecurity incidents take place, SOC teams must know how to report them. Cybersecurity leaders should build redundancy options into response protocols so that responses don't stall if decision makers can't be reached or normal escalation pathways are interrupted because people are working from home.
- **Confirm the security of third parties.** Nearly every organization uses contractors and off-site vendors, and most integrate IT systems and share data with both contract and noncontract third parties, such as tax or law-enforcement authorities. When organizations assess which controls must be extended to employees to secure new work-from-home protocols, they should do the same for third-party users and connections, who are likely to be managing similar shifts in their operations and security protocols. For example, ask providers whether they have conducted any remote IR or BC/DR tabletop drills and, if they have, ask them to share the results. Should any third parties fail to demonstrate adequate security controls and procedures, consider limiting or even suspending their connectivity until they remediate their weaknesses.
- **Sustain good procurement practices.** Fast-track procurement intended to close key security gaps related to work-from-home arrangements should follow standard due-diligence processes. The need for certain security and IT tools may seem urgent, but poor vendor selection or hasty deployment could do more harm than good.

Even with stronger technology controls, employees working from home must still exercise good judgment to maintain information security.

Supporting high levels of consumer-facing network traffic

Levels of online activity that challenge the confidentiality, integrity, and availability (CIA) of network traffic are accelerating. Whether your organization provides connectivity, serves consumers, or supports transactions, securing the CIA of network activity should be a top priority for any executive team that wants to protect consumers from cyberbreaches during this period of heightened vulnerability. Much as organizations are stepping up internal protections for enterprise networks, security teams in organizations that manage consumer-facing networks and the associated technologies will need to scale up their technological capabilities and amend processes quickly.

Technology: Ensure sufficient capacity

Companies that make it possible for employees



to work from home must enable higher online network-traffic and transaction volumes by putting in place technical building blocks such as a web-application firewall, secure-sockets-layer (SSL) certification, network monitoring, antistributed denial of service, and fraud analytics. As web-facing traffic grows, organizations should take additional actions to minimize cyberrisks:

- **Enhance web-facing threat-intelligence monitoring.** To anticipate threats and take preventive measures, security teams must understand how heightened consumer traffic changes the threat environment for web-facing enterprise activities. For example, to find out if attackers are becoming more interested in an organization's web-facing technologies, organizations can conduct increased passive domain-name scans to test for new malicious signatures tailored to the enterprise domain or for the number of adversarial scans targeting the enterprise network, among other threats.
- **Improve capacity management.** Overextended web-facing technologies are harder to monitor and more susceptible to attacks. Security teams can monitor the performance of applications to identify

suspected malware or low-value security agents or even recommend the removal of features (such as noncritical functions or graphics on customer portals) that hog network capacity.

Processes: Integrate and standardize security activities

Customers, employees, and vendors all play some part in maintaining the confidentiality, integrity, and availability of web-facing networks. Several steps can help organizations to ensure that the activities of these stakeholders are consistent and well integrated:

- **Integrate fraud-prevention capabilities with the SOC.** Organizations that support the execution of financial transactions should consider integrating their existing fraud analytics with SOC workflows to accelerate the inspection and remediation of fraudulent transactions.
- **Account for increased costs.** Many SOC tools and managed-security-service providers base charges for monitoring on usage—for example, the volume of log records analyzed. As usage increases with expanded

network traffic, organizations with usage-based fee arrangements will need to account for any corresponding increase in costs.

- **Help consumers solve CIA problems themselves.** For media providers, enabling customers to access content without interruption is essential, but increased usage levels can jeopardize availability. Companies may wish to offer guides to show users how to mitigate access problems, particularly during periods of peak use.

Securing remote-working arrangements and sustaining the CIA of customer-facing networks are essential to ensure the continuity of operations during this disruptive time. The actions we describe in this article, while not comprehensive, have helped many organizations to overcome the security difficulties they face and maintain their standing with customers and other stakeholders.

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McKinsey and Praetorian have entered into a strategic alliance to help clients solve complex cybersecurity challenges and secure innovation. As a part of this alliance, McKinsey is a minority investor in Praetorian.

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