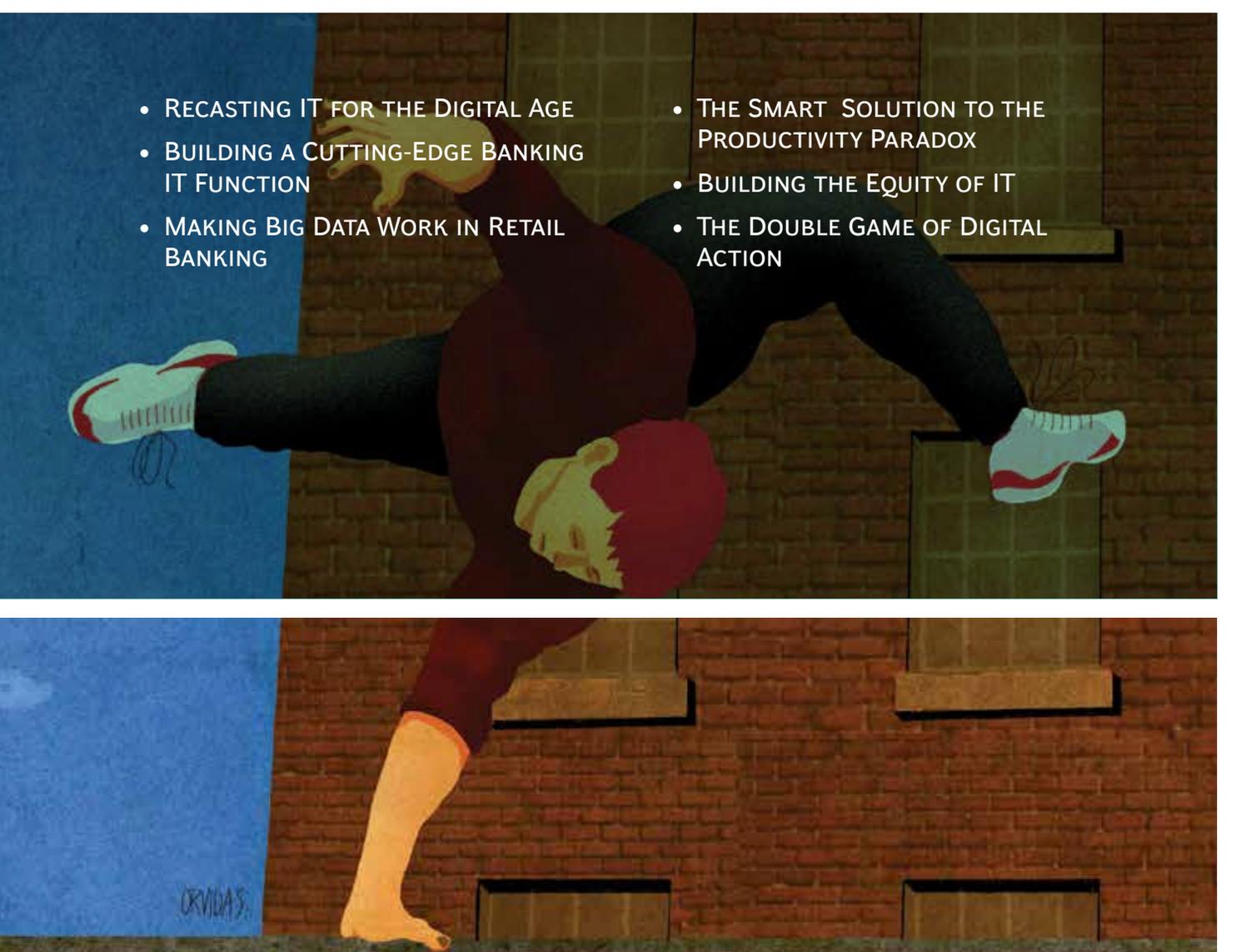


BCG TECHNOLOGY ADVANTAGE

- RECASTING IT FOR THE DIGITAL AGE
- BUILDING A CUTTING-EDGE BANKING IT FUNCTION
- MAKING BIG DATA WORK IN RETAIL BANKING
- THE SMART SOLUTION TO THE PRODUCTIVITY PARADOX
- BUILDING THE EQUITY OF IT
- THE DOUBLE GAME OF DIGITAL ACTION



FIVE SECRETS TO
SCALING UP AGILE

ORVIDAS

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Preface



Over the past 30 years, while global GDP has doubled, spending on technology has increased by a factor of 14. If you added up today's global spending on technology, the sum would represent the world's third-largest economy. But have companies seen the expected payoff, in terms of value creation, from their technology investments? In many cases, the answer is no. Will that change in the digital age?

Digital clearly remains at the top of most companies' agendas. There is hardly a company that has not embarked on a digital transformation journey. Many have managed to deliver a successful digital pilot; some have successfully launched greenfield, start-up businesses. Yet, on the whole, companies are having difficulty realizing their digital ambitions. My conversations with CEOs, CIOs, and other business executives reveal that leaders struggle, in particular, to scale up digital and apply it across their entire organizations. They also struggle to accelerate the speed of their digital transformation efforts.

I remain a strong believer in digital's potential—and the dictum that, to succeed today, every business must view itself as a technology company. It takes much more than just the use of digital technologies to become a high-performing company, however. Digital transformations will be successful and create value only if companies address technology change and the required organizational and behavioral changes at the same time.

This edition of *BCG Technology Advantage* includes publications that span a number of issues related to digital's challenges and opportunities. Our feature piece focuses on how large companies can scale up agile software development beyond individual projects. Other articles and reports describe the role that IT departments can play in digital transformations; how BCG's smart simplicity approach, coupled with digital tools, can unleash productivity gains; how managers can design and execute digital strategies for maximum results; and how retail banks can realize big data's full potential. We also include two interviews: one with Ron van Kemenade, the CIO of ING Bank, detailing the bank's launch of an aggressive overhaul of its IT function, and another with Erwin Logt, the CIO of FrieslandCampina, one of the world's largest dairy companies, discussing his efforts to make IT a strategic partner to the business side of the company.

I hope you find these publications interesting. Please send any feedback to TechnologyAdvantage@bcg.com.

Ralf Dreischmeier
Global Leader, Technology Advantage practice

Contents

FOCUS	
Five Secrets to Scaling Up Agile	2
VIEWPOINT	
Recasting IT for the Digital Age	8
Q&A	
Building a Cutting-Edge Banking IT Function: An Interview with Ron van Kemenade, the CIO of ING Bank	15
INDUSTRY SPOTLIGHT	
Making Big Data Work in Retail Banking	18
VIEWPOINT	
The Smart Solution to the Productivity Paradox	25
Q&A	
Building the Equity of IT: A Conversation with Erwin Logt, FrieslandCampina's CIO	31
FOCUS	
The Double Game of Digital Action: Structuring the Program	34

FIVE SECRETS TO SCALING UP AGILE

by Kaj Burchardi, Peter Hildebrandt, Erik Lenhard, Jérôme Moreau, and Benjamin Rehberg

COMPANIES ACROSS MANY INDUSTRIES are struggling with the transition to Agile, a fast, iterative software-development method. Too many companies have the appearance of Agile—with, for example, hastily converted, brightly colored meeting rooms and daily stand-up meetings—but they achieve little of tangible impact.

At software start-ups in which Agile is commonly used, the development team is at the heart of the business, so buy-in, sustained commitment, and collaboration come fairly naturally. It is not easy, however, to integrate self-directed, cross-functional Agile teams into the existing hierarchy of large companies.

Some large companies, however, are figuring out how to make Agile work. Rather than impose its specific methodologies, they apply its general principles, paying special attention to the integration of Agile teams into the rest of the organization.

When large companies get Agile right, the results can be stunning. Productivity can improve by a factor of three. Employee engagement, measured in quantitative surveys, increases dramatically too. New product features can be released within weeks or months rather than quarters or years. Rates of innovation rise, while the number of defects and do-overs declines. In the first year after going Agile, one bank's development team in-

creased the value delivered per dollar spent by 50%, simultaneously cutting development time in half and improving employee engagement by one-third.

As the quality of software rises and the responsiveness of processes improves, some companies are applying Agile principles to activities other than software development. For such companies, Agile can become a journey of continuous improvement.

Why Agile?

Agile grew out of a desire to improve traditional methods of software development. Customarily, software has been developed sequentially, with the waterfall serving as a rough metaphor for its progression. Separate groups conceive, design, build, test, put into operation, and maintain software, each group waiting for the preceding group to complete its work. The method is inefficient. In many cases, participants spend more time sitting in meetings and managing handoffs across organizational boundaries than writing and testing code. According to the often-cited *The Chaos Report*, less than 10% of large software projects come in on time and on budget.¹

The waterfall method comes from engineering, but writing many types of software is different from building a bridge. A river doesn't change its course, but software users have fre-

quently changing and unpredictable needs. Consequently, Agile relies on bringing together many different points of view and supporting back-and-forth dialogue between developers and business executives.

Many forms of Agile have been developed, but at its heart, Agile is a set of beliefs. It is *iterative, empirical, cross-functional, focused, and continually improving*.

- **Iterative.** Agile is based on doing things repeatedly until you get them right. Short iterations mean that teams can change direction and react quickly. Progress remains visible and predictable because development happens in short sprints. Delivery risk declines progressively.
- **Empirical.** Agile teams rely less on the plans, estimates, and assumptions common to waterfall methods and more on A/B testing and other real-time metrics generated by end users. One of the many virtues of sprints is that they produce empirical feedback quickly, allowing teams to self-correct. Agile teams also measure and track their activities closely.
- **Cross-Functional.** Agile teams have members of such relevant functions as business, marketing, development, and, in some industries, risk management working closely together in order to facilitate early and frequent feedback from business executives and customers. All the members of the team have specific roles and responsibilities.
- **Focused.** Agile teams are fully accountable. They do not work on several projects simultaneously; nor do they leave a project once their specific duty is done. In for the duration, they develop a sense of accountability.
- **Continually Improving.** Agile software is a work in progress, with constant updates and experimentation aimed at satisfying customers.

Putting the Agile set of beliefs into practice can be difficult in large companies, given layers of processes and structures, such as HR,

finance, and legal functions. Rather than viewing Agile as yet another new process, companies should integrate Agile values into their own software-development organization and culture, making reasonable modifications when necessary. (See the sidebar, “The Secret Sauce: Making Agile Work.”)

There are five secrets of success for large-scale Agile transformations.

It Starts at the Top

Transformative change requires support from the top. Senior leaders need to be actively involved in fundamental decisions about the business purpose of going Agile and the cultural barriers and root causes that might stand in the way of success. Without this commitment, legacy approaches to, for example, capital allocation, HR processes, and portfolio management will doom Agile. That’s why business—not just tech—leaders must be accountable.

Agile is based on doing things repeatedly until you get them right.

Agile transformations are different from other transformations: leaders must mobilize management to march in an unfamiliar new direction. The fast pace and cross-functionality of Agile can put many executives out of their comfort zone. Without strong and steady support from the top, many executives and team members revert to the norm. The CEO of a large European bank told us that he wants his organization to operate as a technology company that deals with financial-services products.

To Fly, You Need Pilots

In a large organization, Agile pilots are necessary in order to determine whether Agile will work there and whether the organization will accept Agile principles. Pilots are critical to a company’s making the necessary adaptations to Agile.

THE SECRET SAUCE

Making Agile Work

There are several best practices that help activate the Agile set of beliefs at large companies. These practices—which embrace iterative, empirical, cross-functional, focused, and continually improving approaches—accommodate the realities of large organizations while staying true to Agile principles.

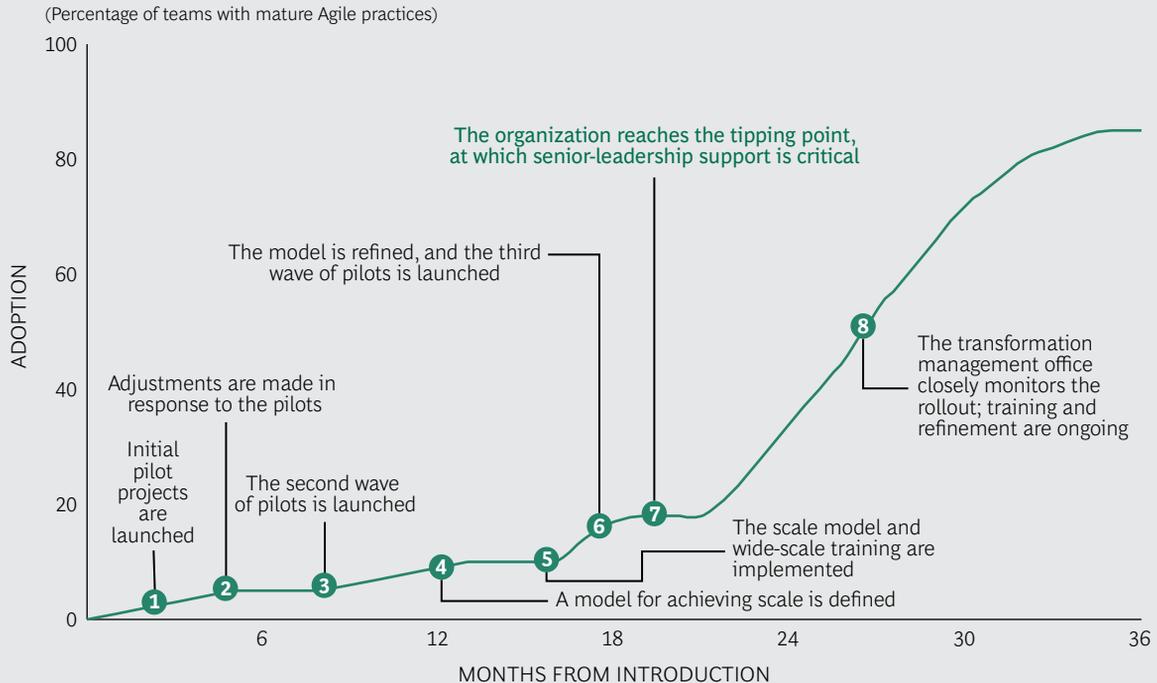
- **Iterative.** Agile teams complete manageable chunks of work—and produce a prototype—within fixed time periods. On the basis of feedback on the prototype, the team moves forward to a new set of tasks. The technical environments of large companies may not easily permit teams to operate in the two-week sprints customarily used in Agile, so many of them have stretched the sprints to intervals of four to six weeks.
- **Empirical.** Testing, a cornerstone of the Agile approach, ensures that software quality remains high and development activities are run efficiently. Large companies, especially those new to Agile, may not have invested heavily in testing tools. But as long as they are simultaneously building the business case for making these investments, corporations can forego some of the rigorous testing conducted by true Agile organizations.
- **Cross-Functional.** Ideally, teams should not violate the “pizza box rule,” which restricts team membership to the number of people who can eat a single pie. The idea is to limit membership to those individuals who possess essential and complementary skills so that the team can accomplish real work. However, this rule can limit the ability of large companies to have the right experts on a team. The rule may, therefore, be loosened as long as all members are fully on board—part-timers need not apply—and contributing, not delegating.
- **Focused.** The single most important element of a functional Agile team is the “product owner,” a single executive who is empowered to make decisions about scope, timing, allocation of budget, and product features. In a pure form of Agile, the owner does need to consult a steering group or governance body. In large companies, however, this focus may be shared by two or three executives, such as a product manager and a business analyst or expert and possibly a “product executive.”
- **Continually Improving.** Agile teams rely on retrospectives, obstacle removal processes, and scrum masters to continually identify opportunities to enhance productivity by tweaking and tuning their environment and way of working. The specific methodologies are less important than the commitment to view the creation of software as an ongoing—not fixed—and organic process.

For example, in a scrum, a single product owner takes responsibility for managing the relationship and interactions between developers and customers. This role requires a careful mix of technical and business skills. Companies may need to have even two or three people collectively serving in that role until the organization develops people who have the required multifunctional skills.

Likewise, it might be difficult to fully implement iterative development in all instances, but frequent feedback between developers and business executives ought to be the norm.

Staged rollouts in waves create momentum by building relevant capabilities and ensure that Agile principles and culture are embedded across the organization. (See Exhibit 1.)

EXHIBIT 1 | Agile Transformations Take Time



Sources: BCG case experience and analysis.

Managing the Tipping Point

The pilot phase is followed by steps that must be executed with some delicacy to avoid unnecessary tension: it's time to scale up Agile in an organization that may be theoretically willing to accept it but, practically, is challenged to do so.

HR processes, such as performance management, may not be set up to handle fully dedicated cross-functional teams where team—not individual—results matter most. Agile's flexibility will almost certainly strain budgeting processes even if Agile is ultimately less costly than traditional development activities. An organization's IT infrastructure may not be set up to accommodate continual integration and deployment because of lengthy provisioning times. Furthermore, traditional development teams may be resentful, and certain activities may be outsourced.

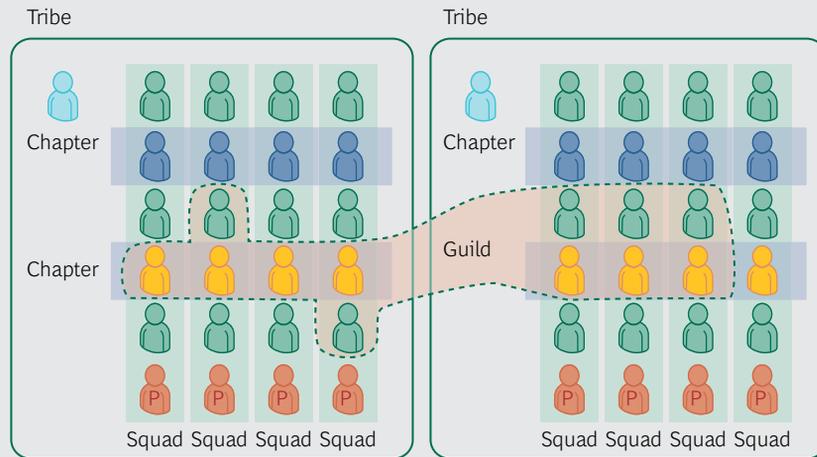
These are all real technology and organizational concerns that will not resolve themselves on their own. Executives must actively manage the integration, and the enterprise almost certainly will have to invest in training

and development to encourage the right culture and behaviors.

The enterprise must invest in training and development to encourage the right culture.

Several successful approaches exist for scaling up Agile within organizations. At one extreme, the music-streaming service Spotify has fundamentally changed its organization structure. The company's product-delivery organization is made up of squads, tribes, chapters, and guilds. The primary unit is the squad, a multidisciplinary team that works toward a shared purpose and is run by a product owner. Tribes are groups of squads that work on related areas. Chapters are groups of people with similar expertise across squads, and they form the line organization. Guilds are interest groups that anyone can join. (See Exhibit 2.) Other companies have simply overlaid cross-functional teams above existing hierarchy.

EXHIBIT 2 | Organizing the Spotify Way



SQUAD

- The primary working unit
- Self-organizing and autonomous
- Long-term mission

TRIBE

- A collection of squads that work on related areas to solve a specific business problem
- Tribes support squads

CHAPTER

- A group of people with similar competencies across squads
- Responsibility for personnel development and training

GUILD

- An interest group that anyone can join

Source: Spotify.

Measure, but Measure the Right Things

The ultimate goal of Agile is to improve the business. Therefore, the ultimate measurement should relate to business performance. If the goal of a bank's Agile project is to reduce the dropout rate in credit card applications, then the dropout rate should be the most important metric. But in order to improve the business, companies also need to track software reliability, security, complexity, and size.

That's where software measurement tools enter the picture. These tools allow companies to demonstrate empirically the productivity and quality improvement of Agile development and the overall performance of Agile teams.

Never Stop

Agile development is an exercise in continuous improvement. It is not a one-off exercise. Agile requires constant monitoring to ensure proper functioning. Companies need to take steps to bake the Agile principles into the organization. There are many ways to ensure that Agile endures. Many companies, for example, create teams consisting of the leaders of each Agile project, and they share best practices.

AT its heart, Agile is about creating the right context in which your people—specifically your developers—can do their best work. It is often thought of as a method for writing software, but ultimately, it is a way to run and continually improve your business.

NOTE

1. The Standish Group International, *The Chaos Report*, 1995, <http://www.csus.edu/indiv/v/velianitis/161/ChaosReport.pdf>.

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RECASTING IT FOR THE DIGITAL AGE

by Thomas Gumsheimer, Frank Felden, and Christian Schmid

DIGITAL TECHNOLOGIES CONTINUE TO rapidly reshape the business landscape. (See the appendix, “Technology Trends to Monitor.”) A striking feature of this ongoing transformation is that, despite these technologies’ underlying technical complexity, a significant share of many companies’ digital campaigns is being driven largely by the business function, with only limited conceptual involvement by the corporate IT department. In fact, sometimes the business even launches digital initiatives without the knowledge of corporate IT. This has become possible because of new enabling technologies, such as software as a service (SaaS) offerings, cloud-based enterprise resource planning (ERP) software, and augmented-reality applications, which are provided by specialists such as Metaio (recently acquired by Apple).

The empowerment of the business function in this manner can provide clear advantages for a company: it can, for example, speed the launch of innovative new products and services to customers. But over time, it can also lead to an assort-

ment of independently driven digital initiatives that have no unifying standards. This can translate into high complexity, additional costs, a lack of compatibility among initiatives, and security issues.

More broadly, the business function’s growing ability to launch and operate digital initiatives on its own raises a question: what role will the corporate IT department, led by the CIO, play in companies’ accelerating digital efforts? There is a very real risk that the IT department could be largely excluded from the company’s digital initiatives and relegated to the management of back-office applications.

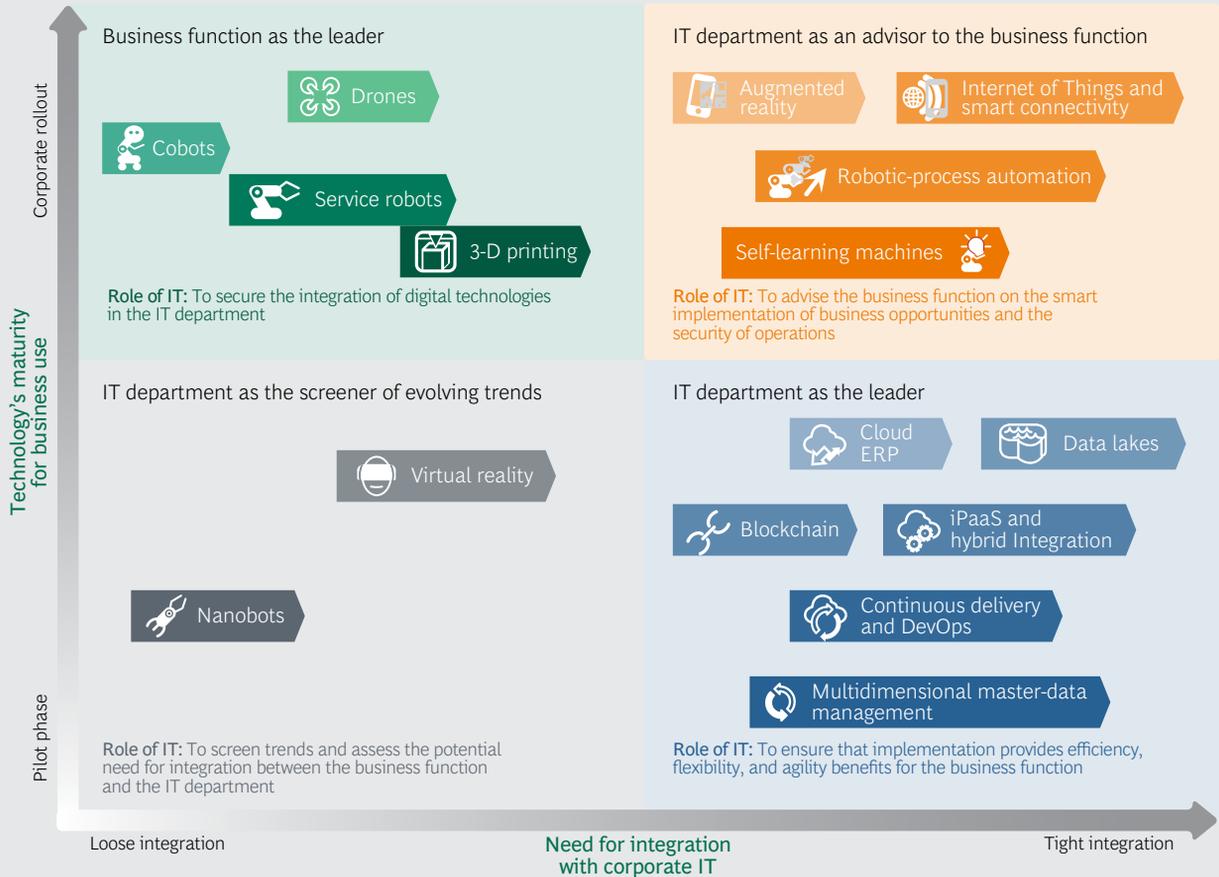
We believe that corporate IT departments can not only avoid such a risk but actually increase the importance of their role. To do so, though, they will need to challenge their self-perception and determine exactly how they can provide real value with regard to digital technologies. A number of IT organizations have already done this successfully—for example, they have set standards and guiding principles that minimize complexi-

ty across local digital initiatives without stifling the spirit of autonomous digital innovation.

A challenge for the corporate IT department is that the parameters of this new role will vary, depending on the nature of the technologies the company uses. To succeed, corporate IT will need to take a critical look at the maturity of these technologies in light of the department’s own capabilities. Some digital technologies should indeed be managed by the IT department; others can be better deployed and maintained by the business function, whether on its own or with the help of specialized third-party providers.

To help companies identify the sweet spots for IT, we have developed a matrix that is based on two dimensions: a technology’s maturity for business use within the company and the level of integration with corporate IT that the technology would require. (See the exhibit, “The Role of the Corporate IT Department Changes Along Two Dimensions.”) Depending on which quadrant a particular technology falls into, the corporate IT

THE ROLE OF THE CORPORATE IT DEPARTMENT CHANGES ALONG TWO DIMENSIONS



Source: BCG analysis.

Note: The technologies offered in the matrix are just some of the technologies that a company might consider using. The matrix's contents will vary according to any given company's needs.

department could take on one or more of four potential roles:

- Securing the integration of digital technologies in corporate IT.
- Advising the business function on the smart implementation of business opportunities and the security of operations.
- Screening trends and assessing the potential need for integration between the business function and the IT department.
- Ensuring that implementation provides efficiency, flexibility, and agility benefits for the business function.

Ultimately, though, the corporate IT department will need to fill all four potential roles simultaneously in order to secure its seat at the table during a company's digital efforts and to maximize its overall value to the firm. To manage this, the IT department will need to be particularly strong on three key fronts: digital IT strategy design and execution support, the integration of digital initiatives with the existing customer experience, and the flexible implementation of digital technologies coupled with the skillful deployment of agile paradigms. In sum, the corporate IT department could play a vital role in a company's digital efforts—but to do so, it will need to build specific capabilities and ex-

pertise and demonstrate the value that it adds.

Digital IT Strategy Design and Execution Support

Companies' digital initiatives—individual products, app-based businesses, digital processes, and so forth—are increasingly being launched and driven by the business function, often supported by external digital advisors and cloud-sourced services. This decentralized approach can deliver tangible benefits, as noted, and work well at the outset. But it can also lead to the use of a complex, often incompatible array of technologies across the organization, translating into considerable inefficiency, fail-

ure to realize potential synergies, and, ultimately, skyrocketing costs.

Best-practice technology companies such as Google, Amazon, and Netflix have managed to address this dilemma. They allow individual departments and business units considerable autonomy in the design and launch of digital initiatives and even in their choice of technologies. But these companies also establish very clear guiding principles and standards on basic concepts to promote consistency and compatibility across the company. In addition to providing the necessary balance between decentralization and control, such an approach can also enable the integration of technologies that are only loosely coupled with corporate IT. Consider, for example, a company that collects data from shop floor robots and then uses that information in big-data analysis.

To strike the right balance between decentralization and control and to create the greatest value through its collective digital efforts, a company should develop a digital IT strategy that—like the company’s traditional IT strategy—is in sync with the company’s business strategy. But the digital IT strategy should include a stronger technology-driven vision, simpler guiding principles and standards, and especially clear implementation guidelines. This strategy should be developed by an internal organization that understands the company’s needs and requirements across business lines, has the requisite technological expertise and skills, and can establish guiding principles to harmonize locally created initiatives in a manner that does not stifle innovation.

In many successful companies, corporate IT departments are already filling this role or building the nec-

essary capabilities to do so. The role demands strong skills in core IT competencies—such as the alignment of business and IT requirements, the establishment of technological and architectural standards, and the proper execution of IT strategies—as well as an understanding of digital technologies and related new requirements, such as agile development, continuous delivery, and the hybrid integration of legacy and cloud environments.¹

It is imperative for the IT department to work closely with the business function.

When crafting the digital IT strategy, it is imperative for the IT department to work closely with the business function to help it understand these technologies, evaluate their potential business value, and figure out how to realize that value. This advisory role is especially important for nontechnology companies, such as banks, insurers, and retailers, that do not have R&D departments. One way that the IT organization can effectively perform this role is to establish joint teams with the business function, comprising personnel who bring together both business know-how and a deep understanding of technology and its related impact. Such teams should be embedded throughout the product development process; if IT personnel are not integrally involved throughout, there is a good chance that the business function, acting independently, will frame requirements that are inconsistent with the principles of the company’s IT strategy.

To get the business function to buy into this joint-team approach, the corporate IT department must invest heavily in developing the

skills necessary to help the business explore and test technologies. The IT department should also be proactive. Rather than simply veto any ideas that do not comply with the company’s current IT strategy, the IT department should come up with suitable alternatives. Digital innovators such as Spotify, through its “squad” model, have shown how this collaborative approach can work in practice. Spotify’s squads are cross-silo, multidisciplinary teams that comprise

individuals from the product and engineering functions. The teams share a vision and are subject to common guiding principles (regarding, for example, how interfaces are built), but they pursue their objectives autonomously. Amazon’s “two-pizza teams”—fully accountable, agile teams with only a few members, who can be fed with two pizzas—are another example of how this type of approach can work effectively. For the deployment and ongoing management of technologies loosely coupled with corporate IT, the department can draw on the company’s digital or strategy offices.

The Integration of Digital Initiatives with the Existing Customer Experience

Digital technologies and trends can enable cross-functional and seamless customer experiences, such as those provided by omnichannel retailing. They can also enable direct interactions with a company’s customers, such as when banking clients look for real-time financial advice or manufacturing customers seek to configure products in a

custom-order environment. To deliver fully on this potential, however, the customer experience must be managed with an end-to-end perspective.

The corporate IT department is uniquely qualified to take on this role. It has a broad, encompassing view of the company's business processes and considerable experience in supporting them centrally by providing IT services. It also coordinates the needs of the different business units: it understands the technologies that they decide to employ and the implications of those choices for related processes and applications and on the company's infrastructure. Furthermore, it understands the units' interactions with internal and external interfaces. Finally, the IT department is positioned to align these needs and technical requirements with the company's broader IT strategy while maintaining a high-level view of costs and complexity.

To deliver fully in this role, the corporate IT department will need to build up its understanding of the real value and maturity of evolving digital technologies and trends that hold promise for the business function, such as robotic-process automation and the data-storage repositories known as data lakes. The IT department has unique advantages on this front, including its ability to leverage its vendors' knowledge and experience. The IT department can also support secondments of select internal developers and business analysts to vendors and tech companies, and it can form focused research partnerships with start-ups and universities. The added knowledge gained through these efforts can help the IT department more effectively integrate the various digital technologies that are employed across the company and its digital ecosystem.

Succeeding in the role of integrator will also demand that the corporate IT department reconceptualize and reposition itself; most IT departments currently view themselves largely as service providers to the business. Forming joint business and IT teams, as discussed above, can help an IT department make this leap.

The Flexible Implementation of Digital Technologies

To fully capture the many business opportunities that digital technologies afford today—for example, the ability to win new customers with real-time responses—companies must implement these technologies quickly. This holds especially true for such customer-facing industries as consumer goods and retail, banking, insurance, and media, where consumer preferences and expectations can change seemingly overnight. Most companies, however, are still heavily dependent on large legacy systems and technical landscapes that are often incompatible with digital technologies, preventing the company from rapidly adopting and deploying them. Compounding matters, most companies will have to remain wedded to their legacy systems, in part or whole, for at least the next few years.²

To support the business adequately amid these challenges, the corporate IT department must ensure that digital functionality is available to the business—and do so without making time-consuming and expensive changes to the whole architecture or temporarily shutting down the company's existing systems. This requires using new technologies that can integrate the digital and legacy worlds, including cloud-based solutions such as integration platform as a

service (iPaaS) and hybrid tools that allow the smooth integration of new cloud environments and SaaS offerings with mainframes and Unix machines. The IT department will also need to ensure that it can enable the integration of partners' and clients' systems with the company's existing systems and devices. This will require using application program interfaces (APIs) and microservices—and it will place significant demands on the company's underlying technical infrastructure overall.

In addition to the direct challenge of integration, both the corporate IT department and the business function will be forced to tackle the related challenge of managing the enormous amounts of data that these integrated processes will generate. Collecting and managing this information, which will include both structured and unstructured data, will require new capabilities, including multidimensional master-data management and the use of data lakes. The IT department should be part of each master-data-management initiative and advise on a governance process and guidelines to ensure that the data-management models of the company's individual-country operations and business lines are compatible. In order to mitigate technology-related risks, the IT department should also be able to advise the company on the technologies that its data-management efforts will employ, capitalizing on the department's experience with the life cycles of hardware, software, and technology in general.

In conjunction with the execution of these measures, the corporate IT department will need to adopt a way of working that heavily leverages agile paradigms in a manner that goes beyond the ways that agile is typically used. ING

Bank Netherlands, for example, has deployed agile principles across its entire organization instead of confining their use solely to IT development. The application of fast, flexible models and philosophies, such as continuous delivery and DevOps, can further help the company deploy new features in very short time frames.

Trying to achieve all of this will force the corporate IT department to change not only its standards and organizational setup but also its culture and mentality. The IT staff will need to transition from providing technical services to becoming more integrative and orchestrating. The challenge of the required cultural transformation should not be underestimated. Managing it successfully will entail hiring top IT talent—and competing with the big technology companies and start-ups to do so. (See *The Power of People in Digital Banking Transformation*, BCG Focus, November 2015.)

How to Facilitate the Transformation

Today's rapidly evolving digital technologies will transform many businesses. Corporate IT departments, led by the CIO, can both enable and drive these transformations, leveraging their expertise and unique vantage point within the company. We have seen a number of IT departments successfully manage this evolution by taking the following actions:

- **Changing the self-perception of corporate IT** from service provider to business advisor and technological innovator. This has often required an upgrade of the IT department's capabilities and skills, which can be achieved through a number of means: by conduct-

ing “hackathons” to explore the development of new customer journeys, leveraging innovation networks to identify evolving digital trends, and focusing on hiring top talent, among others.

- **Ensuring digital readiness** on the part of both the IT department and the business function so that the business's digital requirements can be met quickly and efficiently. IT departments have done this by adopting both revolutionary and evolutionary approaches. A revolutionary approach includes building a fast, flexible, and adjustable architecture and process landscape and leveraging multidimensional master-data management, continuous delivery, and DevOps. An evolutionary approach includes digitizing core customer processes, leveraging APIs to reduce complexity, and using hybrid integration and iPaaS tools to ensure the smooth interoperability of digital and legacy technologies and systems.
- **Creating a truly agile organization** by leveraging the experiences of start-ups and technology companies. IT organizations can benefit by studying these companies' innovative practices, such as Netflix's novel, cloud-based “NoOps” approach to managing development and operations.
- **Expanding internal IT skills** through various means. Corporate IT departments have boosted their skills by, for example, including innovative training methods, secondments of staff to start-ups and technology companies, the hiring of coaches versed in agile meth-

odologies, and a continuous inflow of new talent.

IT departments have also optimized their relationship with the business function by taking the following actions:

- **Aligning themselves closely with the business** in the use of new technologies, such as by holding joint innovation activities and creating teams that comprise business and IT people.
- **Clearly communicating** the advantages of a unified digital IT strategy to the rest of the company.
- **Teaming up with their companies' strategy and digital departments** to manage the deployment and operation of digital technologies that do not require much involvement from corporate IT.

By emulating these efforts, corporate IT departments can help ensure that their companies realize the full value of their digital efforts—and that the IT department remains an integral driver of that process.

NOTES

1. Continuous delivery refers to the ability to update and release software rapidly, on an ongoing basis, in response to changing business needs.

2. To mitigate the effects of dependency on legacy systems, a number of successful IT organizations have turned to “IT4IT” technologies and practices, such as continuous delivery and development operations (DevOps). The latter is an approach in which development and operations engineers work together throughout an application's entire life cycle—not just during the development and deployment stages—in an effort to facilitate greater speed and higher quality.

Appendix

TECHNOLOGY TRENDS TO MONITOR

Across industries, digital technologies are shattering established business paradigms and advancing rapidly as businesses, governments, and nonprofit organizations find more and more ways to leverage them. The following is a small sample of digital technologies that are either already developed or on the threshold of viability.



Augmented-Reality and Virtual-Reality Applications. Augmented-reality applications integrate digital information—including images, sound, video, graphics, and GPS data—with the real-world environment. Virtual-reality applications deliver a complete virtual experience and are transforming a wide range of products, services, and processes across industries. For example, Lowe’s has created a home-improvement simulator, called the Holoroom, that allows the company’s customers to virtually construct, view, and plan home improvements before making a purchase.



Blockchain. This cryptographically secure distributed-ledger protocol, perhaps best known as the technology that underpins Bitcoin, has attracted significant attention from venture capital firms and investors. Established financial-industry players are also showing considerable interest: more than 40 investment banks have joined the innovation firm R3, which leads an industry-wide consortium that focuses on the technology. These companies believe that blockchain technology could change the financial-market paradigm by accelerating banking processes at relatively low cost.



Cloud-Based ERP Systems. These systems offer companies far greater speed and flexibility than legacy ERP systems. They are often based on in-memory technology that enables fast transactions and a real-time experience, and they look and feel like apps. They are provided on-premises or via the cloud through usage-based license models. SAP’s cloud-based ERP package, SAP S/4HANA, for example, offers both data-analytics capabilities that are a thousand times faster than those of its predecessor and a variety of new features and capabilities.



Cobots. Collaborative robots are capable of learning and can work side-by-side with humans. Robots made by Denmark-based Universal Robots, for example, can perform a variety of jobs, from sorting eggs to sorting blood samples. Programming these robots requires no coding skills, only the ability to use a touch-screen user interface. By connecting cobots with machine learning, it might be possible to develop increasingly powerful robots in the future—for example, robots that can train themselves.



Continuous Delivery and DevOps. These approaches close the gap between development and operations, enabling companies to release software reliably at any time, independent of fixed-release schedules. Continuous delivery also fosters a zero-defect mentality while fully automating the delivery pipeline. Best-in-class practitioners of continuous delivery become capable of continuous deployment: some companies release software more than 100 times per day.



Data Lakes. These repositories can store both

structured and unstructured data. Their underlying technology—Hadoop, for example—supports a high degree of physical distribution of data, ensuring scalability, stability, and availability. Data lakes, which store copies of the source data, allow analysts to explore the data using any type of analytics—such as real-time or complex algorithms—that they choose. This is an improvement over traditional data warehouses, which can support only the type of analytics that is based on the warehouse’s data model.



Drones. Unmanned aerial vehicles equipped with high-resolution cameras allow utilities and oil and gas companies to inspect onshore and offshore facilities, such as power grids and oil rigs, in all types of weather and without shutting down a facility to ensure the safety of human inspectors. Eventually, drones may be capable of performing repairs and routine tasks throughout these companies’ maintenance cycles as well.



Hybrid Integration Services and iPaaS. These services greatly simplify the challenge of connecting applications to a cloud environment and reduce the cost of doing so. Encapsulated services, or wrappers, connect any application or resource, ensuring that the benefits of the cloud, such as load balancing, can be assessed anytime, anywhere. Hybrid cloud environments preserve investments in legacy systems through their ability to access existing mission-critical data and work flow processes. New cloud services can speed the time to market for new products and help companies seize new market opportunities.



The Internet of Things. Applications based on the

Internet of Things are not new, but they continue to evolve and can be used in many diverse situations. These applications, which allow connected devices to gather and share data, also facilitate dynamic responses to product demand, real-time optimization of maintenance in manufacturing, and remote monitoring of individuals' health, including the related notification of the appropriate parties in the event of an emergency. Amazon's Dash Replenishment Service, for example, enables connected devices to order consumer goods, such as toner for printers, when supplies are running low.



Multidimensional Master-Data-Management Tools.

Once these devices are fully developed, they will allow companies to better respond to the increasingly complex data-management demands that digitization is generating. The benefits will include an enhanced ability to manage data holistically among business functions and across industries, data domains, and organizational structures.



Robotic-Process Automation.

Robots have been able to replicate muscle-powered tasks for years. With the advent of robotic-process automation, the technology now extends into knowledge-related and back-office work, such as tasks traditionally performed by call center employees, doctors, and lawyers. The next step of robotics' evolution could produce a code-free virtual workforce that replicates human actions and can automate any software-based process.



Self-Learning Machines.

The algorithms that these machines employ provide more

precise results than those that can be achieved with traditional big data. They also reveal correlations that are hidden from traditional big-data applications and can explore data even with very limited knowledge of the context. This technology has already become available to a broad audience through services such as Amazon Machine Learning, which is capable of delivering billions of forecasts per day.



3-D Printing.

The potential applications of this technology continue to expand exponentially, and demand for printers is soaring: Gartner expects more than 490,000 units to be shipped in 2016. This technology helps companies reduce downtime and cost considerably by allowing them to print parts at their various facilities on an as-needed basis instead of storing available component parts in centralized locations. Amazon, for example, recently filed a patent for mobile 3-D-printing delivery trucks, in which products would be printed upon order in locations close to customers, speeding time to delivery and sparing the company storage and inventory costs. As the variety of printing materials continues to expand—printers can now handle glass, carbon, textile fibers, and biological material—3-D printing's possibilities will continue to grow.

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BUILDING A CUTTING-EDGE BANKING IT FUNCTION

AN INTERVIEW WITH RON VAN KEMENADE,
THE CIO OF ING BANK

ING Bank is aggressively overhauling its IT function, aiming to deliver step changes in the function's efficiency, quality of output, and attractiveness as an employer. The company's CIO, Ron van Kemenade, recently spoke with BCG senior partner Hanno Ketterer about the effort's genesis, the technologies and methodologies employed, and the challenges to date. Edited excerpts of the discussion follow.

ING Bank is undertaking a massive technology transformation, which you've termed "Power IT." What spurred you to initiate that transformation?

In 2013, we came to the conclusion that any separate initiatives we might undertake to improve our quality, cost, and engineering capabilities might indeed lead to substantial impact. But more likely, they would suffer from lack of consistency, funding, support, and commitment. We also determined that we needed to take significant steps to support the bank's "Think Forward" strategy. This is why we created the Power IT program.

We launched the program with three overarching aims. First, we

wanted to create a best-in-class IT organization relative to our peers, one that would make us the preferred employer of IT talent in the Netherlands. Second, we wanted to substantially improve our quality. Third, we wanted to drive down our costs. At the time of the launch, we were far from where we wanted to be on those fronts. We were not the most preferred IT employer in the market, so we basically struggled to hire highly skilled engineers. Our quality, measured in time to market, also fell short—we were not agile enough. And our costs were well above our benchmarks.

Many European banks have launched initiatives designed to reduce costs. How did you convince ING's board to support such a comprehensive program, one that also entails investing in talent and new technologies?

The "how" question is not easy to answer. But let me explain a bit of the reasoning behind the program's design. There are costs associated with everything you do, whether that's buying an expensive machine, hiring an internal engineer, or doing things a particular way. There are also associated benefits. Our goal was not simply

RON VAN KEMENADE

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to drive down costs but rather to ensure that the money we do spend delivers maximum value. We could always reduce costs by, say, sourcing more work to India. But that would not address the fact that our engineers are not as productive as we need them to be. We could also cut costs by outsourcing our data centers or squeezing out the very last dollar from our suppliers. But these steps would not address the underlying causes of our inefficiency. They also wouldn't make us a better place to work. Neither would they reduce the complexity of our landscape or improve our processes.

Ultimately, we determined that the root causes of our costs were the complexity of our technology stack, the degree of automation of our processes, and the productivity (read: knowledge and skills) of our engineers. We knew, though, that addressing these root causes would also deliver substantial related benefits. Our quality would improve, as would our attractiveness as an employer. If you have a simplified technology stack, fully automated processes, and an agile way of working—and if new hires get to work with highly skilled peers—your company becomes an attractive place to work.

So we actually took the root causes of cost and made them the purpose of our program, since they go hand in hand. If you increase quality, you reduce cost. If you automate and make your processes more agile, you avoid waste and become more efficient. If you hire highly skilled engineers, you become more productive.

ING's transformation has involved the use of cutting-edge technologies and approaches, such as using private clouds, switching to APIs, and imple-

menting DevOps.^{1,2} Can you elaborate on some of these and explain why you think that they can take ING's IT to the next level?

We've made some bold choices. We could have decided to consolidate on just one platform and make sure that it's virtualized, which would have given us the benefit of optimized hardware. Or we could have stayed with our SOA-based architecture but not immediately expose functionality through the use of APIs.³ Or we could have maintained our current architecture for the various channels and not build for Web scale. But we decided that since we were investing a lot in the simplification of our landscape and the consolidation of data centers, platforms, operating systems, and middleware—and since we were looking at a three- or four-year journey anyway—we should do all of the above: build a new digital platform that was cloud-based and API-based, and Web scale at the same time. Obviously, this added complexity, as well as risk, to the program. But we believed that we could handle it and wanted to deliver to the business the benefits of a modern Web-scale stack as soon as we could.

Have there been specific tools, approaches, or methodologies that have helped you to achieve that end state, and which you would recommend to other CIOs undertaking similar journeys?

Moving toward this state has taken a combination of skills, methodologies, and sometimes technologies. Consider, for example, the decommissioning of the mainframe, which is probably the best example I can think of and a critical enabler of us realizing our ambition. Decommissioning is something

that basically everybody in the market would like to do, though I don't know of many companies, including ING, that have fully realized it to date. To decommission the mainframe, you need a fully functional roadmap. This is not easy to create, and it certainly wasn't for us, given that we had a significant number of business applications residing on our mainframe. For every single functional component, you need to have an alternative platform: if there is no target, there is no migration strategy. And off-loading a mainframe means migrating all of the functionality and interfaces. So you need to have your best people, those with knowledge of the entire organization, allocated to building these functional roadmaps, creating migration targets, and making sure that those targets are on the roadmaps of the business.

A second necessary element for successful decommissioning is rigorous program management. You need to break down the task into stages, with specific targets assigned to each stage. Everyone needs to know that in, say, stage three, which might take place in the second half of the year, the goal is to functionally migrate a specific number of applications.

A third key element is the use of the right supporting technologies where necessary. In our case, we have chosen to accelerate the decommissioning of our mainframe by using a rehosting environment that allows COBOL code residing on a mainframe to run in a container technology. The use of this technology allowed us to avoid fully refactoring applications when there was no target platform available to migrate to.

We have combined these three elements—roadmapping, rigorous

program management, and use of supporting technologies—and hope that they will do the trick. These elements have proved equally valuable to us in realizing other milestones on our journey.

Let’s move from technology to people. Using Spotify as inspiration, ING has also embarked on a large transformation effort to bring an agile way of working to both the IT organization and the business. What was the motivation for that?

The ultimate goal of creating an agile environment is to increase responsiveness to customers. Agile can certainly be useful for cost reduction and for creating a better process, one in which engineers feel more at home. But in the end, you do it for your customers, whether they are external or internal users. Those customers’ needs and desires change regularly and quickly in response to a range of factors, including new trends, new regulatory requirements, and changes in other industries. And customers demand that you respond. Our old way of working did not facilitate the necessary responsiveness. So we began to embrace agile methodologies in 2010, applying “scrum” practices to our development process. Those first baby steps involved just three teams. In 2011, we rolled out agile across all of development. But we found that working in an agile way solely in development didn’t really make much of a difference. IT operations needed to be included as well, since that’s basically where the buck stops before you go into production. So we applied agile to operations, too, and formed our first DevOps teams.

We also involved our business colleagues, since we considered their involvement critical for realizing the full benefits that agile can de-

liver, given the focus on the customer. The business had the opportunity to lead teams, decide on priorities and backlogs, provide short-cycle feedback, and interact on a frequent basis—often daily—with the engineers.

The business recognized and appreciated the benefits of agile but was not organized optimally to take full advantage of what it could deliver. The business then took it upon itself to reorganize in ways that broke down silos and fostered the necessary end-to-end ownership and accountability. Making this transition—using Spotify and its “squad”-based, feature-team approach as a model—proved highly challenging for our business colleagues, especially culturally. But I tip my hat to them. They had the guts to do it. And the benefit to the company as a whole has been sizable, as the bank is now unique in the Netherlands compared with a lot of other financial-services players.

The Power IT transformation has been under way for roughly 21 months now. Based on what you’ve learned so far, what advice would you give a CIO who plans a similar transformation?

The biggest lesson we’ve learned so far is that getting the necessary alignment within the company can be challenging; in our case, it proved far more difficult than we expected. Teams’ priorities would change in response to the near-term, day-to-day demands of the job, with the result that sometimes projects necessary to push the transformation forward—a decommissioning of something or a platform change—would disappear from, or get pushed lower down on, teams’ backlogs and hence not get done on time. In response to this, we made the switch from hav-

ing the effort led by a program team, an approach that only facilitated line management, to more centrally driven program management. Now, in the event that there are disputes about teams’ priorities, our group of CIOs, together with our business colleagues, make the final call. We expect that Power IT will unfold on schedule as a result of this adjustment.

But this was a huge lesson for us. We had assumed that alignment would occur naturally because teams would view things from an enterprise-wide perspective rather than solely through the lens of their own team. But we’ve learned that this only happens in a mature organization, which we’re still in the process of becoming.

NOTES

1. “API” stands for application program interface.
2. “DevOps” is the practice of having development and operations engineers work together throughout the entire life cycle of an application.
3. “SOA” stands for service oriented architecture.

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MAKING BIG DATA WORK IN RETAIL BANKING

by Elias Baltassis, Christophe Duthoit, Tamim Saleh, and Olivier Sampieri

RETAIL BANKS ARE DATA businesses. Their value chains have always been supported by data, and a large part of their competitive advantage is based on better use of the information that data provides and the insights it originates. Banks, along with retailers and telecommunications companies, have long had more consumer data available to them than other businesses.

Consumers embraced digital channels for all manner of commerce well before many businesses, and banks were among the first companies to take advantage of new streams of data. A few were early movers, employing advanced data analytics, establishing dedicated teams, appointing chief data officers, and investing substantial time, effort, and resources in building out infrastructure and enabling data analysis.

All that said, The Boston Consulting Group's work with leading retail banks around the world shows that despite the early start and formidable resources, most banks are far from realizing big data's full potential.

Data and analytics today bring the ability to combine three elements:

- Vastly bigger volumes of data, including highly detailed data combined from different systems
- Much more insightful models, powered by

so-called machine-learning software, which can make data-driven predictions and decisions

- More efficient technology, such as Hadoop software-hardware clusters, which are among the most cost-effective ways to handle massive amounts of both structured and far more complex unstructured data

Beyond the basic roadblocks that hold up companies in every industry, such as resistance to change and lack of qualified resources, banks have their own reasons for not having made more progress with big data. These include competing priorities, such as addressing regulatory changes in the wake of the financial crisis; IT complexity (because of multilayered systems and siloed data, banks rarely use the full breadth and depth of data at their disposal); and a combination of lack of overall vision and widely dispersed and loosely coordinated efforts, which result in suboptimal allocation of human and technical resources and limited interaction and exchange of ideas. In addition, because banks often work with aggregated data served up by their systems, they do not always appreciate the potential that is embedded in the rich precision and detail of the data they possess.

There are at least four areas in which focused and coordinated big-data programs can lead to substantial value for banks in the form of

increased revenues and bigger profits. (See Exhibit 1.)

Improving Current Practices with Point Analytics

One of the simplest—and most powerful—applications of data analytics is the development of point solutions for individual needs and issues while steering clear of other areas. Big data can be used to improve the assessment of customer risk in a particular context, for instance. Data analytics can also be employed to more effectively measure marketing potential.

One large European bank, for example, used a combination of point solutions to upgrade its credit underwriting and pricing and to enhance the effectiveness of cross-selling and up-selling campaigns. The bank had been running campaigns to increase the share of high-end (gold and platinum) credit cards in its portfolio. It had been using both risk assessment and marketing analytics based on aggregated data to preapprove current standard-card customers and target potential new clients. Its transformation rate was an unimpressive 3% to 5%.

We helped develop a series of advanced-analytics models that can process far more

detailed customer information—including data collected at the transaction level and compiled from multiple sources—related to credit risk, behavior, card use, and purchase patterns for other products and services. Using this data and the new models, the bank generated an entirely new series of risk and targeting scores. After a few adjustments were made on the basis of test campaign results, the new scores were applied to the bank's full portfolio of card-marketing programs. Uptake surged fivefold to an average of more than 20%, and the bank generated tens of millions of euros in new revenues—without incurring the excessive costs often associated with new-client acquisition in saturated European banking markets.

Transforming Core Processes with Platform Analytics

Retail banks use data-driven reasoning in many of their core processes, such as new-product development, customer relationship management (CRM), and product pricing. But most banks use data that they are already capturing, such as structured data from accounting and reporting systems or other conventional internal sources, and they apply analytics to only a limited number of points in their core processes. More

EXHIBIT 1 | Four Big-Data Value Drivers for Banking



IMPROVING CURRENT PRACTICES

Leverage the vastly improved understanding of customer behavior provided by big data to improve specific and well-delimited areas with point analytics

Examples: cross-selling, up-selling, risk management, campaign-specific Web analytics



TRANSFORMING CORE BANKING PROCESSES

Use platform analytics to regularly introduce data-driven improvements along the full value chain of core banking processes

Examples: collections, early-warning systems, omnichannel optimization



BOOSTING IT PERFORMANCE

Use the characteristics offered by big-data technologies—such as scalability, easy use of multistructured data, and economics—to improve or radically change legacy IT

Examples: DWH load reduction, DWH functionality expansion, new IT architectures



CREATING NEW REVENUE STREAMS

Leverage the insights generated by banking data, most likely in an anonymous way, to create new revenue streams

Examples: insights for retail shops, service providers, infrastructure managers, cities

Source: BCG analysis.

Note: DWH = data warehouse.

advanced banks have built a platform analytics capability that collects and analyzes not only internal multistructured data but also data from external sources. The internal data takes various forms and is often sourced from new digital channels and media. It can include, for example, customer interaction logs from the bank's website, voice logs from call centers, and smartphone interaction logs. Additional data is collected from other sources, such as external databases, geolocation analyses, public websites, and social media. These banks develop insights and apply them at every information-exchange point of their core processes.

Big data can both improve the capabilities and reduce the costs of bank IT systems.

Platform analytics helped a large U.S. bank substantially improve the performance of its end-to-end collections process. Following the financial crisis, the bank faced two new challenges:

- Unprecedented volumes of customers who had never before been delinquent but now faced financial problems
- An increasing number of financially stretched customers who were juggling multiple credit-card accounts and credit lines—and deciding which cards or lines to let slip into default and which to keep in good standing with regular payments

The bank's challenge was to identify at-risk accounts as early as possible, assess the borrowers' capacity to pay, evaluate their willingness to pay (a totally new behavioral characteristic), and match borrowers with restructuring and rehabilitation programs that suited each borrower's specific circumstances.

Data analytics were able to improve every step of the collections process, from early identification of delinquency to treatment selection to foreclosure—even to external-

recovery channel management. By combining structured and unstructured data from internal and external sources—including a number of sources that were previously untapped—into new behavioral models, the bank was able to develop programs that were tailored to customers' financial situations and predispositions. Big-data technologies also delivered accurate information about customers with outdated contact details, allowing the bank to increase effective outreach by more than 30%. The bank developed a new valuation approach for files in distress, which allowed the institution to more accurately reprice the portfolios of nonperforming loans for sale to external collectors.

Perhaps most significant, big data helped the bank better understand both the quality of the credit files coming into the collections process and the performance drivers of its collectors—as well as the interplay between the two. This yielded some surprising results. Established practices were built on the assumption that to maximize total collections, the most difficult files should be allocated to the best collectors. But an advanced-analytics analysis of the criteria used to determine which files were difficult and which were easy showed that allocating the easy files to good collectors actually maximized the number of files processed and, eventually, yielded a higher volume of collections.

As a result of the redesigned collections process and the optimization of each step, the bank increased the funds it collected by more than 40%, resulting in savings of hundreds of millions of dollars in bad debts that it would otherwise have written off.

Boosting IT Performance

Big-data IT technologies can both improve the capabilities and reduce the costs of bank IT systems. Linear scalability, in which banks buy only the hardware or software capability that they actually need; the use of inexpensive commodity-hardware components, especially for tasks that are computationally intensive; and the ease of manipulation of multistructured or unstructured data are all big steps forward for most financial institutions.

Banks can leverage these characteristics in several ways. These include efficiently processing the vast amounts of data generated by the omnichannel customer journeys common today; implementing more sophisticated, data-intensive models; and doing a better job of balancing the workloads of data warehouses that often operate close to saturation levels, thereby avoiding expensive upgrades.

A large European bank, for example, recently faced a conundrum with respect to its plans for a new data warehouse and CRM systems: the functionalities requested by the bank's business units far exceeded the budgeted capacity of the new system, which was a traditional, though state-of-the-art, data warehouse. A review of the bank's data storage and manipulation needs sparked the insight that led to a different—and much less costly—solution. The bank identified a series of applications using unstructured or multistructured data from various digital channels. Because traditional systems are not well suited to processing this type of data, they consume excessive calculation and storage resources. A new, hybrid data-warehouse architecture, combining traditional and big-data technologies and running on clusters of Hadoop commodity servers, accommodated all the functionalities needed by the business units and produced savings of almost 30% of the initial budget.

Creating New Revenue Streams

Companies in multiple industries are generating entirely new revenue streams, business units, and stand-alone businesses as a result of the information provided by the data they hold. (See “Seven Ways to Profit from Big Data as a Business,” BCG article, March 2014.) Banks are no exception; indeed, their vast volumes of data give them opportunities for customer insights that other businesses can only imagine. The challenge for banks is in using and manipulating data in ways that respect customer trust and privacy. The EU has promulgated especially stringent regulations in this regard. (See *Earning Consumer Trust in Big Data: A European Perspective*, BCG report, March 2015.)

Despite these constraints, several retail banks have found ways to monetize insights (as op-

posed to data) generated through their core activities by making customer data anonymous and aggregating or packaging it in ways that are valuable to other companies.

Speed and agility are crucial in creating big-data applications.

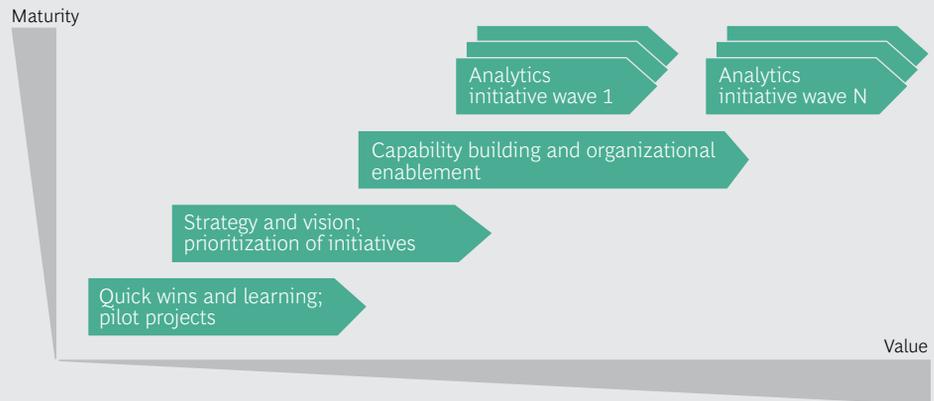
In one example, a leading European retail bank used data from its payment-card unit to build a digital dashboard for restaurants and bars. The dashboard displays high-level, aggregated information about each establishment, including the age and revenue brackets of customers, the behavioral segments to which customers belong, and whether they are first or repeat customers—information that restaurants could use to better serve, and sell to, their patrons. Restaurants were quick to recognize the dashboard's value: it achieved penetration of more than 50% of the bank's restaurant clients in just a few months. The bank projects new revenues of €50 million with a profit margin of about 40%—and that's after paying for the bank's new big-data system. The bank has since launched several similar initiatives.

Getting the Most from Big Data

Data and analytics are powerful tools, but they are also complex, requiring technology, technical expertise, organizational and resourcing support, and, quite often, a test-and-learn approach to capitalize on their potential. It takes time to build, staff, test, adjust, and perfect big-data programs so that they function at full potential. For banks, as for other companies, big data is a journey. (See Exhibit 2.)

Most banks have already run pilot or proof-of-concept projects, and rightly so. This is the best way to validate the potential, identify issues, and get the first quick wins from big data. Speed and agility are crucial in creating big-data applications. Short cycles, iterative development, and frequent pilots should be the rule. Risk taking should be encouraged

EXHIBIT 2 | The Big-Data and Analytics Journey



Source: BCG analysis.

and mistakes accepted. Big data is often uncharted ground, and even disappointment—or, at least, carefully analyzed disappointment—can be a good teacher. Since companies can evolve and mature, even after an imperfect start, most banks will be able to put themselves on the road to high-impact big-data success. We have created a basic roadmap to follow.

Assess your current situation. Most banks are already using big data, sometimes even without knowing it. Every retail bank has teams that use data and relatively advanced analytical techniques in everyday tasks, such as risk assessment and pricing and campaign management. And most banks have started experimenting with the new big-data technologies. More often than not, however, these efforts are carried out in a piecemeal and uncoordinated fashion. Even more often, data governance is administered on an ad hoc basis and based on purely technical, not business-related, considerations. In many cases, banks also fail to integrate new analytical opportunities and roles and responsibilities to create more data-driven, customer-centric organizations.

It is paramount for a bank to run a thorough diagnostic of its current data and analytics situation to identify the areas and capabilities in which it is close to achieving its desired state (or to aligning with the current state of the market) and those to which it needs to devote attention.

Develop a big-data vision. In our experience, the next step is the one that causes many banks to falter: moving beyond the diagnostic stage and building a vision of the role that data will play in the value chain, which includes identifying and prioritizing future applications and opportunities and evaluating the capabilities that the bank needs in order to successfully implement its plan. Too often, banks take a narrow view of the opportunities and capabilities necessary to succeed. The most innovative—and potentially most lucrative—opportunities usually are not readily apparent. That vision also shapes the role and place of big data in the organization and helps determine budgets, staffing, and organization structure. Strong sponsorship at senior levels sends a signal to the rest of the bank that top management attaches high importance to data and analytics.

Banks need to create an environment in which novel applications—ideas that truly differentiate a company from its competitors—can be quickly identified and developed. The exploration of new data applications should be encouraged at all levels of the organization, with employees given time and resources to pursue their ideas.

Bring the organization along. Ensuring widespread success means overcoming organizational inertia and skepticism. It's hard to overstate the importance of this step. The wide range of expertise needed to identify and develop applications will require

the skills of many individuals across the company. It's vital, therefore, to create strong links among professionals who may well have very different backgrounds and very little experience in working with one another. Frequent dialogue and ongoing collaboration will help these interdisciplinary teams zero in on, and prioritize, the most relevant business problems and opportunities. Formal processes can spur this kind of collaboration, as can a more informal push from the top. Establishing a clear roadmap for success that focuses not only on building capabilities but also on continually demonstrating the value of big data is essential to achieving buy-in and building momentum.

A roadmap for success that continually demonstrates the value of big data is essential.

Cultivate the critical capabilities. Similarly, banks need to recognize that the requisite big-data capabilities are not limited to high-price, state-of-the-art hardware and software plus a team of data scientists. All too often, the inability to recognize the breadth of the capabilities required hinders the organization's data enablement and restricts the impact of big data to a few very specific, and often limited-impact, areas.

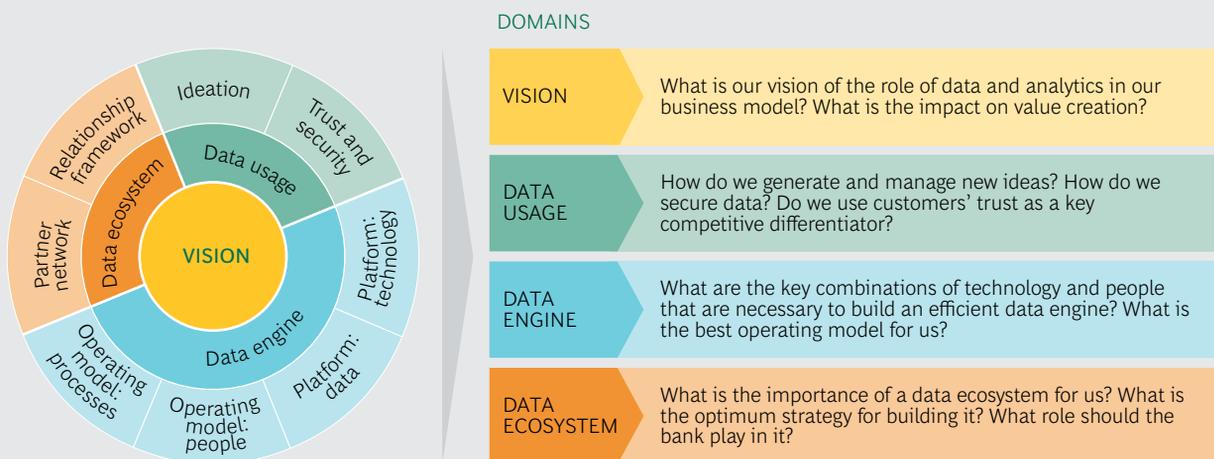
Banks end up building small pockets of excellence but fail to instill in their organizations an appreciation of the power that big data can bring.

Big-data capabilities fall into three domains:

- *Data Usage.* How does the bank generate and manage new ideas? How does it secure data? Does it use customer trust as a key competitive differentiator?
- *Data Engine.* What are the key combinations of technology and people necessary to build an efficient data engine? What is the best operating model for each particular bank?
- *Data Ecosystem.* Who are the partners, and what are the relationships that a bank needs? Which roles are internal, and which are external? What is the optimum strategy for building the ecosystem? What is the bank's own role in it?

Banks need to address all three domains as they move from vision to execution. (See Exhibit 3. See also *Enabling Big Data: Building the Capabilities That Really Matter*, BCG Focus, May 2014.) These capabilities need to be built by completing specific, discrete projects with measurable business cases and clear milestones. Large foundational programs that take years to deliver business value—if they ever do—should be avoided.

EXHIBIT 3 | Big-Data and Analytics Capabilities



Source: BCG analysis.

Working on data and analytics requires compiling the right mix of skills early on, with dedicated resources working in multidisciplinary teams that combine businesspeople, data scientists, and IT experts. The teams should be tightly linked units that are core to the business.

Last but not least, banks need to understand that operating pace is key: it is not so much what you do, but how fast you do it. The focus of banks and their big-data teams needs to be on the speed to market from idea generation to final implementation. Building the ideal organization structure is less important than working cross-functionally and integrating data and analytics into day-to-day business processes, with the goal of rapidly generating tangible value.

FOR retail banks, big data is already big business. But for many, it can be much bigger still, as the volume and depth of the available data grow, analytical models improve, and the sophistication of banking executives and data scientists increases with experience and success. There is no bigger playing field for big data than banking. Banks that raise their game first will not only reap immediate financial rewards but will also establish data and analytics capabilities that will be hard for competitors to overcome.

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THE SMART SOLUTION TO THE PRODUCTIVITY PARADOX

by Elsy Boglioli, Vanessa Lyon, and Yves Morieux

ROBERT SOLOW, NOBEL LAUREATE in economics, famously quipped in 1987 that “you can see the computer age everywhere but in the productivity statistics.” Other than a brief bump between 1995 and 2000, the growth in productivity in advanced economies has not kept pace with the growth in IT spending.

Technology was supposed to free people for more productive uses of their time. But so far it has not worked out that way. Companies invested heavily in technology but not in true integration. They integrated the tools with one another but not with the way people work. As a result, they often made matters worse. The technology that was meant to liberate employees has insidiously trapped them. It is no wonder that, in 2014 in the US, 51% of employees reported being disengaged, while 18% said they were “actively disengaged,” a recipe for subtle forms of corporate sabotage.

Now we are at the dawn of a new technology age, characterized by the explosive growth of data, connectivity, and processing power.

And while history might suggest that today’s digital, cloud, and connected technologies will have little effect on productivity, we believe their benefits could be substantial. Compared with the industrial systems of the past (massive HR, ERP, and CRM databases), today’s technology is more flexible, forgiving, and conducive to collaboration and data analytics. For example, agile software development, which is based on iteration and continual improvement, allows developers to write code that conforms to how people actually do their jobs.

If companies successfully marry these new digital approaches with what we call “smart simplicity,” they can unleash the latent power of their technology and their people. Smart simplicity is built on the premise that companies are most productive when they harness the intelligence of their employees. (See “Smart Rules: Six Ways to Get People to Solve Problems Without You,” BCG article, October 2011.) Many of today’s most successful digital natives, such as Netflix and Spotify, deploy aspects of smart simplicity in order to run agile and productive businesses.

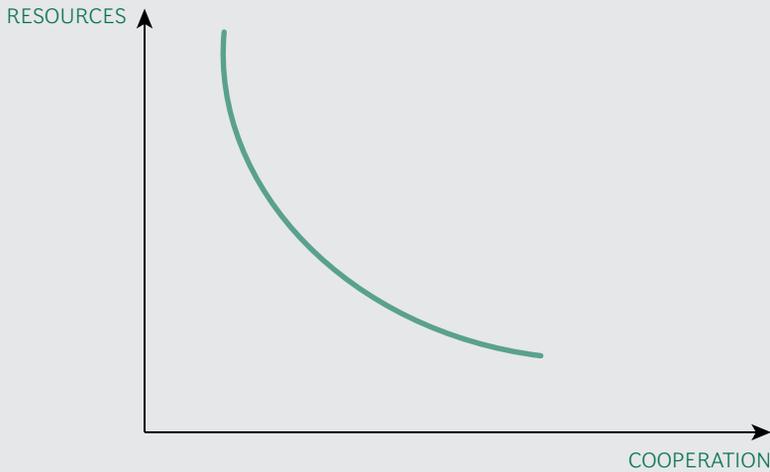
Fixing Taylor’s Legacy

The structure of the modern corporation owes a debt to Frederick Taylor, a US mechanical engineer who applied the principles of his profession to factories. Taylor’s approach assumed that workers had little ability to think for themselves and work unsupervised. Today, 100 years after Taylor laid out his system of scientific management, the introduction of technology into organizations built on his principles tends to constrain rather than expand employees’ ability to exercise their creativity.

Smart simplicity seeks to unlock productivity by creating an environment in which employees are able to both exercise their autonomy and work together. Autonomy harnesses people’s flexibility and agility, while cooperation multiplies the effects of their efforts through synergy. When people cooperate, they require fewer resources. (See Exhibit 1.)

What’s more, smart simplicity and digital work well together. Digital technologies facilitate the autonomy and cooperation at the heart of smart simplicity, and smart sim-

EXHIBIT 1 | As Cooperation Increases, the Need for Resources Decreases



Source: BCG analysis.

plicity addresses the sociological component—how work gets done—that so often is missing in technology integration. Together, digital technologies and smart simplicity can help solve the productivity paradox.

The Digital Solution

If Taylor is responsible for the structure of modern corporations, economist Ronald Coase illuminated their economic rationale. As he explained in his 1937 article, “The Nature of the Firm,” entrepreneurs can choose to contract for goods and services in the market. But by forming corporations, they avoid the transaction costs—the effort spent in research, negotiation, coordination, and enforcement—associated with such market exchanges.

As organizations grow, however, they create their own internal transaction costs—what we call “complicatedness.” Complicatedness refers to the structures, procedures, processes, and other well-meaning mechanisms intended to address the mounting complexity of modern businesses. (See Exhibit

2.) Over the past 15 years, the number of procedures, vertical layers, interface structures, coordination bodies, scorecards, and decision approvals has increased between 50% and 350%, depending on the company.

Digital technologies can help reduce both external and internal transaction costs. Their flexibility—coupled with the power of smart simplicity—allows for faster information research, easier coordination, streamlined processes, and greater coordination both within and across organizations (as we will show later).

Together, digital technologies and smart simplicity can help solve the productivity paradox.

Digital technologies allow companies to improve productivity in two ways: by making hard improvements that dramatically increase the efficiency of “smart” machines and processes, and by making soft improvements that increase the efficiency of people working together.

- **The Hard Side.** Increasingly, machines are communicating and coordinating with one another. Sensors, for example, can detect when a piece of equipment is close to failure and automatically order a replacement. A recent BCG analysis concluded that digital and related technologies could make improvements in productivity worth €90 billion to €150 billion over the next five to ten years in Germany alone. (See *Industry 4.0: The Future of Productivity and Growth in Manufacturing Industries*, BCG Focus, April 2015.)

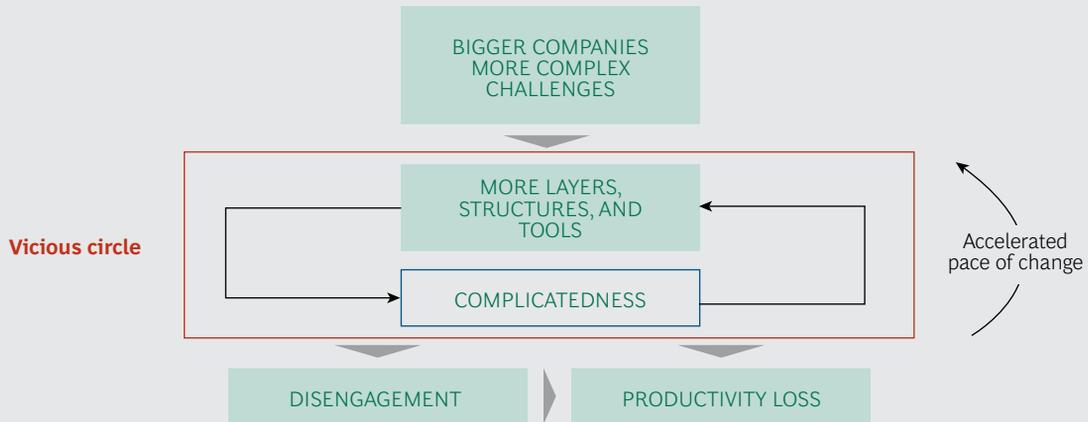
- **The Soft Side.** The soft benefits are where smart simplicity can provide the most help, and these may ultimately be the more powerful levers to unlock productivity, especially as services and “people businesses” come to dominate the global economy. The ability to share data, communicate instantaneously, and quickly build and modify digital applications favors collaboration and lower transactional costs.

According to a recent study, companies that lead a digital transformation of their business are 26% more profitable than their industry

average.¹ These companies do not just apply digital pixie dust to existing processes but thoughtfully integrate technology into those processes and the flow of work.

The essence of true digital transformation, in our view, is leveraging digital tools to push smart sim-

EXHIBIT 2 | The Vicious Circle of Complicatedness



Source: BCG analysis.

plicity into organizations and unlock latent productivity.

Smart Simplicity

Smart simplicity is built around six “smart rules” that derive from game theory, sociology, observation, and proven application.² They allow employees to make critical judgments, balance complex trade-offs, and come up with creative solutions to new problems. Simply stated, the rules are as follows:

- 1. Understand what your people really do.** To respond intelligently to complexity, people must really understand each other’s work: the goals and challenges they have to meet, the resources they can draw on, and their constraints. This kind of information can’t be found in formal job descriptions; you can learn it only by observing and interacting.
- 2. Reinforce integrators.** Conflicts between front and back offices and between the corporate center and country operations are common. Often, the response is to create some sort of coordinating unit—a

middle office or regional layer. But that just turns one problem into two. A better response is to empower line individuals or groups that work effectively across organizational boundaries. In almost any unit you will find one or two managers—often from a particular function—who already interact with multiple stakeholders. These people can act as integrators, helping teams obtain from others the cooperation needed to deliver more value.

- 3. Increase the total quantity of power.** Usually the people with the least power in an organization shoulder most of the burden of cooperation and get the least credit. When they realize this, they often withdraw and hide in their silos. Companies need to give these people more power so they will be willing to take more initiative, but without taking power away from others—which can happen in reorganizations, for example, when one part of the company gains power at the expense of another.

New sources of power can be created around expertise

building and knowledge transmission. For example, in a matrix organization of project managers and line managers, project managers can assess and reward project-related performance, while line managers can decide who gets to be trained in advanced management skills.

- 4. Increase reciprocity.** A good way to spur productive cooperation is to expand the responsibilities of integrators. Making their goals richer and more complex will drive them to resolve trade-offs. And they won’t necessarily need more resources to go with their new responsibilities. It’s actually often better to take resources away. A family with five television sets, for example, doesn’t have to negotiate over which program to watch because everyone can watch the show that he or she prefers.
- 5. Extend the shadow of the future.** The longer it takes for the consequences of a decision to take effect, the more difficult it is to hold a decision maker accountable. For example, by the time a multiyear project is

completed, many of those involved at the launch will have moved to another job or location. To paraphrase game theorist Robert Axelrod, the “shadow of the future” does not reach them.

One way companies can extend the shadow of the future is by increasing the frequency of output performance reviews. A telecom systems manufacturer found that cooperation between its hardware and software engineering units increased when it performed compatibility testing every two weeks instead of every six months.

- 6. Reward those who cooperate.** In some activities, such as R&D, there is such a long interval between cause and effect that it’s impossible to set up direct

feedback loops. In such cases, managers can close the feedback loop by explicitly introducing a penalty for people or units that fail to cooperate and increasing the payoff for all when they do.

Digital Simplicity

There is nothing digital, per se, about these smart rules, but digital technologies can activate many of them. (See Exhibit 3.) Digital is particularly effective at understanding what people do (rule 1), as it facilitates transparency, data sharing, and fast communication. Executives can identify integrators, who effectively move across internal hierarchies, by analyzing information traffic (rule 2). And integrators can be given new power (rule 3) in the form of access to employee data or responsibility for

managing an internal online forum. Likewise, in matrix organizations, data and digital tools can empower executives who might otherwise think they have lost authority in a reorganization.

Just as data can help identify integrators, it can help spot people who are not cooperating and be used to evaluate performance when several teams share responsibility for an outcome (rule 4). Digital tools can create feedback loops so that employees become more responsible for their actions (rule 5). Finally, these tools can help reward those who cooperate by measuring online collaboration or evaluating participation in decision making across hierarchies (rule 6).

One place where you can see the six smart rules in action is in

EXHIBIT 3 | How Digital Tools Can Support Smart Simplicity

SMART RULE	POTENTIAL OF DIGITAL TO SUPPORT THE RULE	EXAMPLE	RISKS
Understand what your people really do		Master data management and other tools that provide a single point of reference (social networks, forums, chats, wikis, blogs)	Information overload, loss of focus
Reinforce integrators		Network analysis can identify employees who cross internal hierarchies, and digital tools can empower them	Integration of complex internal networks and communities
Increase the total quantity of power		Access to data, digital tools, and communities can serve as new sources of power	Resistance from traditional managers; potential that digital power will be overused
Increase reciprocity		Integrators can be given new responsibilities, such as access to data; several teams can be given joint performance measures when responsibility is shared	Free riders who do not contribute to the community
Extend the shadow of the future		Digital tools such as prototyping can bring the future closer and create feedback loops between, for example, sales and R&D	Information overload
Reward those who cooperate		Ratings, rankings, and objective measures can evaluate community contributions	Pressure on individuals unaccustomed to being ranked

Source: BCG analysis.

teams that deploy agile methods of software development. Agile teams have moved away from the hierarchical “waterfall” model toward a cross-functional and cooperative setup supported by digital tools. In short, they embrace the cooperation and autonomy that are central to smart simplicity. (See the sidebar, “Smashing the Waterfall.”)

These principles can be applied well beyond the confines of software development. Agile methodologies, for example, work in such areas as outsourcing negotiation, mortgage origination at banks, and nonsoftware product development.

Context Matters

Digital is not a panacea. By themselves, digital tools will not promote cooperation and autonomy. Like traditional IT tools, digital can reinforce existing patterns of corporate inefficiency. Its ease of use and flexibility, for example, can lead to a proliferation of incompatible tools and competing user interfaces. The exponential growth in digital data can also make it challenging to separate signals from noise.

What, then, is the best way to marry digital tools and smart simplicity? To start, there’s nothing simple about the application of smart simplicity to your organization. Unlike digital start-ups, most organizations have decades of practices and legacies baked into their collective unconscious. The six smart rules will require managers of these organizations to think and work differently.

When we advise companies on smart simplicity we suggest that they start with their pain points and imagine the difference that co-

SMASHING THE WATERFALL

Cloud and agile teams are embracing concepts at the core of smart simplicity by doing away with waterfall development. In a waterfall, separate groups conceive, design, build, test, put into operation, and maintain software. It’s a model that comes straight out of Taylor’s principles. Participants can spend more time sitting in meetings and managing handoffs across organizational boundaries than writing and testing code. Disputes among these groups are often discovered late in the game and have to be resolved by senior executives.

In cloud organizations, executives tend to head cross-functional product teams rather than functional silos. All the functions needed to deliver a product or service report to a single leader, who has the authority to marshal resources and make decisions without time-consuming negotiations with other parts of the organization. Many of these teams combine the development, testing, and operations functions into a single software engineering role. These coders are responsible not just for writing but also for testing and deploying features, reducing the handoffs that slow development at traditional companies.

Cloud teams support this radically different organizational model with digital tools. First, they have highly automated

processes for testing and deploying code. With a single click, developers’ code can be checked in, tested, and deployed. This frees up coders to exercise their creativity and write code rather than wait for other teams to complete their work. (Such downtime can frequently consume 20% to 30% of a developer’s workweek.) The automated tools help create direct feedback loops, in the vernacular of smart simplicity, but also provide a level of comfort to executives, who may worry that they have relinquished operational control to developers. Coders also write modular software that can be easily joined with other modules and swiftly updated. Similar to automation, modularity helps speed the development process by reducing downtime.

Data, in particular, becomes a source of power at these companies. The cross-functional teams invest heavily in systems that generate real-time usage metrics, and they constantly monitor this data. Operational dashboards are generally updated every minute, while business dashboards are updated daily. Anyone at the company can see the test results and other operational and usage metrics. This broad dissemination of data serves as a new source of power for employees. It also opens the door for innovative thinking and cross-pollination of ideas.

operation would make. Pain points can be bottleneck processes or components of the organizational matrix that are redundant or obso-

lete. Next we ask companies to identify the obstacles that stand in the way of cooperation. What, in other words, are the goals, resourc-

es, and constraints that make current behaviors rational?

Once they understand these obstacles, companies can find ways to change the context to make engagement and cooperation useful for employees. Changing the context almost always entails changing aspects of the organization such as budgeting, evaluation and reward systems, decision rights, and, of course, digital tools. When properly integrated into the organization, digital tools can become the backbone of cooperation.

AS Paul Krugman has written, “Productivity isn’t everything, but in the long run it is almost everything.” In the last century, bureaucratization was perhaps the price that had to be paid for rapid economic expansion and productivity growth. But as productivity growth has slowed, it is time to re-examine the modern corporation’s roots in Taylorism. The rigid hierarchies and rules of the industrial era have run their course. Smart simplicity, supported by digital tools,

can help unleash the productivity and engagement so desperately needed in the modern economy.

In the process, companies can create a new social contract with their employees. By applying the simple rules described above and smartly deploying digital tools, companies can give their employees a sense of autonomy and community that has long been missing from many workplaces. This social contract will be built on new ways of managing—more coaching and less directing—and new ways of working. For the first time in a long time, companies have a chance to improve both their business and their relationship with their employees.

NOTES

1. George Westerman, Didier Bonnet, and Andrew McAfee, *Leading Digital, Turning Technology into Business Transformation*, Harvard Business Review Press, 2014.
2. See Yves Morieux and Peter Tollman, *Six Simple Rules: How to Manage Complexity without Getting Complicated*, Harvard Business Review Press, 2014.

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BUILDING THE EQUITY OF IT

A CONVERSATION WITH ERWIN LOGT,
FRIESLANDCAMPINA'S CIO

FrieslandCampina has relied on speed, innovation, and execution to become one of the world's largest dairy companies. When Erwin Logt was hired as chief information officer in 2013, his goal was to embed those same qualities into the IT function.

Logt, who joined after an 18-year career at Procter & Gamble, wants his organization to become a strategic partner to his business colleagues, providing rock-solid technology services and generating distinctive value through IT-driven business transformation. After only two years, the IT organization of the €11.5 billion Dutch company is well on its way to achieving both goals.

Marc Schuurin, a BCG partner and managing director, recently interviewed Logt about his first two years at FrieslandCampina and his goals. Excerpts follow.

What was the position of IT within FrieslandCampina when you joined as CIO?

IT was a technology-centric organization primarily focused on base capabilities, IT operations,

and the transformation of our value chain through the deployment of a new global SAP-based template. We had just completed the integration of Friesland Foods and Campina, which had merged in 2008, including the consolidation of IT. Our IT capabilities in topics like digital and analytics were still relatively low.

What is the strategy of FrieslandCampina?

FrieslandCampina aims to become the most successful, professional,

and attractive dairy company in the world by increasing our market share of value-added and branded products and by improving our operating profit and the performance of our member dairy farmers. Our strategy, called route2020, calls for us to accomplish these goals by 2020. For IT, this means we must modernize and further professionalize ourselves, and change our culture. In parallel, we must build new capabilities and knowledge to enable our business partners to reach their route2020 goals.

ERWIN LOGT

Erwin Logt is the chief information officer of FrieslandCampina and the joint business leader of the company's digital efforts. Prior to joining the company in 2013, he held a number of positions with Procter & Gamble, US, starting in 2007. These included the global IT leader of the sales organization and the home-care business unit and the global business-intelligence leader for sales, supply chain, and R&D. From 1995 to 2007, he held various positions for Procter & Gamble in the UK, Germany, Switzerland, and Belgium. He holds business and information technology degrees from Technical University Eindhoven, the Netherlands.



When you joined the company, how was IT viewed within FrieslandCampina?

IT had an image problem. It was being measured on cost and was perceived to be making suboptimal contributions to FrieslandCampina's corporate goals. But IT was also misunderstood, and successful projects were not always visible. There were good people in IT, but they were not always in the right roles. And morale was not as strong as it should be. The focus was more on technology and not so much on the value we could generate. I believe the IT organization was underutilized.

After your first 100 days, what was your assessment of what needed to be done?

We needed to take four immediate actions to lay a new foundation for IT. First, reposition IT as an organization within the company. Define a new strategy and business plan, and communicate, communicate, communicate. We had to be more visible so that our business partners understood our plans—but also our problems and our challenges. We had to run IT more as a business, and we had to build a new image.

Second, we needed to get our operational costs and quality in line with industry standards. Nobody likes to hear about the extras if the engine is not reliable.

Third, we needed to transform the IT organization in terms of people, processes, culture, and organization model.

Fourth, while we needed to support ongoing priority work like the global SAP program, we also had to invest in new capabilities such as business intelligence and digital, as the business was moving fast.

We do not want only to serve and enable the business, we also want to trigger and drive change and transformation. In today's world, IT is no longer there to just provide services and solutions and be an internal supplier. It has to step up and shape the future and become fully embedded in the business. It is uniquely positioned to do so, and not doing so is a loss for every company, in my opinion.

What are the key elements of your strategic program?

It has three key components. First, *fix* the base to drive IT operational excellence. Centralize all operational IT activities under one umbrella, upgrade our infrastructure, consolidate and right-source commodity scope, drive technical innovation, and better leverage our strategic partners.

Second, *run IT as a business*. Organize for success, build a value-centric culture, professionalize internal IT processes, and introduce commercial thinking into IT.

Third, *drive value*. Focus on automation, standardization, and simplification of existing value-chain business processes, as well as on areas in which information and technology can create even more distinctive capabilities—areas like digital marketing, e-commerce, business intelligence, and our employees' workplace.

What did the transformation mean for the people in your organization?

In order to create a new business- and value-centric organization model and to create a new culture, we needed to put our existing people in the right roles and hire new people. We first assessed the top 100 roles in the IT organization.

While technical expertise is still critical, we needed more business-savvy and international people. Today, over 40 percent of the top 100 IT roles have either changed in scope or in personnel.

Our culture has changed as well, especially in our headquarters. We doubled the number of non-Dutch employees in our top 100 roles, and we hired the first group of 15 MBA graduates. In addition to their ability to drive business opportunities and engage with business partners, they bring an entrepreneurial spirit and healthy outside-in view. They are challenging the status quo.

We had to change fast for the health of both the company and the IT organization. We needed a small revolution in the first one to two years.

To drive innovation and quickly build mastery in new areas, we created three lean teams around digital themes, specifically, commerce, analytics, and workplace. These teams are able to throw ideas against the wall and see what sticks. The idea is to learn fast and fail cheap. We have seen a few examples where a relatively small innovative idea from these teams has created a snowball effect and has speeded up the creation of much larger capabilities.

The IT organization and culture is moving in the right direction, and we are getting the right mix of people to propel us to the next level, but we still have quite a journey ahead of us.

How do you make the tough choices that such a transformation requires?

That's a difficult question, and I am certain my decision making is not flawless. We do not have the

luxury of waiting for perfect information, so we need to rely on good data and get started. We can make course corrections as we go. We often know that we want to go to Italy but we don't know yet if we want to go to Milan or Rome. While we can discuss that for a long time, why not buy a car and start driving?

Can you explain your “equity of IT” philosophy?

During my P&G career I became a strong believer in the PIE model—performance, image, exposure—of personal career development. This model also works for a discipline or organization. It's not enough for IT to have a strong performance. We also need a good image. The better our image, the more trust we generate, the more support we will receive, the more strategic we can become, and the more value we can generate for FrieslandCampina. But to change our image we need exposure. We need to be out there and communicate. IT needs to be visible. Our programs and solutions need to be visible, and we need that consistent message. This is not a natural step for an organization that has been serving in the background. We had to make it part of the reward-and-recognition processes for our people.

Think of IT as a brand. Then the question is (as with any commercial brand) how to build strong equity? A strong image is key, starting with defining what you want to be known for, and then building and maintaining that image consciously.

What were some moments of truth that IT has experienced during the transformation?

Our key moments of truth are related to rebuilding trust and nur-

turing our image as a partner. In early 2014, our Asian SAP system in Kuala Lumpur crashed and was up and down for two weeks. The team had to be decisive and act fast. They moved the SAP environment of seven countries to our outsourced data center in the Netherlands in one week. It was an incredible effort.

This was the first moment of truth for me. It gave me insight into my team and what worked and did not work in the organization. It was also a first step in changing the image of IT. People still talk about the way the team dealt with the issue.

A second moment was when the team developed what we call our corporate daily shipment report. We did not ask our business colleagues what they wanted up front. The IT team talked to two other FMCG [fast-moving consumer goods] companies and then quickly and inexpensively built the first version. We then went to the business and asked if they wanted it. This report is now live and widely used by management to steer the business in real time. While this particular report is a relatively small capability, it was proof for my team especially that our new culture and behavior can work.

A third key moment that helped us build trust was around our 2014 cost-reduction program. We were achieving our stretch target and committing to absorbing business-driven increases, thus showing the fix-the-base strategy was on track and delivering on our promise to co-own business challenges.

What's next?

We need to continue to benchmark ourselves regularly, and we

are proud to see that FrieslandCampina IT is doing better in the Grocery Manufacturers Association benchmark versus peers than a few years back. Our fix-the-base strategy is working on cost and quality. But we need to stay humble and very alert as we recently experienced with some performance issues in the employee workplace environment.

Furthermore, to be known as change agents and transformation leaders, we need to continue to optimize our organization and strengthen our culture and mastery even more. We need to initiate more innovation and show our business partners both what is possible and what is needed for FrieslandCampina. At the same time, we cannot lose sight of the key corporate priority to transform our value chain. This is an ambitious goal, but we have a fantastic team in a great company where we are given the opportunity, and we are very energized to make it happen.

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THE DOUBLE GAME OF DIGITAL ACTION

STRUCTURING THE PROGRAM

by Philipp Gerbert, Thomas Gumsheimer, and Sebastian Steinhäuser

This is the second in a series of articles on setting and executing digital strategies with speed, foresight, and savvy.

MANAGERS ARE INCREASINGLY NERVOUS about the lack of progress in their digital initiatives. Too often, organizations merely add digital “pixie dust” to traditional processes or engage in a frenzy of digital experiments and ventures. Rather than drive competitive advantage, these efforts leave companies more vulnerable.

In the first in our series of publications on digital strategy (see “The Double Game of Digital Strategy,” BCG article, October 2015), we laid out an approach—based on making simultaneous long- and short-term moves—to setting strategic priorities in a climate of digital uncertainty. Here we explain how companies across industries can systematically pursue those priorities.

Mapping the Action Space

Digital technologies and approaches are infusing all aspects of the business world. The Internet of Things, ubiquitous connectivity, big data and advanced analytics, the cloud, cognitive computing and artificial intelligence, robotics, and 3-D printing are deeply altering nearly all industries. “Mobile first” and social media strategies are essential for success in consumer industries. “Digital

twins”—virtual models of physical things that are used to simulate production and maintenance and to provide training—and augmented reality are reshaping the industrial environment.

To create business value, companies can operate in an action space consisting of six interdependent layers. (See Exhibit 1.)

- *Defining the strategy* focuses on building competitive advantage in the double game. It provides insight into short-term “no regrets” moves as well as more-transformative plays. These decisions establish the path for the other five layers.
- *Reshaping the customer experience* explores how to eliminate pain points and how to surprise customers with new levels and forms of service today while achieving quantum improvements in customer experience tomorrow.
- *Reimagining offerings and business models* prepares companies to create novel products and services, often by exploiting new data and powerful analytics.
- *Reengineering business processes* entails adopting flexible and intuitive digital technologies to simplify processes and increase efficiency.

- *Building capabilities*, often by working with outside partners and creating new platforms, enables companies to develop new ways of working, new business models, and other building blocks of digital transformation.
- *Accelerating the transformation* involves devising new approaches to speed up learning, ramp-ups, and transformational plays.

Since we discussed strategy setting in our earlier article, we will now focus on the other five layers, examining each through a case study that highlights best practices and—equally important—potential pitfalls and interdependencies. These examples should challenge your priorities and help you sharpen your approaches. As we demonstrate with two concluding stories, a complete digital transformation requires playing in all six layers.

Reshaping the Customer Experience

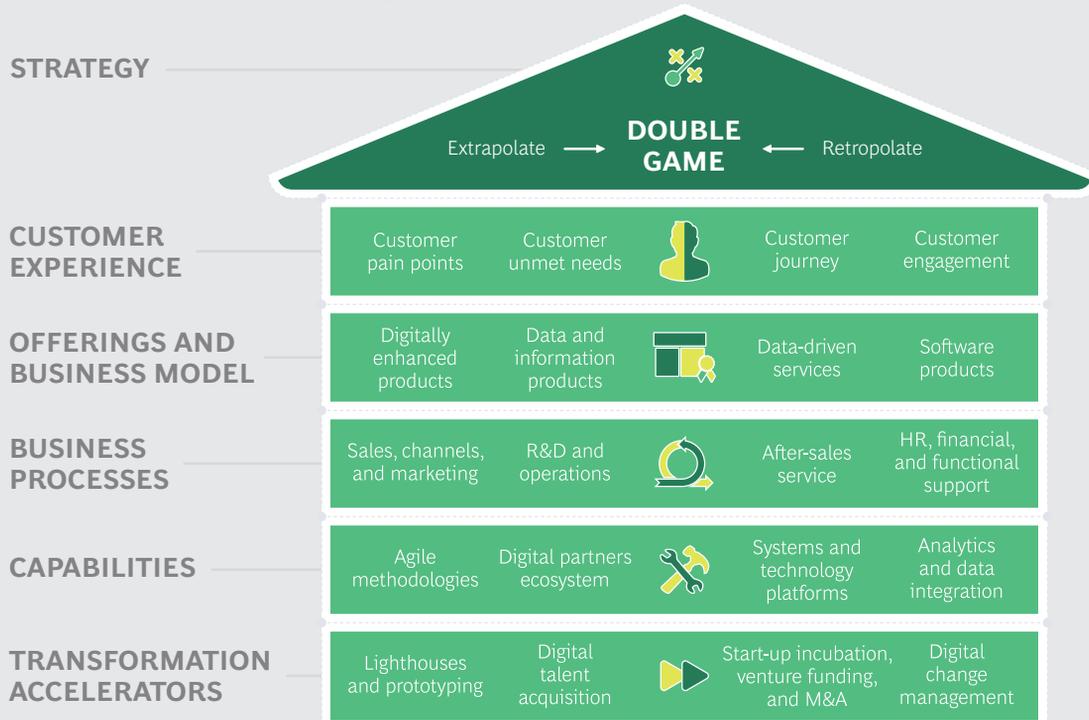
Delivering a superior customer experience is a natural initial goal of many digital pro-

grams. For example, a toy company interested in designing products that bridge the gap between physical and digital realms started by studying the desires of children, their parents, and retailers. The extensive ethnographic research it conducted combined structured interviews with unstructured creative discovery sessions. The company uncovered a range of unmet needs, from the desire of family members to collaborate on kids' wish lists online, using a format similar to wedding registries, to the desire of children for even more variety in toy offerings.

The company created online communities and services to strengthen its brand and to raise the level of customer satisfaction. These efforts steered the company toward further improvements in customer interaction, such as offering assembly assistance via smartphone and connecting adults and children through online and mobile communications. The entire program contributed to a significant improvement in sales and profits.

A key challenge in this area is to avoid letting perfection stand in the way of progress. It is more important to launch minimally viable

EXHIBIT 1 | The Action Space for Digital Transformation



Source: BCG analysis.

offerings and then to upgrade them quickly in response to customer feedback than to let time and opportunity slip away. Customers have proven to be highly collaborative—accepting initial imperfection and suggesting practical product improvements—when their feedback is acted upon.

Reimagining Offerings and Business Models

New offerings designed to retain or increase the share of wallet of current customers and to win new customers are at the heart of many digital programs. A global manufacturer of farm equipment is seizing the opportunity to make “precision agriculture” possible by introducing digital innovations into a traditional industry.

Recognizing the potential impact of digital on the economics of farming, the company began enhancing its traditional tractors with sensors, software, and displays. Those initial moves are transforming the driver’s cabin into a sophisticated control center capable of analyzing vast amounts of soil quality, irrigation, and other data. A cloud-based analytics platform processes this data along with weather forecasts and historical field records to choose suitable seed mixtures, optimal planting patterns, and the most efficient and cost-effective ways to harvest.

Step changes in efficiency require building new processes that rely on digital tools.

Farmers who employ the new technology are enjoying up to double-digit increases in productivity while using less fertilizer and water. Even greater efficiency gains are on the way as the company prepares for entirely unmanned operations.

A common pitfall in this aspect of digital transformation is the unwillingness of companies to cannibalize their existing business. They limit their powers of imagination and forfeit growth opportunities.

Reengineering Business Processes

In the early days of electrification, companies retained factory layouts built around the original site of the steam engine, even though electricity obviated the need for direct mechanical connections between power generation and power uses.

Today, history is repeating itself. Rather than thinking creatively about how digital technology can support novel approaches to work or production, many companies simply digitize the “belts and pulleys” of legacy processes. Often, however, step changes in efficiency require the building of new processes that rely on smart algorithms and other digital tools.

A major European automotive supplier overcame this challenge by abandoning many fragmented initiatives across production sites and instead strategically reengineering its manufacturing and supply-chain operations. The company’s new strategic direction combined logistics network optimization—almost always the low-hanging fruit in operations—with more-fundamental approaches involving assembly robots and augmented reality.

After only three months, the company started to pilot the most promising short-term initiatives, such as logistics tracking. Three months later, it began scaling up the successful pilots across all sites while also addressing the next round of initiatives, leveraging its increasing digital experience base.

Radical process reengineering demands careful strategic workforce planning. In the digital age, such transformation can increase a company’s productivity—but only if the company quickly finds or trains candidates to fill new job profiles that may affect a substantial part of its total workforce. (See *Man and Machine in Industry 4.0: How Will Technology Transform the Industrial Workforce Through 2025?*, BCG Focus, September 2015.) Without active management of workforce issues, fundamental reengineering will almost certainly stall or even fail.

Building Capabilities

Digital transformation calls for fundamental new capabilities, and these are not easy to

build, especially within traditional organizations in industries unaccustomed to rapid change. Utilities, for example, have historically operated in a world of low uncertainty, large economies of scale, stable environments, and predictable returns. Consequently, their focus has been on traditional considerations of efficiency, reliability, and risk avoidance. But times have changed. Pricing and billing are automated. Intermittent renewable-energy sources have entered the picture. Sensors and actuators are proliferating in power-generation equipment and across the entire grid. As a result, utilities and upstarts can take advantage of big data, smart-grid analytics, and cloud computing to improve their methods of generating, distributing, and selling power to customers.

The most successful companies emulate the best practices of “digital natives.”

A European utility is striving to become truly customer-centric in this multifaceted, increasingly smart, and renewables-oriented energy world. One of the company’s most critical new capabilities under development is an IT architecture that efficiently handles mass processes such as billing and yet is flexible enough to adapt quickly to changing market demands. In parallel, the utility is creating minimally viable products that it can test and improve in the marketplace while keeping the lights on. To shorten the time to market, the company is relying on lean startup methodologies, prototyping, cross-functional teams, and other agile approaches. Recognizing that it did not possess many of these agile and collaborative skills internally, the utility has been working with outside partners to assist in the transformation and to help embed the new capabilities in the organization.

Playing the double game in this area is challenging because it requires simultaneous action to maintain legacy technologies, embed new digital tools, and introduce a flexible and scalable new digital architecture that will

pave the way for an even more radically redefined future. IT departments and external partners can be critical resources in this undertaking, or they can be a hindrance if their specific skill profiles, business practices, and interests do not sync with what is needed—so be prepared.

Accelerating the Transformation

Companies are adopting various practices to accelerate their digital transformation, including rapid prototyping, incubators, M&A, and the acquisition of digital talent, as well as traditional change management levers. (See *How to Jump-Start a Digital Transformation*, BCG Focus, September 2015.) Many of the most effective accelerators call for new ways of working and new forms of behavior, such as cross-functional, self-directed teams and collaboration built around agile software development methodologies.

A North American pharmaceutical company, for example, adopted a prototyping approach to accelerate digital change. It started by testing initiatives such as search engine optimization and targeted training in the sales and marketing organization. When these improvements led to a 10 to 20 percent reduction in spending for marketing, with no falloff in sales, executives moved on to bigger tasks. To improve the customer interface, the company introduced minimally viable apps that complement specific drugs. The company sees these services as a way to engage with its customers “beyond the pill,” to differentiate its drugs, and to drive growth.

The challenge is that—unlike with traditional transformations—experienced managers are hard to find. Very few executives, for example, have industry experience and deep knowledge in prototyping and agile methodologies. The most successful companies try to make up for this deficiency by emulating the best practices of “digital natives” and engaging in controlled experimentation.

Keep Your Eyes on the Double Game

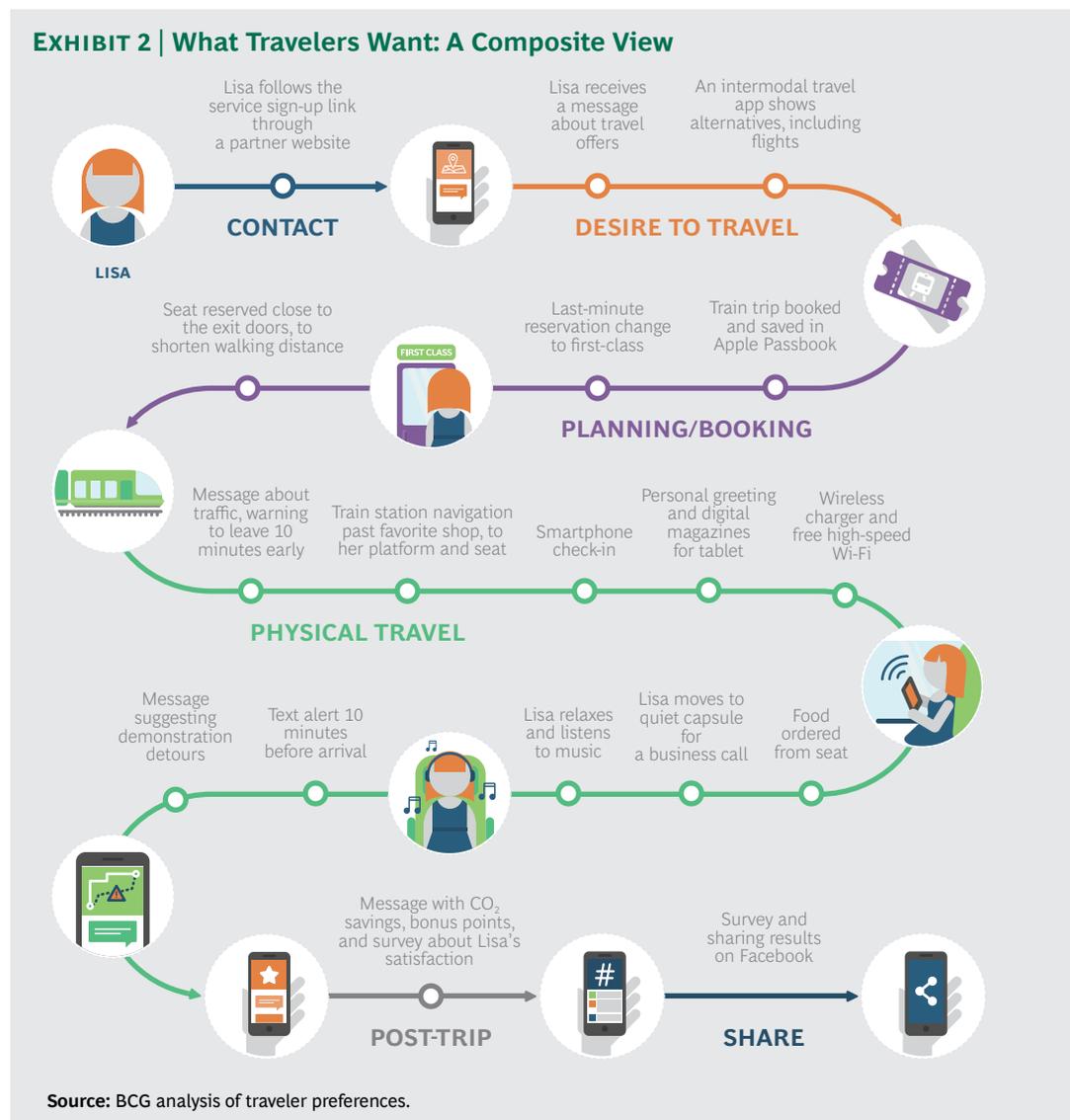
The elements of digital transformation are, of course, interdependent and mutually rein-

forcing. A large, state-owned rail and logistics company took a three-tiered approach to digital transformation that illustrates the action space's many interdependencies and points of overlap. (See Exhibit 2.) First, it redefined the customer experience and implemented new ways to launch and scale up initiatives. Second, it defined a target state of digital transformation ten years in the future. Third, it prepared its people, processes, and offerings for the double game. The company also sent executives on immersion tours to Silicon Valley, created a digital lab, and completed its first digital acquisition.

To redefine the customer experience, the company mapped out the passenger's journey, from initial travel inspiration through the last mile of the trip and beyond, ending

with sharing feedback and memories on social networks. The company also created detailed profiles of business, elderly, and commuter travelers based on its ethnographic interviews and market research. This exercise enabled the company to identify its passengers' frustrations and unmet needs along the customer journey. Company executives then laid the groundwork for fixes and improvements by using the digital tools at their disposal. They identified more than 400 potential improvements and selected 50 to implement.

The executives recognized that they would have to embark on a huge change-management effort. To encourage managers and employees to become drivers of innovation, they selected five early prototype projects, in or-



der to highlight the positive effects of implementing even small changes.

One prototype, a seat reservation app for commuter rail customers, constituted the company's first direct digital relationship with these loyal patrons. The app addressed a common complaint of customers—their inability to reserve a seat in commuter trains—but it also opened the way for greater dialogue with the company's customers. The railroad began field-testing the app 12 weeks after inception; because it relied on a public cloud, the app's infrastructure costs were one-fifth what the IT department had anticipated.

Have you created a digital roadmap of short- and long-term actions?

To accelerate development, the prototype team had to convince traditionalists to waive burdensome company guidelines. In the course of developing the new app-based service, the team also identified structural deficits and inefficiencies in the company's IT platforms that needed to be addressed.

To minimize the risk of engaging in a series of myopic short-term experiments, the company developed a comprehensive picture of the mobility landscape in 2025 and anticipated product offerings at that time. The exercise allowed the company to “retropolate” from that vision of the future back to the present. In developing this view of the future, executives analyzed the potential impact of self-driving cars, digital intermodal route planning, and other services. As a consequence, they launched a portfolio strategy around new modes of travel and around supplemental intermodal as well as digital services.

While it may be surprising that a state-owned company would undertake these innovations with such energy, it is even more remarkable when an arm of government does so. (See the sidebar “Turning Digital in Saudi Arabia.”)

A Checklist for Action

The following questions may help you set up, prioritize, and execute a digital initiative.

- Do you have an explicit approach for each part of the action space?
 - What does your customer journey look like? What are your customers' known pain points or unmet needs?
 - Are there short-term opportunities to enhance current offerings and services? What long-term transformative trends might alter your business model?
 - Did you apply digital technologies to achieve radically simplified processes? Have you run pilot projects to improve specific business processes?
 - How are you upgrading your digital skills and capabilities to become more agile and to build data analytics teams, tools, and partner ecosystems? In what areas did you consciously decide to develop an in-house capability, and why?
 - Did you track and manage your digital initiatives' interdependencies?
- Have you created a digital roadmap of short- and long-term actions?
 - Have you formulated a roadmap of your first set of digital initiatives? How does it fit in with your overarching digital strategy?
 - How and for what reasons do you prioritize resources and time across the layers of the action space?
 - Are you accounting for the double game? Where do you trade off short- and long-term actions? Is the focus of your strategy still right?

Playing the double game of digital strategy is inherently challenging. Fortunately, digital not only creates this challenge, but shapes the solution. Many digital technologies have

TURNING DIGITAL IN SAUDI ARABIA

When Saudi Arabian officials realized several years ago that they were facing persistently high rates of youth unemployment and persistently low rates of female participation in the labor market, they did not even have a network of employment offices to help address the problems.

After benchmarking many systems in Western countries, the Ministry of Labor in Saudi Arabia decided to take a radically new approach. The minister turned the nation's lack of an installed base into an advantage by going fully digital.

The country introduced an all-online process for applying for unemployment assistance that was designed to minimize human effort. A single SMS message containing the applicant's government ID number initiates the process—a radical departure from the endless piles of paperwork involved in most traditional systems.

To set up this process, officials introduced a new level of speed and agility in their central organization and built a powerful IT system. For example, they needed to be able to automatically check applicants' eligibility with dozens of institutions and to collect personal, educational, and employment data.

In arguably the most radical innovation for Saudi Arabia, eligibility was based on the individual's personal, not family, situation, fundamentally boosting opportunities for women.

At the same time, the ministry designed online training courses to improve the ability of applicants to find a job. To stay eligible for unemployment assistance,

applicants had to complete the courses. Within the first 10 weeks, applicants had started 1.8 million courses, ultimately completing more than 90 percent of them. To broaden its selection of courses, the government partnered with accredited private-sector companies to accelerate and tap into the best education programs available globally.

Amazingly, the ministry introduced a smooth customer journey, fast processes, training programs, and strong IT infrastructure, all within eight months. The ministry is now experimenting with customizable, incentive-based training programs instead of purely penalty-based ones. Applicants who qualify, for example, can take highly popular English language courses abroad. In this way, the programs increasingly become personalized to individual job seekers, motivating them with opportunities to earn meaningful rewards.

In the pilot program, activity levels were three to five times higher than in the existing system for more-complex tasks and up to ten times higher for easier tasks. These programs have helped propel a sevenfold increase in the number of women employed in the private sector since 2010.

become so intuitive and easy to use that generalists can apply them. In this regard, the technologies have become a bit like e-mail. Managers can lead by example by acquiring and fostering digital skills. After all, some

things are too important to be left entirely to the experts.

Next up: how executives should manage in an analytics and data-driven age.

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NOTE TO THE READER

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