2018 Number 1

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Games in the strategy room

Why people play them—and how to beat the real odds they mask

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THIS QUARTER

The pace of change across the business landscape is unrelenting. Technological, economic, and political disruptions are requiring a rethink by most companies of where and how they compete, what organizational model they need to keep up, and where they must build capabilities. This issue of the *Quarterly* provides a road map for navigating many of these challenges.

The cover story, "Strategy to beat the odds," is the culmination of a multiyear research effort by our Strategy Practice. In a nutshell, my colleagues Chris Bradley, Martin Hirt, and Sven Smit broke from the usual best-practice examples and frameworks that often characterize writing on strategy and instead developed a new set of strategic tools, based on data from thousands of companies.

The authors' research shows how to boost the odds of achieving strategic breakthroughs by capitalizing on your endowment, riding the right trends, and making a few big moves. They also believe that when leaders have an empirically backed view of strategy, they stand a much better chance of overcoming the social dynamics that frequently conspire to produce inertia, gamesmanship, and risk aversion in the strategy room.

The article is drawn from their new book, *Strategy Beyond the Hockey Stick*, and it's a must-read for any leader trying to formulate strategy that stays ahead of rapid change. One of the biggest strategic questions facing many companies is how to harness, rather than get blindsided by, digitization, an incredibly disruptive economic force. Another article in this issue,

"Why digital strategies fail," lays out five pitfalls that many leaders are stumbling into, and suggests how to sidestep them.

Strategy and organizational structure are inextricably related. In the 1962 classic *Strategy and Structure,* Professor Alfred Chandler argued that structure follows from strategy. Today's environment appears to be inverting that logic. Aaron De Smet and Chris Gagnon assert in "Organizing for the age of urgency" that competing at the speed of digital calls for adaptive, fast-moving organizations that can respond quickly and flexibly to new opportunities and challenges as they arise. Often, that means moving decision making to the front lines, rather than capturing data, moving it up a hierarchical chain, centrally analyzing it, and sending guidance back. In a related article, Boeing's senior vice president and CIO describes how his company is trying to do exactly that.

Leaders hoping to create the tech- and data-enabled organization of the future need more than data. They also must understand how increasingly powerful tools, particularly those enabled by artificial intelligence, are shaking up what companies can do with that data. In "What AI can and can't do (yet) for your business," Michael Chui, James Manyika, and Mehdi Miremadi provide a field guide on several promising developments poised to bend the trajectory of AI, enabling it to generate sharper insights, sometimes with less data than is necessary today.

As these articles suggest, the nature of functional business knowledge is changing: evergreen topics such as strategy and organization are colliding in unexpected ways with the forces of digital, big data, and artificial intelligence. Those collisions are creating new business opportunities, and they are also necessitating new organizational capabilities—starting at the top and moving all the way to the front lines. I hope this issue of the *Quarterly* helps you build the muscle you and your organization need. Q

Robert Sternfels
Senior partner,
San Francisco office
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Features

THE TECH- AND DATA-ENABLED ORGANIZATION OF THE FUTURE

REACHING FOR THE DIGITAL PRIZE

Features

REACHING FOR THE DIGITAL PRIZE (CONTINUED)

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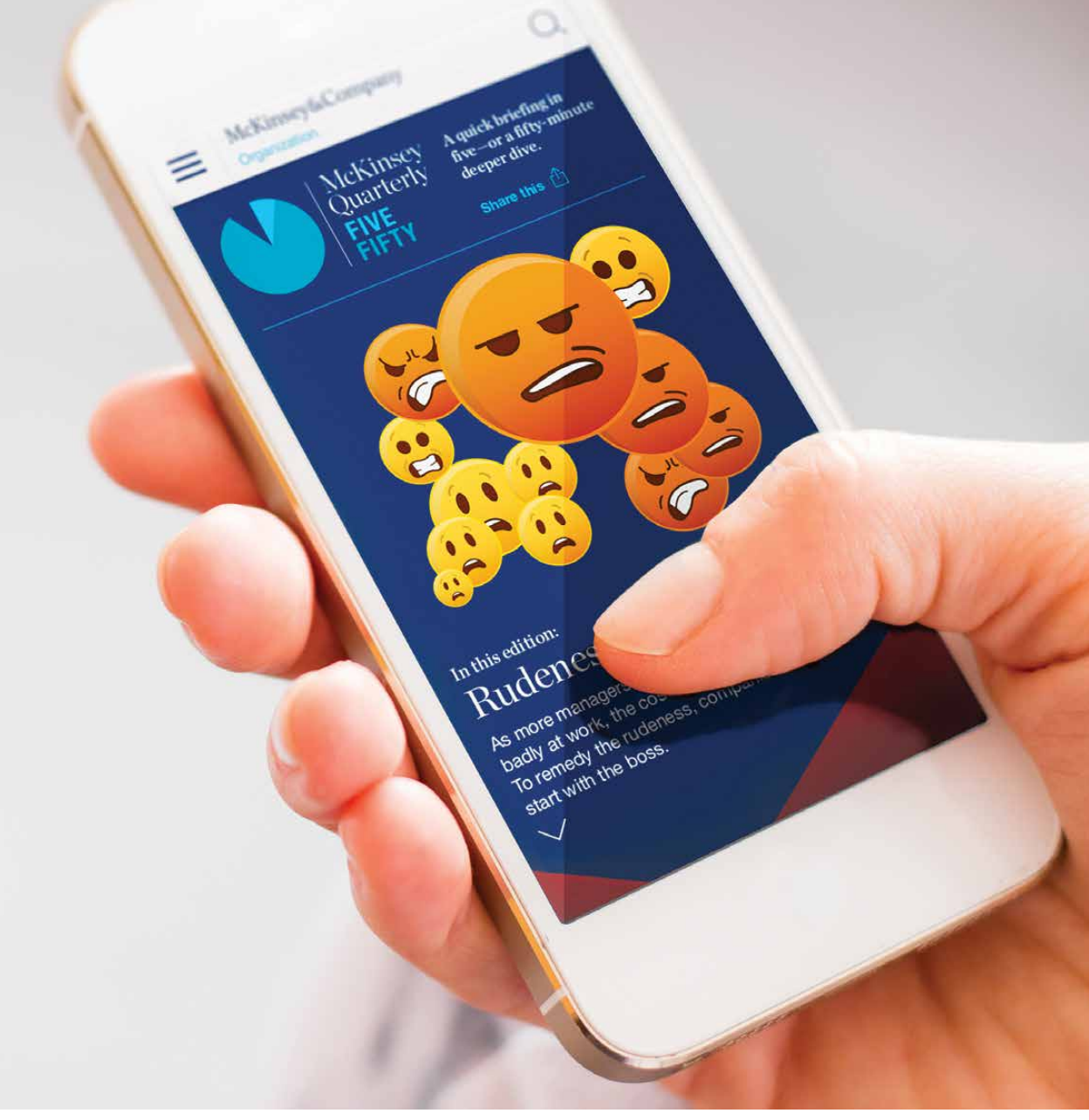

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SHOULD ASSESSING FINANCIAL SIMILARITY BE PART OF YOUR CORPORATE PORTFOLIO STRATEGY?

Businesses with different financial profiles can tax managers and put performance at risk. When divesting isn't an option, here's how to manage the conflicts.

by Tim Koller, Dan Lovallo, and Zane Williams

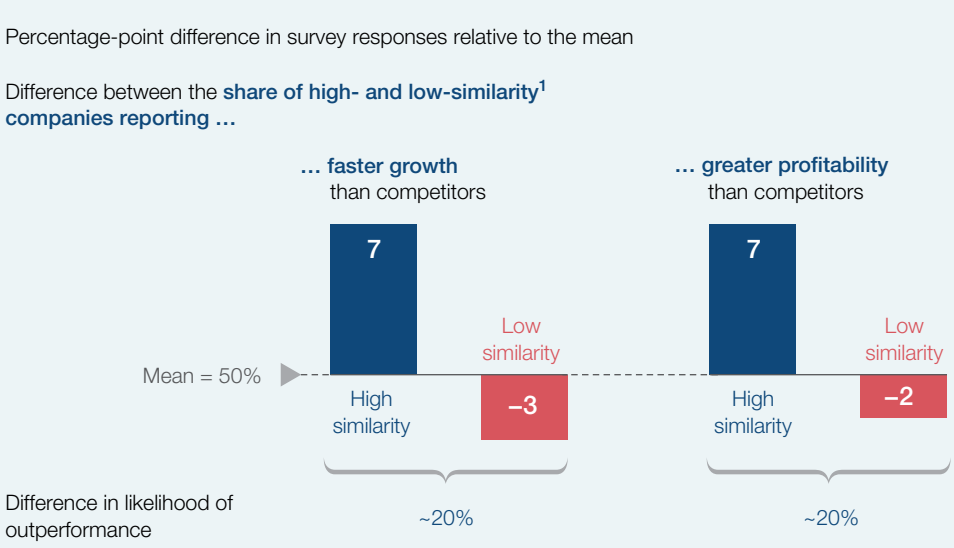
Strategic connections among, for example, a company's suppliers, customers, skills, and technology have long been the sine qua non of corporate portfolio decisions. Businesses that are strategically similar—or *related*, in the parlance of portfolio theory—belong in the same company. Those that aren't, the theory posits, would be better owned by someone else.

What we are calling *financial similarity* may be just as relevant. In a recent survey of more than 1,200 executives,[1] we found that those managing portfolios of financially similar businesses are 20 percent more likely than those managing financially dissimilar portfolios to describe themselves as more profitable and faster growing than their peers (exhibit). Financial similarity is not an issue addressed in discussions of portfolio theory, and (other than among executives at complex conglomerates) we frequently find that it's a subconscious issue for many executive teams. As a result, they underestimate the difficulty of managing businesses with fundamentally different economic characteristics—including revenues, margins, capital intensity, and revenue growth.

How does financial dissimilarity affect performance? In part, it's a cognitive challenge for managers to make comparisons across businesses with dissimilar business models, growth rates, and maturity.[2] Using different metrics to evaluate and capture the complexity of the portfolio complicates comparisons, while turning to coarser metrics or crude rules of thumb leads to worse decisions.

Exhibit

Financially similar companies are more likely to outperform peers.



[1] Financial similarity defined as companies with business units that have similar size, margins, returns on capital, and revenue growth.

Source: McKinsey online investment-performance survey of 1,271 executives, 2016

Managers of financially dissimilar businesses also often face greater internal political challenges. Performance goals and resource allocation necessarily vary across units that differ in business model, scale, or maturity, and that variability can generate conflict. This is especially true when some units are given a budget to invest and grow while others are asked to cut costs, or when one unit's goals seem easier to hit than do another's. As a result, large, established units often end up with more of a company's resources than their performance warrants—at the expense of small, faster-growing businesses. Large, powerful business units are often not cash cows but rather just fat cows.

When strategic linkages among businesses are limited or nonexistent, often the most value-creating solution is just to divest or spin off those with significantly different financial characteristics from the core business. But in many cases, the strategic advantages of keeping financially dissimilar businesses in the same portfolio may outweigh the inevitable challenges. For example, consider a company that serves the same customers with two businesses: one that supports a legacy, analog technology and another that supports a transition to an emerging digital one. Or consider companies with units that offer complementary goods to common customers, such as the manufacturing, servicing, and financing of equipment or combinations of products and an advisory/data business.

In these cases, a company must make an extra effort to ensure that all units are managed to maximize value. This might entail combining financially dissimilar businesses into a separate unit with distinct and specialized management—much as Google did when it renamed itself Alphabet. Managers there left the core business in a central Google division and designated smaller, newer businesses as separate units—which it reports collectively to investors as "Other Bets"—under Alphabet's CEO.[3]

A company might also implement a flat accounting structure, eliminating most intermediate reporting units. With unit results reported at a highly detailed level, for as many as 50 or more units, managers could more easily identify smaller, faster-growing businesses, protect their resources, and foster their development. Both approaches protect the budgets and other resources of small units embedded in larger ones from cuts to their product development or advertising spending to meet the larger unit's budget. A company might also consider more structural protection for smaller-unit budgets, commonly known as ring-fencing.

Similarly, a company's planning processes must differentiate performance targets for different units, rather than applying broad corporate programs to all units. For example, some units may need to be exempt from a broad general and administrative cost-reduction program. For very new fast-growing units, more emphasis might be shifted to revenue targets rather than profit targets, or even to meeting specific nonfinancial objectives, such as launching a product by a certain date. Targets for more mature units might put more weight on margins and return on capital.

Financial similarity is an issue that's seldom a part of corporate portfolio discussions. Our research suggests that companies will benefit if more leaders become more aware of the challenge and look for opportunities to address it. Q

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[1] The online survey was in the field from April 12 to April 22, 2016, and received responses from 1,271 executives. Analysis controlled for strategic linkages as well as industry, region, company size, and functional specialties.

[2] See, for example, Robert L. Goldstone, "Similarity, interactive activation, and mapping," *Journal of Experimental Psychology: Learning, Memory, and Cognition*, January 1994, Volume 20, Number 1, pp. 3–28; Arthur B. Markman and Dedre Gentner, "Structural alignment during similarity comparisons," *Cognitive Psychology*, October 1993, Volume 25, Number 4, pp. 431–67.

[3] Alphabet Inc. Form 10-K, US Securities and Exchange Commission, December 31, 2016, sec.gov.

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A CLOSER LOOK AT IMPACT INVESTING

The mistaken rap on this kind of "social" investment is that returns are weak and realizing them takes too long.

by Vivek Pandit and Toshan Tamhane

With the fraying contract between society and business an urgent priority, many companies and banks are eager to find investments that generate business *and* social returns. One avenue is "impact investing"—directing capital to enterprises that generate social or environmental benefits, in projects from affordable housing to sustainable timberland and eye-care clinics, that traditional business models often sidestep.

Mainstream investors often fear to tread on this terrain, leaving the field to adventurous venture capitalists and nongovernmental organizations (NGOs) who act as "first institutional investors." While they see a clear upside in new customers and satisfied employees, they accept the conventional view that these investments can't be scaled adequately to create attractive returns, carry higher risk overall, and are less liquid and thus tougher to exit. Impact investing may be forecast to grow to more than $300 billion by 2020, but even that would be a small fraction of the $2.9 trillion or so that will likely be managed by private-equity (PE) firms worldwide in 2020.

Our research in India, a testbed of new impact-investment ideas where some 50 investors have poured $5.2 billion into projects since 2010 and investment is growing at a 14 percent annual clip, presents a different perspective. We tested four notions that have made mainstream investors shy. The findings suggest that as more companies and larger investors become acquainted with the true state of play, in India and elsewhere, they'll find investment opportunities that align with their social and business aims.

The myth of lower returns

Impact investments in India have demonstrated how capital can be employed sustainably as well as meet the financial expectations of investors. We looked at 48 investor exits between 2010 and 2015 and found that they produced a median internal rate of return (IRR) of about 10 percent. The top one-third of deals yielded a median IRR of 34 percent, clearly indicating that it is possible to achieve profitable exits in social enterprises.

We sorted the exiting deals by sector: agriculture, clean energy, education, microfinance firms and others that work to increase financial inclusion, and healthcare. Nearly 80 percent of the exits in financial inclusion were in the top two-thirds of performance. Half the deals in clean energy and agriculture generated a

similar financial performance, while those in healthcare and education have lagged. With a limited sample of only 17 exits outside financial inclusion, however, it is too early to be definitive about the performance of the other sectors.

Exhibit 1 shows some evident relationships between deal size and volatility of turns as well as overall performance. The larger deals produced a much narrower range of returns, while smaller deals generally produced better results. The smallest deals had the worst returns and the greatest volatility. These findings suggest that investors (particularly those that have been hesitant) can pick and choose their opportunities, according to their expertise in seeding, growing, and scaling social enterprises.

Capital doesn't need as much patience as you think

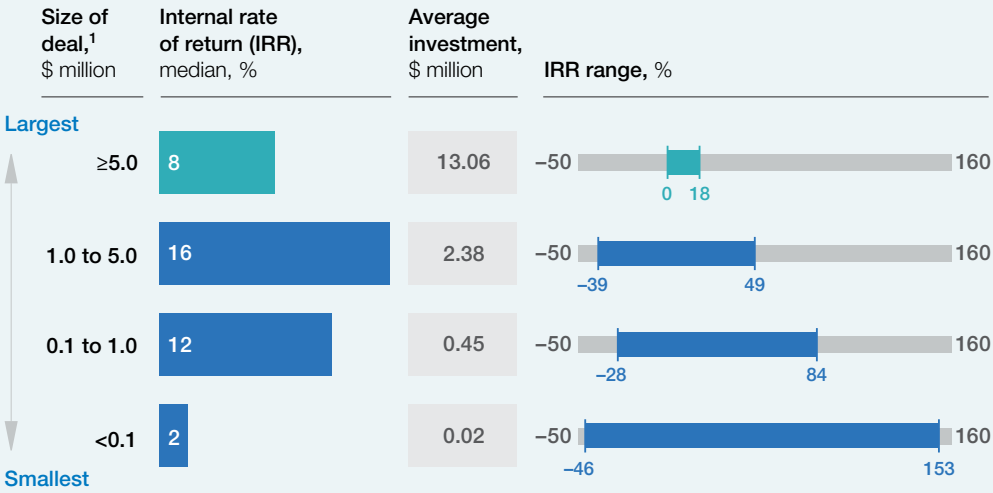
Our analysis shows both the mean and the median holding periods when investors exit have been about five years, no different than the holding periods for conventional PE and venture-capital (VC) firms. Deals yielded a wide range of returns no matter the holding period. Viewed another way, this also implies that social enterprises with strong business models do not need long holding periods to generate value for shareholders.

Conventional funds are joining in

Social investment requires a wide range of investors to maximize social welfare; companies receiving investment need

Exhibit 1

Midsize deals produce better results on average, while the smallest generated the greatest volatility.



[1] Number of exited deals = 48.

Source: Impact Investors Council (IIC) survey covering investments over the years 2010–16; VCCEdge; McKinsey analysis

different skills as they evolve. Stage-one companies need investors with expertise in developing and establishing a viable business model, basic operations, and capital discipline. For example, one investment in a dairy farm needed a round of riskier seed investment before becoming suitable to conventional investors.

Stage two calls for skills in balancing economic returns with social impact and the stamina to commit to and measure the dual bottom line. And stage three requires expertise in scaling up, refining processes, developing talent, and systematic expansion.

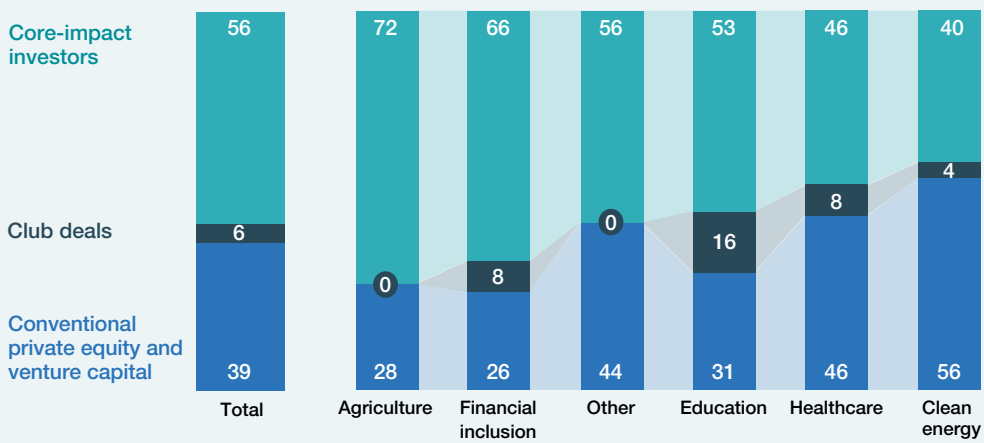
Core impact investors were the first investors in 56 percent of all deals (Exhibit 2), and in eight of the top ten microfinance institutions in India. Significantly, we found that this led to interest from conventional PE and VC funds, even as the business models of the underlying industries began to mature. Conventional PE and VC funds brought larger pools of capital, which accounted for about 70 percent of initial institutional funding by value.[1] This is particularly important for capital-intensive and asset-heavy sectors such as clean energy and microfinance. Overall, mainstream funds contributed 48 percent of the capital across sectors (Exhibit 3).

Club deals that combine impact investors and conventional PE and VC funds contributed 32 percent of capital, and highlight the complementary role of both kinds of investors. As enterprises mature and impact investors remain involved, they are able to pull in funding from mainstream funds. Nonprofit

Exhibit 2

Core impact investors play a critical role in seeding and de-risking social enterprises.

Deals as first institutional investor,[1] %



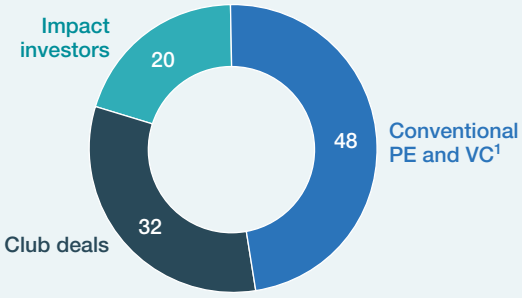
[1] Based on data for 248 first institutional deals; figures may not sum to 100%, because of rounding.

Source: Impact Investors Council (IIC) survey covering investments over the years 2010–16; VCCEdge; McKinsey analysis

Exhibit 3

Overall, mainstream funds contributed nearly half the capital across sectors.

Share of investment value by type of investor, %
100% = $5.2 billion in cumulative investments



[1] Private equity and venture capital.

Source: Impact Investors Council (IIC) survey covering investments over the years 2010–16; VCCEdge; McKinsey analysis

organizations also play a complementary role, by providing highly effective boots-on-the-ground capabilities. Nonprofits have typically been active longer than impact companies, and have developed cost-effective mechanisms for delivering products and services and implementing business plans. Impact investors could be seen as strategic investors in nonprofits, which in turn play a role in scale-up, talent attraction, and the delivery of financial and operating leverage. One impact investor, for instance, build a sister organization to coach microfinance founders as they set out, and help them build skills.

The social impact is significant

Impact investments touched the lives of 60 million to 80 million people in India. That's equivalent to the population of France, a figure that is much greater than the proverbial drop in the ocean many imagine impact investment to be—more like a small sea. To be sure, India has vast populations of people in need. But then again, as social enterprises scale, so will their impact, reaching a critical number of at-risk people in smaller populations.

As investors, reexamine their understanding of impact investing, the capital commitments they make are sure to expand. That will undoubtedly provide new challenges. But our research suggests that this nascent asset class can meet the financial challenges as well as achieve the social returns sought by providers of capital globally. Q

[1] VCCEdge, McKinsey analysis.

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ACCELERATING THE DIFFUSION OF TECHNOLOGY-ENABLED BUSINESS PRACTICES

New research highlights some of the most important actions available to executives.

by Tera Allas and Vivian Hunt

McKinsey research has long demonstrated the wide gap between productivity levels in different countries. Research in 2015, for example, suggested that if the degree of productivity dispersion among the bottom 75 percent of UK firms matched that of Germany, the United Kingdom would be more than £100 billion better off annually as measured by incremental gross value added (GVA).[1] This analysis also showed that a major reason for that discrepancy is the United Kingdom's relatively slower diffusion of digital technologies and proven business practices among the bulk of its business population.

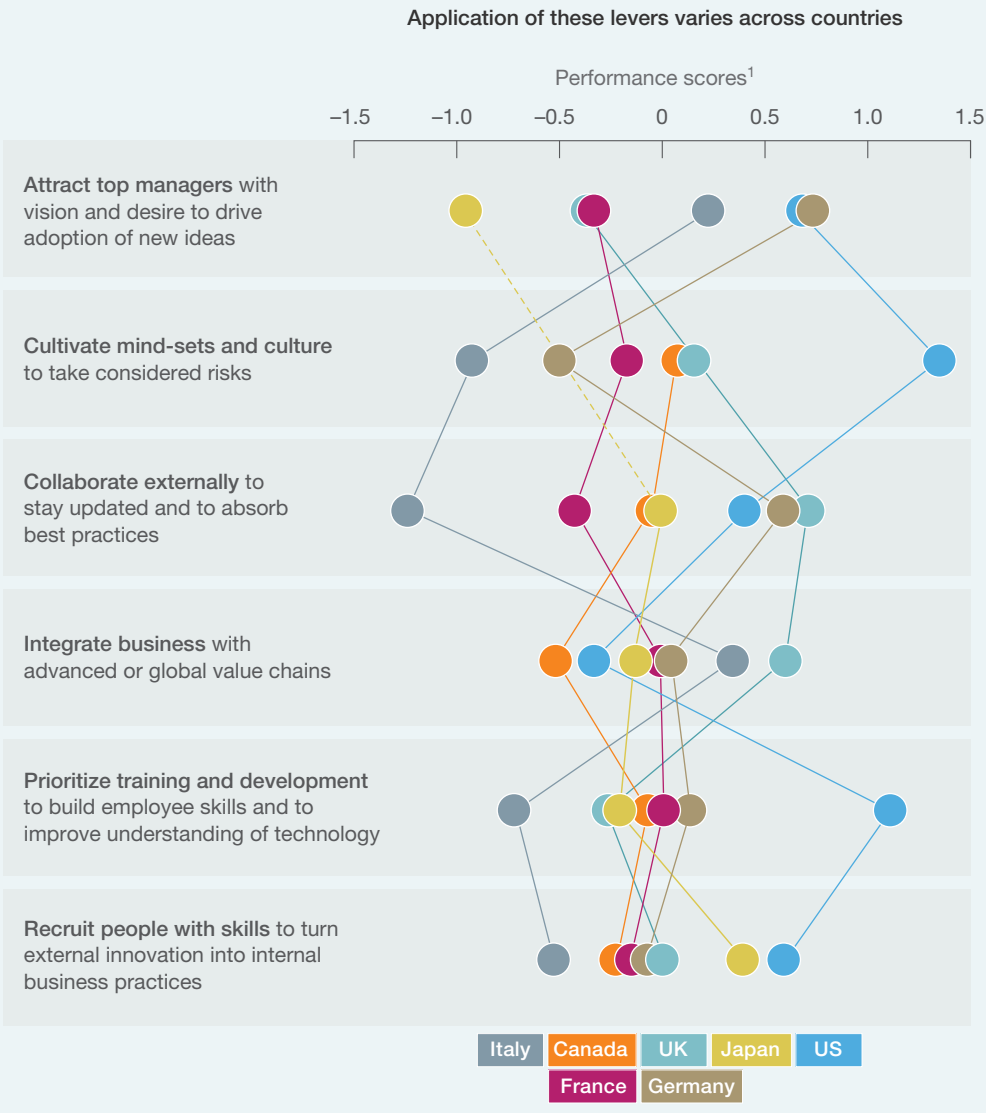
We set out recently to investigate what drives, and holds back, the diffusion of technology-enabled business practices, using a mix of academic literature, studies from multinational organizations such as the Organisation for Economic Co-operation and Development (OECD) and the World Economic Forum, and in-depth interviews with business leaders and other experts. We identified 13 levers, or "characteristics," that appear to accelerate the adoption of technologies and practices that have been implemented by innovation leaders but are new to less advanced firms.[2] Six of those 13 levers can be influenced directly by the actions of businesses themselves, largely independent of broader factors such as competition, education, regulation, and infrastructure quality.

The application of these six levers varies widely among firms within countries and across different geographies (exhibit). For example, professional management practices that drive diffusion have been more widely adopted, on average, in German and US firms than in firms in other countries. On the other hand, Japanese firms tend to benefit more than others from access to plentiful science and technology talent. UK firms, in turn, stand out for their external collaborations with the strong local-science base and for their embrace of value chains that are advanced, global, or both.

Given the importance of, and wide disparity in performance across, these six levers, they form a useful checklist for companies anywhere seeking ways to accelerate their uptake of productivity-enhancing, technology-enabled business practices:

Exhibit

Six levers help companies to accelerate the adoption of technology and innovative business practices.



[1] Average of z-scores for 2–4 selected metrics per lever, where each metric is given equal weight. Z-scores represent standard deviations from the mean value of each metric across the G-7 countries.

Source: European Innovation Scoreboard 2016; Eurostat; Global Entrepreneurship Monitor; Organisation for Economic Co-operation and Development (OECD); The Global Competitiveness Index 2016–17, World Economic Forum; The Global Innovation Index 2016; World Management Survey; Organizational Health Index by McKinsey; McKinsey analysis

1. Attract top managers with the vision and desire to drive adoption of new ideas. It makes sense to ensure that at least some C-suite executives have a track record of advocating and implementing new business approaches or technologies such as artificial intelligence (AI), big data analytics, or robotics. Sixty percent of companies identified as early adopters of artificial intelligence in a recent MGI study,[3] for example, reported significant support from their C-suite; only 33 percent of those conducting more limited experiments with AI reported this sort of support.

2. Cultivate the mind-sets and culture to take considered risks. This can happen through embedding the outside perspective in company values and through creating opportunities for managed experimentation and quick wins (emphasizing that it's not essential to get it right the first time). McKinsey innovation analysis shows that 55 percent of top-quartile innovators set concrete targets and aspirations for innovation and growth, compared with just 38 percent of second-quartile innovators and 20 percent and 10 percent, respectively, of third- and fourth-quartile innovators.[4]

3. Collaborate externally. Business and professional hubs and networks, as well as exchanges or joint research activities between universities and business, are key. As Corning's Silicon Valley technology chief Dr. Waguih Ishak pointed out in a recent *McKinsey Quarterly* article,[5] such relationships constantly renew how a firm operates. Indeed, academics estimate that around 40 percent of a company's success in adopting new ideas is explained by the quality of its internal and external networks.[6] Associations among business, government, research institutions, and trade unions have been behind the adoption of Industrie 4.0 in Germany.

4. Integrate the business with advanced or global value chains to expose it to the maximum number of best practices. This can mean looking beyond the usual supplier suspects to more innovative up-and-coming companies, or seeking experimental partnerships with leading-edge potential customers (even if not initially profitable). Surveys consistently show that suppliers and customers are among the most important sources of encouragement for the adoption of advanced business practices.[7]

5. Prioritize training and development to build better employee skills. Such efforts may include initiatives to improve top management's understanding of technology but may also be targeted at ways of working. In an experiment in India, textile firms were split into two groups, with one set receiving training (a key mechanism for diffusing knowledge) to build up its management skills, while the other did not. The group with training was 11 percent more productive and $230,000 a year more profitable.[8]

6. Recruit people with the skills to turn external innovation into concrete business practices and competitive advantage. The United Kingdom's Innovation Survey shows that companies that both invent new ideas and adopt those of others employ almost twice as many degree-level graduates and two and a half times as many science and engineering

graduates as noninnovative ones. Highly educated talent not only tends to be more externally oriented[9] but also enhances "absorptive capacity": the ability of companies to observe, learn from, and implement ideas from the outside.[10]

These levers sound fairly intuitive, but our research suggests they're too often overlooked. Leaders worried about staying at the leading edge can't afford to ignore them.

[1] See Jonathan Dimson, Vivian Hunt, Daniel Mikkelsen, Jay Scanlan, and James Solyom, "Productivity: The route to Brexit success," December 2016, McKinsey.com.

[2] For a full list of the 13 characteristics, see Exhibit 8 in *From ostrich to magpie: Increasing business take-up of proven ideas and technologies*, CBI, November 2017, cbi.org.uk.

[3] See "How artificial intelligence can deliver real value to companies," McKinsey Global Institute, June 2017, McKinsey.com.

[4] See Marc de Jong, Nathan Marston, and Erik Roth, "The eight essentials of innovation," *McKinsey Quarterly*, April 2015, McKinsey.com.

[5] See Dr. Waguih Ishak, "Creating an innovation culture," *McKinsey Quarterly*, September 2017, McKinsey.com.

[6] See Hans Georg Gemünden and Thomas Ritter, "Network competence: Its impact on innovation success and its antecedents," *Journal of Business Research*, September 2003, Volume 56, Number 9, pp. 745–55.

[7] See, for example, "UK innovation survey 2012 to 2014: Statistical annex," Department for Business, Energy & Industrial Strategy, October 2016, gov.uk.

[8] See Nicholas Bloom et al., "Does management matter? Evidence from India," *Quarterly Journal of Economics*, February 2013, Volume 128, Number 1, pp. 1–51, academic.oup.com.

[9] See Stefanie Schurer, Sonja C. Kassenboehmer, and Felix Leung, *Do universities shape their students' personality?*, IZA Institute of Labour Economics discussion paper, number 8873, February 2015, iza.org.

[10] See Rachel Griffith, Stephen Redding, and John Van Reenen, "Mapping the two faces of R&D: Productivity growth in a panel of OECD industries," *Review of Economics and Statistics*, November 2004, Volume 86, Number 4, pp. 883–95, mitpressjournals.org.

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SHAKING UP THE LEADERSHIP MODEL IN HIGHER EDUCATION

Economic pressures, digital disruption, and rising job complexity are prompting universities to seek more "outsider" leaders for their top jobs.

by Scott C. Beardsley

Higher education in the United States is a big industry—more than $500 billion in annual expenditures—and it's under some big-time pressure as well. Colleges and universities are being squeezed by rising costs, buffeted by increasingly activist stakeholders, struggling to keep up with the effects of digitization on traditional educational models, and facing off against new competitors, such as MOOCs (massive open online courses). Competition for students is so fierce that many universities must rely heavily on student-aid "discounts" to keep dorms and classrooms filled. Demographic change, meantime, demands the continuous reassessment of student–customers and their needs.

This litany of disruption should sound familiar to people in private industry, where corporate boards often respond by seeking nontraditional leaders—those outside a company's industry—who have different sets of skills and who can bring fresh approaches to problems.

Do business leaders have any business leading universities? Anecdotally, at least, it seems that colleges and universities are turning to the for-profit sector for an injection of nontraditional leadership. Just to name three recent examples: Janet Napolitano, former secretary of homeland security, was named president of the University of California system in 2013. Clayton Rose, a former vice chairman at JPMorgan Chase was appointed president of Bowdoin College in 2015. And in 2016, South Carolina State University appointed James Clark, a retired AT&T executive, as president.

Yet research on the scope of these leadership changes and the reasons behind them remains spotty. I've had the opportunity to observe the phenomenon from both sides of the desk, as it were—first as a McKinsey senior partner and now as the dean of the University of Virginia's Darden School of Business. To gain additional insights into higher education's leadership transition, I dug into the data and conducted interviews with leading search firms, which have become ubiquitous in presidential-succession processes.

More outsiders than ever

My research[1] reveals that there is discord on the definition[2] of a nontraditional leader and that, no matter what the definition,

the sheer number of nontraditional leaders is significant and growing (Exhibit 1). Nontraditional leaders by my definition—those who have not, at some point in their careers, come through the full-time tenured-faculty track—now represent fully a third of the presidential population. They could become the majority of leaders of liberal-arts colleges within another decade or so, if present trends hold.

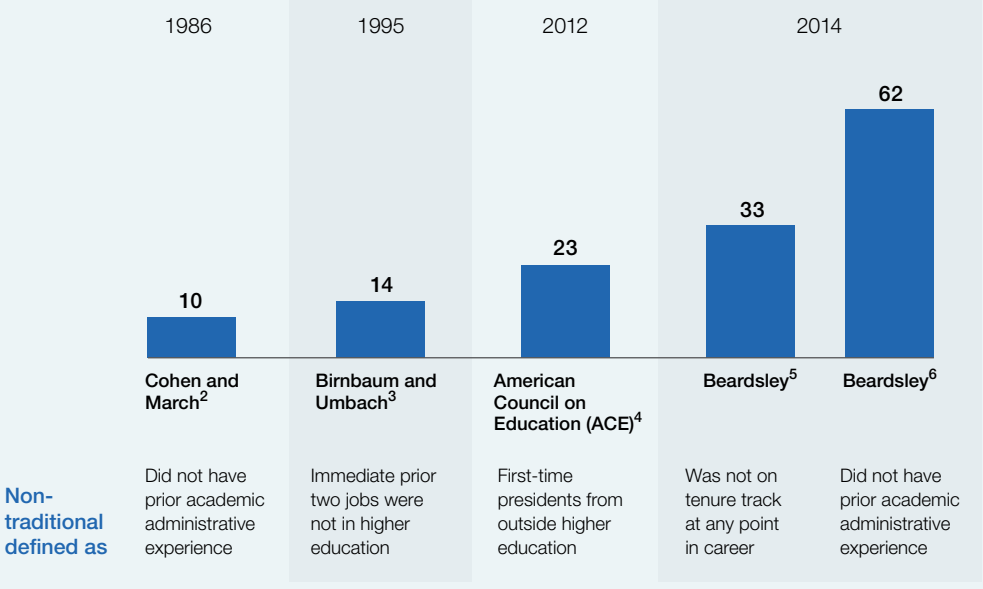
Nontraditional leaders are not uniformly distributed

It is also clear that the proportion of nontraditional presidents is not uniform across universities. Search-firm executives interviewed indicated that institutions facing a crisis or with less risk-averse boards tend to look for nontraditional leaders. The data further

Exhibit 1

The typical profile of a higher-education leader has been trending toward nontraditional.

Estimated share of presidents with nontraditional backgrounds,[1] %



[1] Estimates vary across studies because definitions of nontraditional leaders and types of universities in samples vary.
[2] Michael D. Cohen and James G. March, *Leadership and Ambiguity: The American College President* (Harvard Business Review Press, 1986); data from large public and independent colleges and universities. Typical promotional hierarchy for academic administrators defined as proceeding from professor to department chair to dean to provost to president.
[3] Robert Birnbaum and Paul D. Umbach, "Scholar, steward, spanner, stranger: The four career paths of college presidents," *The Review of Higher Education*, spring 2001; data from baccalaureate colleges in 1995.
[4] *On the Pathway to the Presidency*, American Council on Education, 2013; data from US colleges and universities in 2012.
[5] Scott C. Beardsley, *Higher Calling: The Rise of Nontraditional Leaders in Academia* (University of Virginia Press, 2017); data from *US News & World Report* on 2014 liberal-arts colleges and Internet searches.
[6] Using Cohen and March's definition (ie, % of presidents whose prior job was not president, provost, or chief academic officer) and data from 2014 liberal-arts-college presidents; Scott C. Beardsley, *Higher Calling*.

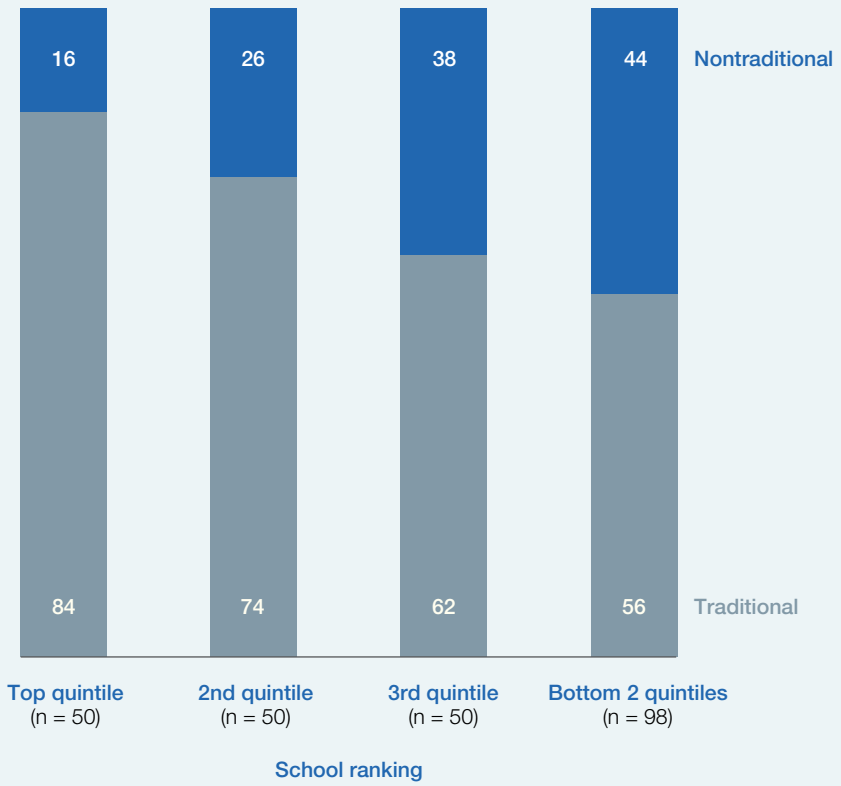
suggest that schools with a higher-than-average proportion of nontraditional leaders tend to be smaller (in students and staff), less well-resourced (in endowment per student), on the East Coast of the United States, and religiously affiliated.

Institutions at the top of popular lists, such as *US News & World Report*'s Best Colleges ranking, are far *less* likely to appoint nontraditional leaders than lower-ranked institutions—16 percent nontraditional presidents for the top quintile of colleges against 44 percent for the bottom two quintiles (Exhibit 2). That said, there are still significant numbers of nontraditional presidents in the least likely segments: those that include the highest ranked, most selective, and richly endowed schools. Among them are stalwarts such as Bates, Bowdoin, Carleton, and Colby colleges.

Exhibit 2

Institutions at the top of popular college-ranking lists are far less likely to appoint nontraditional leaders than lower-ranked institutions.

Presidents of liberal-arts colleges by background, %



Source: Scott C. Beardsley, *Higher Calling: The Rise of Nontraditional Leaders in Academia* (University of Virginia Press, 2017); Internet searches; Integrated Postsecondary Education Data System; 2014 college rankings from *US News & World Report*

Looking ahead

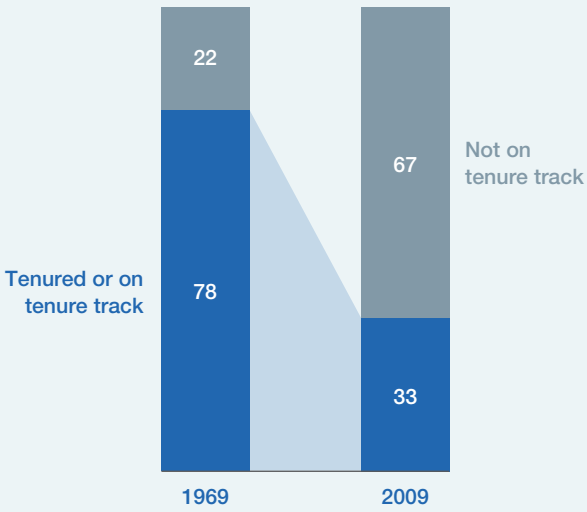
Are nontraditional leaders more successful? The data fall silent on this question because answering it requires defining and measuring success. A few markers, however, suggest that nontraditional leaders are holding their own. For example, institutions are more likely to hire a nontraditional president following a traditional president than the reverse. Nontraditional presidents also tend to have longer tenures: their median is 6.9 years versus 4.6 years for traditional presidents.

Executive-search professionals had much to say about the trends underlying the growing number and apparent success of nontraditional leaders. On the leadership "supply side," there has been a dramatic decline, over the past few decades, in the number of tenure-track professors in the United States (Exhibit 3). Then there's the job itself: just as in the corporate world, it has changed, with leaders now required to take on many external-facing duties that extend beyond fund-raising and maintaining good town–gown relations. Understanding academic norms and culture remains essential, but

Exhibit 3

The pipeline for traditional college presidents is thinning.

Faculty composition in US higher-education institutions, %



Source: William G. Bowen and Eugene M. Tobin, *Locus of Authority: The Evolution of Faculty Roles in the Governance of Higher Education* (Princeton University Press, 2015); Jack H. Schuster and Martin J. Finkelstein, *The American Faculty* (Johns Hopkins University Press, 2006); National Center for Education Statistics's Integrated Postsecondary Education Data System, 2009

Colleges and universities will need to be managed and led more like the large, complex organizations they are.

intense public scrutiny brought on by 24/7 social media, shifting government regulations, and declining state funding for public universities are all placing a premium on better management, so many talented traditional leaders no longer want the job. Universities have become much more complex businesses, as well. Many large research institutions, for example, have hospital systems that account for as much as half of their revenue and employment.

While these trends show no signs of reversing, they won't stop talented tenure-track professors from continuing to reach the top. The forces at work do mean, though, that colleges and universities will need to be managed and led more like the large, complex organizations they are. The debate will rightfully shift from whether the next president should be traditional or nontraditional to what challenges the leader needs to address. Over time, search committees will increasingly consider outsiders, many of them from business. And to the extent that they are successful, the door will open wider for more of them. Q

[1] The quantitative data set studied the 248 liberal-arts colleges identified by *US News & World Report.*

[2] Search-firm executives' and academic definitions of a nontraditional leader vary widely, from anyone who hasn't climbed the tenure-track ranks to the provost office to anyone whose last two jobs were not at a university.

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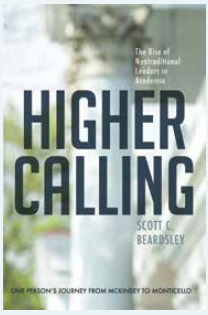


This article is based on research that appears in the author's recent book, *Higher Calling: The Rise of Nontraditional Leaders in Academia* (University of Virginia Press, September 2017).

MAXIMIZING INDUSTRIAL REVENUES—AFTER THE SALE

Strengthening OEMs' core service businesses in parts, repair, and maintenance could give performance a big lift.

by Markus Forsgren, Florent Kervazo, and Hugues Lavandier

New equipment sales are declining for many original-equipment manufacturers (OEMs) in industries from agriculture to oil and gas. To boost the bottom line, many are looking to postsales services, where our analysis has shown that typical earnings-before-interest-and-taxes margins can be 25 percent or higher, compared with roughly 10 percent for new equipment.

To capture those potential gains, we find industrial OEMs often are tempted to prioritize data-driven advanced services, such as e-commerce platforms and remote monitoring. In doing so, however, they may overlook *core* aftermarket services—the provision of parts, repair, and maintenance. To identify the best opportunities, OEMs first need to undertake a detailed examination of aftermarket lifetime value—the total amount of service revenue they could capture across their customer base.[1]

Our research showed striking performance variations in aftermarket lifetime value at more than 40 Fortune 500 companies. Companies in the top-performing industries captured five times as much aftermarket lifetime value per customer than those in the lowest-performing industries. The differences within industries were equally significant, with the best performers realizing three times more value than the lowest.

Lagging OEMs should identify the aftermarket lifetime value of each individual product and then select levers tailored to performance improvement (exhibit). For instance, they might be able to increase product lifetime effectively by remarketing used equipment or increase average annual service revenue by repricing spare parts more dynamically. As companies evaluate improvement levers, they should take care to balance opportunities related to digital offerings with those of core services.

[1] Aftermarket lifetime value is the product of three variables: product lifetime, lifetime penetration (the percent of an OEM's installed base for which it provides services during a product's lifetime), and average annual services revenue.

Markus Forsgren is a partner in McKinsey's Stockholm office, and **Florent Kervazo** and **Hugues Lavandier** are partners in the New York office.

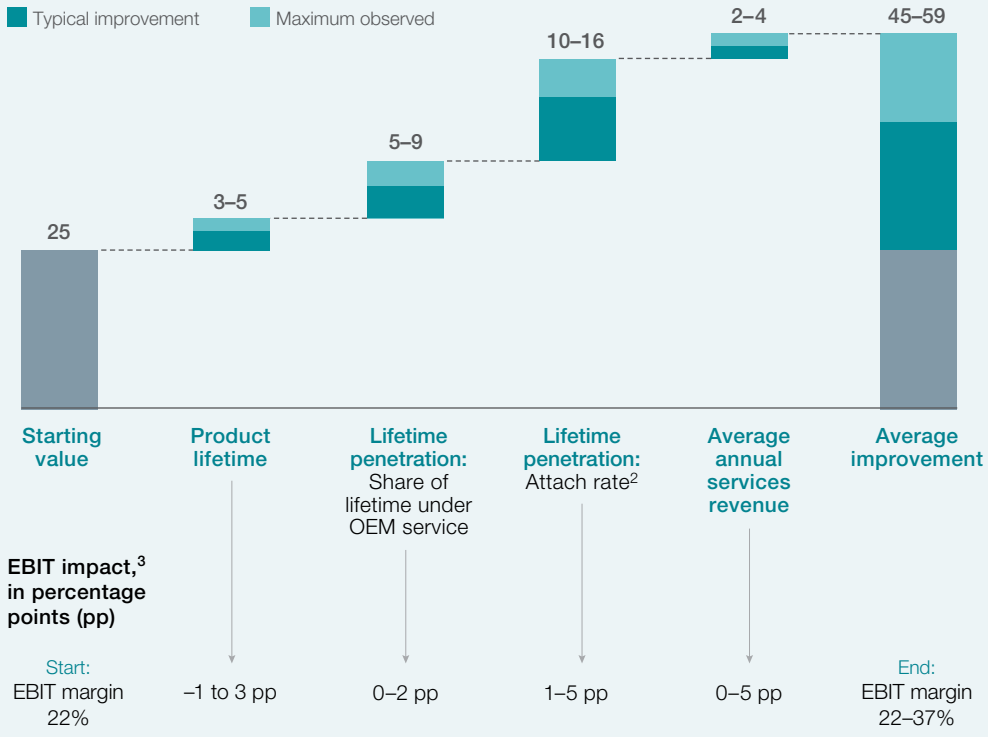
The authors would like to thank Aditya Ambadipudi, Alex Brotschi, and James Xing for their contributions to this article.

For the full article, see "Industrial aftermarket services: Growing the core," on McKinsey.com.

Exhibit

Companies can apply a broad set of improvement levers to boost the aftermarket lifetime value of their products.

Improvement in aftermarket lifetime value across industries,[1]
% of product's initial sales price



[1] Analysis of 40 OEMs.
[2] Attach rate = % of new equipment sold with warranty or service contracts.
[3] EBIT = earnings before interest and taxes; impact is average achieved when companies apply various improvement levers to elements of aftermarket lifetime value.

WILL BATTERIES DISRUPT THE UTILITIES INDUSTRY?

A rapid decline in storage prices encourages customers to produce a greater share of their own power, partially "defecting" from the grid.

by David Frankel and Amy Wagner

Cheap solar energy is already a challenge to utilities. But cheap storage will be even more disruptive, raising the prospect that individual and business customers will bypass traditional suppliers for greater parts of their consumption.

Storage prices are dropping much faster than anyone expected—battery costs in 2016 were one-quarter of what they were in 2010. In this new world of low-cost storage, solar users can stay connected to the grid in order to have 24/7 access but rarely have to use or pay for energy, instead using stored energy, which helps dramatically reduce their utility bills. So-called partial grid defection reduces demand for power provided by utilities (because consumers are making their own energy) and likely increases rates for those who remain (because there is less consumption to cover fixed grid costs). This is already happening in places where electricity is expensive and solar is widely available, such as Australia and Hawaii. On the horizon are other solar-friendly markets such as Arizona, California, Nevada, and New York (exhibit).

Storage, though, can also benefit utilities in markets where loads are expected to be flat or falling. In some US states, for example, utilities can earn returns by providing contracts for distributed energy resources. This would, among other things, allow them to defer expensive new investments.

The future of storage is a matter of balance. The ideal would be a regulatory system that strives to balance the desire for a healthy storage market and greater freedom for customers to manage their own energy requirements against the need to ensure the economic sustainability of the utilities and access to electricity service for all customers. Getting this right will be tricky, and no doubt there will be missteps along the way. But there is also no doubt that storage's time is coming. Q

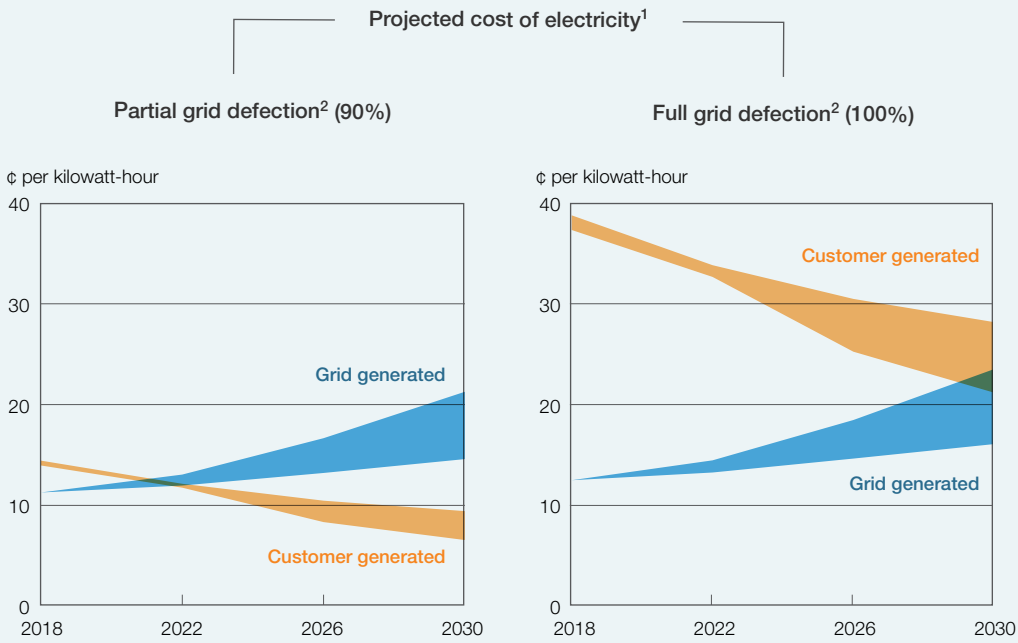
David Frankel is a partner in McKinsey's Southern California office, and **Amy Wagner** is a senior expert in the San Francisco office.

The authors wish to thank Jesse Noffsinger and Matt Rogers for their contributions to this article.

For the full article, see "Battery storage: The next disruptive technology in the power sector," on McKinsey.com.

Exhibit

Partial grid defection likely makes economic sense within a few years; full defection will take longer.



[1] Levelized based on upfront capital cost and annual operations over total energy production.
[2] Grid-defection economics are estimated based on solar power and storage for a hypothetical Arizona residential customer. Partial grid defection assumes that 10% of power needs will be supplied by the utility grid. Full defection assumes addition of a small generator for backup power.

HOW CHINA'S SHIFT TO CONSUMER-LED GROWTH IS CHANGING INDUSTRY DYNAMICS

The experience of the specialty-chemical sector shows the ground-level impact.

by Elisabeth Hirschbichler, Nathan Liu, and Ulrich Weihe

China's move from an investment-led to a consumption-led economy is a familiar theme. But the momentous shift is changing the fortunes of manufacturing industries in less visible ways as demand for higher-value products expands. The specialty-chemical industry is a case in point (exhibit). In line with wider economic trends, the fastest growers (and those with higher earnings before interest, taxes, depreciation, and amortization) include the specialty chemicals used in the manufacture of consumer goods such as personal-care ingredients and fragrances. Similarly, growth in advanced industries such as autos, aerospace, and electronics is supporting higher demand for the likes of electronic chemicals and high-performance plastics. On the flip side, products used in traditional industries are growing more slowly, their margins squeezed as these markets become more commoditized.

There may be lessons for other industries in the way the changes are reshaping the specialty-chemical sector. Chinese players will benefit, to be sure, but the new playing field should also allow international players—which have been losing share on their earlier, older-line investments—scope to reposition themselves to their advantage. The demand for more sophisticated products, after all, plays to the strengths of foreign companies in specialty chemicals and elsewhere.

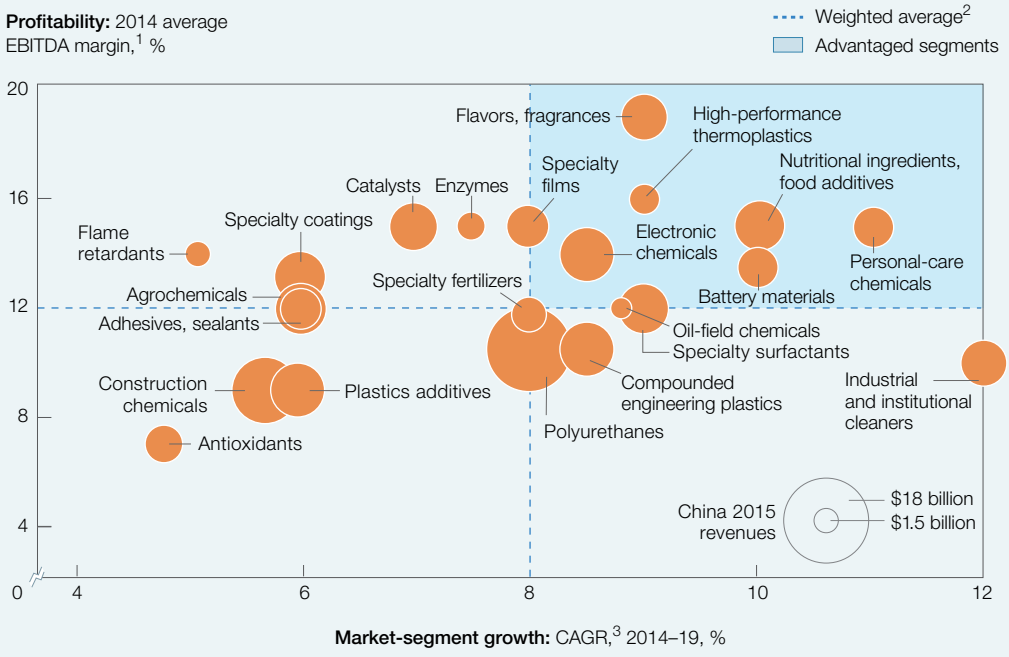
With China's economic turn likely to affect the prospects for individual specialty chemicals in different ways, executives will need to carefully adapt product strategies to fit these evolving patterns of demand.

Elisabeth Hirschbichler is an associate partner in McKinsey's Vienna office, **Nathan Liu** is a partner in the Shanghai office, and **Ulrich Weihe** is a partner in the Frankfurt office.

For a more complete set of findings, see "A game plan for international specialty-chemical companies in China," on McKinsey.com.

Exhibit

Many of the specialty-chemical industry's advantaged segments are related to the manufacture of consumer goods.

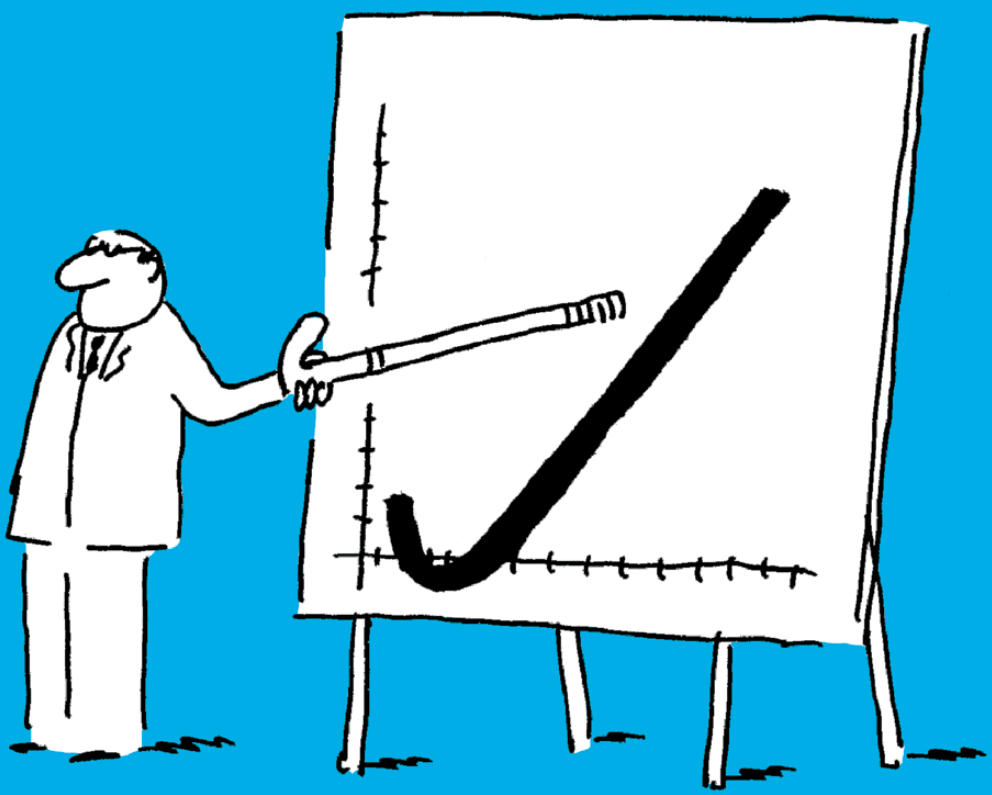


[1] For selected specialty-chemical sectors. EBITDA = earnings before interest, taxes, depreciation, and amortization; margins estimated based on EBIT margin + 5 percentage points; correlation derived from 50 publicly listed Chinese specialty-chemical companies.
[2] Excludes construction chemicals and polyurethanes.
[3] Compound annual growth rate.

Source: CCID Consulting; Freedonia; IHS World Industry Survey; Marketline; McKinsey analysis

EXCERPT FROM

STRATEGY BEYOND THE HOCKEY STICK



Signed cartoons by Mike Shapiro;
all other cartoons by Jeremy Banks (Banx)

Strategy to beat the odds

If you internalize the real odds of strategy, you can tame its social side and make big moves.

by Chris Bradley, Martin Hirt, and Sven Smit

Several times a year, top management teams enter the strategy room with lofty goals and the best of intentions: they hope to assess their situation and prospects honestly, and mount a decisive, coordinated response toward a common ambition.

Then reality intrudes. By the time they get to the strategy room, they find it is already crowded with egos and competing agendas. Jobs—even careers—are on the line, so caution reigns. The budget process intervenes, too. You may be discussing a five-year strategy, but everyone knows that what really matters is the first-year budget. So, many managers try to secure resources for the coming year while deferring other tough choices as far as possible into the future. One outcome of these dynamics is the hockey-stick projection, confidently showing future success after the all-too-familiar dip in next year's budget. If we had to choose an emblem for strategic planning, this would be it.

In our book, *Strategy Beyond the Hockey Stick* (Wiley, February 2018), we set out to help companies unlock the big moves needed to beat the odds. Another strategy framework? No, we already have plenty of those. Rather, we need to address the real problem: the "social side of strategy," arising from corporate politics, individual incentives, and human biases. How? With evidence. We examined publicly available information on dozens of variables for thousands of companies and found a manageable number of levers that explain more than 80 percent of the up-drift and down-drift in corporate

performance. That data can help you assess your strategy's odds of success before you leave the strategy room, much less start to execute the plan.

Such an assessment stands in stark contrast to the norms prevailing in most strategy rooms, where discussion focuses on comparisons with last year, on immediate competitors, and on expectations for the year ahead. There is also precious little room for uncertainty, for exploration of the world beyond the experience of the people in the room, or for bold strategies embracing big moves that can deliver a strong performance jolt. The result? Incremental improvements that leave companies merely playing along with the rest of their industries.

Common as that outcome is, it isn't a necessary one. If you understand the social side of strategy, the odds of strategy revealed by our research, and the power of making big moves, you will dramatically increase your chances of success.

THE SOCIAL SIDE OF STRATEGY

Nobel laureate Daniel Kahneman described in his book *Thinking, Fast and Slow* the "inside view" that often emerges when we focus only on the case at hand. This view leads people to extrapolate from their own experiences and data, even when they are attempting something they've never done before. The inside view also is vulnerable to contamination by overconfidence and other cognitive biases, as well as by internal politics.

It's well known by now that people are prone to a wide range of biases such as anchoring, loss aversion, confirmation bias, and attribution error. While these unintentional mental shortcuts help us filter information in our daily lives, they distort the outcomes when we are forced to make big, consequential decisions infrequently and under high uncertainty—exactly the types of decisions we confront in the strategy room. When you bring together people with shared experiences and goals, they wind up telling themselves stories, generally favorable ones. A study found, for instance, that 80 percent of executives believe their product stands out against the competition—but only 8 percent of customers agree.[1]

Then, add agency problems, and the strategy process creates a veritable petri dish for all sorts of dysfunctions to grow.[2] Presenters seeking to get that all-important "yes" to their plans may define market share so it excludes geo-

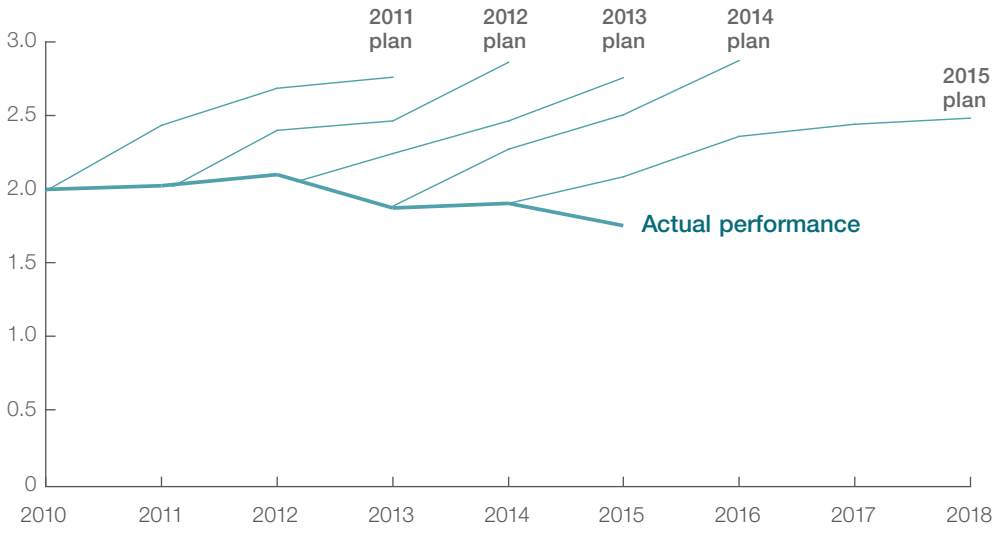
[1] See Dominic Dodd and Ken Favaro, *The Three Tensions: Winning the Struggle to Perform Without Compromise*, first edition, San Francisco, CA: Jossey-Bass, 2007.

[2] Agency problems emerge when an agent is required to make decisions for another person or group, whose information, preferences, and interests may not be aligned with the agent's.

Exhibit 1

One thing leads to another: Social dynamics and cognitive biases can lead to successive hockey sticks.

EBITDA,[1] disguised example, $ billion



[1] Earnings before interest, taxes, depreciation, and amortization.

graphies or segments where their business units are weak, or attribute weak performance to one-off events such as weather, restructuring efforts, or a regulatory change. Executives argue for a large resource allotment in the full knowledge that they will get negotiated down to half of that. Egos, careers, bonuses, and status in the organization all depend to a large extent on how convincingly people present their strategies and the prospects of their business.

That's why people often "sandbag" to avoid risky moves and make triple sure they can hit their targets. Or they play the short game, focusing on performance in the next couple of years in the knowledge that they likely won't be running their division afterward. Emblematic of these strategy-room dynamics is the hockey-stick presentation. Hockey sticks recur with alarming frequency, as the experience of a multinational company, whose disguised results appear in Exhibit 1, demonstrates. The company planned for a breakout in 2011, only to achieve flat results. Undeterred, the team drew another hockey stick for 2012, then 2013, then 2014, then 2015, even as actual results stayed roughly flat, then trailed off.

To move beyond hockey sticks and the social forces that cause them, the CEO and the board need an objective, external benchmark.

THE ODDS OF STRATEGY

The starting point for developing such a benchmark is embracing the fact that business strategy, at its heart, is about beating the market; that is, defying the power of "perfect" markets to push economic surplus to zero. Economic profit—the total profit after the cost of capital is subtracted—measures the success of that defiance by showing what is left after the forces of competition have played out. From 2010 to 2014, the average company in our database of the world's 2,393 largest corporations reported $920 million in annual operating profit. To make this profit, they used $9,300 million of invested capital,[3] which earned a return of 9.9 percent. After investors and lenders took 8 percent to compensate for use of their funds, that left $180 million in economic profit.

Plotting each company's average economic profit demonstrates a power law—the tails of the curve rise and fall at exponential rates, with long flatlands in the middle (Exhibit 2). The power curve reveals a number of important insights:

- *Market forces are pretty efficient.* The average company in our sample generates returns that exceed the cost of capital by almost two percentage points, but the market is chipping away at those profits. That brutal competition is why you struggle just to stay in place. For companies in the middle of the power curve, the market takes a heavy toll. Companies in those three quintiles delivered economic profits averaging just $47 million a year.

- *The curve is extremely steep at the bookends.* Companies in the top quintile capture nearly 90 percent of the economic profit created, averaging $1.4 billion annually. In fact, those in the top quintile average some 30 times as much economic profit as those in the middle three quintiles, while the bottom 20 percent suffer deep economic losses. That unevenness exists within the top quintile, too. The top 2 percent together earn about as much as the next 8 percent combined. At the other end of the curve, the undersea canyon of negative economic profit is deep—though not quite as deep as the mountain is high.

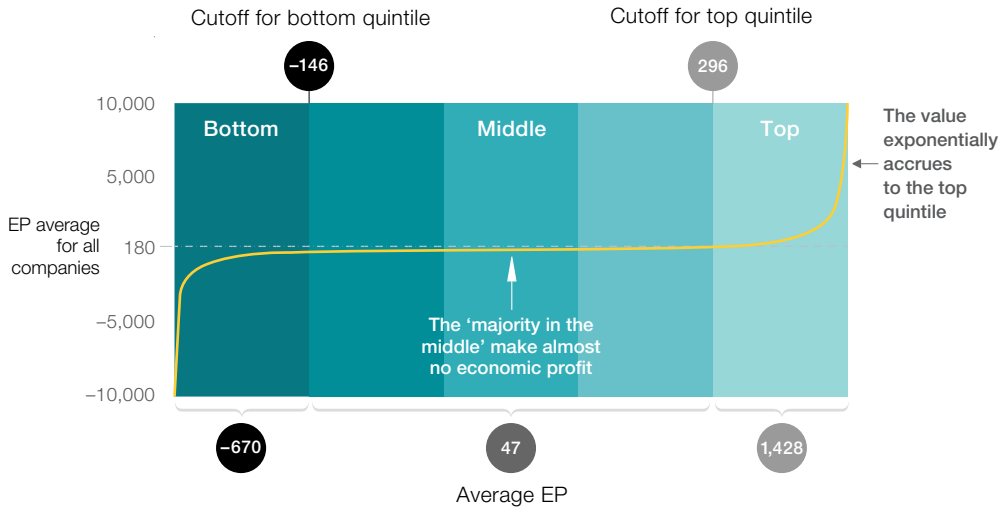
- *The curve is getting steeper.* Back in 2000–04, companies in the top quintile captured a collective $186 billion in economic profit. Fast forward

[3] We measure profit as NOPLAT—net operating profit less adjusted taxes. Invested capital comprises operating invested capital of $6,660 million and goodwill and intangibles of $2,602 million. In other words, 28 percent of the capital of a typical company represents additional value over book value paid in acquisitions.

Exhibit 2

The power curve of economic profit: The global distribution of economic profit is radically uneven.

Average annual economic profit (EP) generated per company, 2010–14, $ million, n = 2,393[1]



[1] Excluding 7 outliers (companies with economic profit above $10 billion or below –$10 billion).

Source: Corporate Performance Analytics by McKinsey

a decade and the top quintile earned $684 billion. A similar pattern emerges in the bottom quintile. Since investors seek out companies that offer market-beating returns, capital tends to flow to the top, no matter the geographic or industry boundaries. Companies that started in the top quintile ten years earlier soaked up 50 cents of every dollar of new capital in the decade up to 2014.

- *Size isn't everything, but it isn't nothing, either.* Economic profit reflects the strength of a strategy based not only on the power of its economic formula (measured by the spread of its returns over its cost of capital) but also on how scalable that formula is (measured by how much invested capital it could deploy). Compare Walmart, with a moderate 12 percent return on capital but a whopping $136 billion of invested capital, with Starbucks, which has a huge 50 percent return on capital but is limited by being in a much less scalable category, deploying only $2.6 billion of invested capital. They both generated enormous value, but the difference in economic profit is substantial: $5.3 billion for Walmart versus $1.1 billion for Starbucks.

- *Industry matters, a lot.* Our analysis shows that about 50 percent of your position on the curve is driven by your industry—highlighting just how critical the "where to play" choice is in strategy. Industry performance also follows a power curve, with the same hanging tail and high leading peak. There are 12 tobacco companies in our research, and 9 are in the top quintile. Yet there are 20 paper companies, and none is in the top quintile. The role of industry in a company's position on the power curve is so substantial that it's better to be an average company in a great industry than a great company in an average industry.

- *Mobility is possible—but rare.* Here is a number that's worth mulling: the odds of a company moving from the middle quintiles of the power curve to the top quintile over a ten-year period are 8 percent (Exhibit 3). That means just 1 in 12 companies makes such a leap. These odds are sobering, but they also encourage you to set a high bar: Is your strategy better than the 92 percent of other strategies?

THE POWER OF BIG MOVES

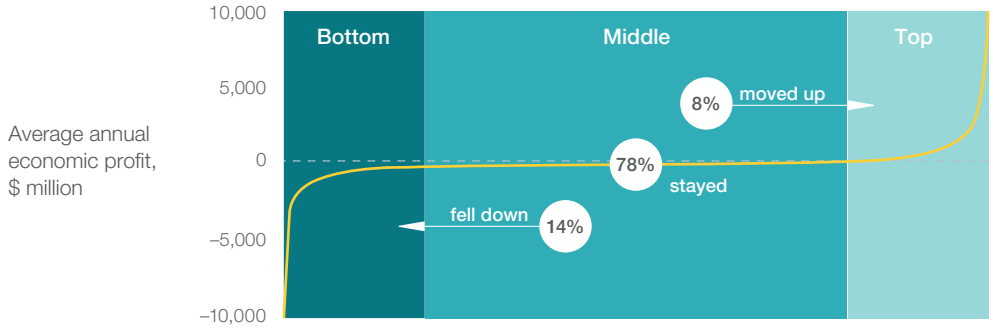
So what can you do to improve the odds that your company will move up the power curve? The answer is lurking in our data. Consider this analogy: To estimate a person's income, we can start with the global average, or about $15,000 per year. If we know that the person is American, our estimate jumps to the average US per capita income, or $56,000. If we know that the individual is a 55-year-old male, the estimate jumps to $64,500. If that guy works in the IT industry, it jumps to $86,000. And if we know the person is Bill Gates, well, it's a lot more than that.

Adding ever more information similarly helps to zero in on the probabilities of corporate success. Even if you know your overall odds, you need to understand which of your attributes and actions can best help you raise them. We identified ten performance levers and, importantly, how strongly you have to pull them to make a real difference in your strategy's success. We divided these levers into three categories: endowment, trends, and moves. Your endowment is what you start with, and the variables that matter most are your revenue (size), debt level (leverage), and past investment in R&D (innovation). Trends are the winds that are pushing you along, hitting you in the face, or buffeting you from the side. The key variables there are your industry trend and your exposure to growth geographies. In analyzing the odds of moving on the power curve, we found that endowment determines about 30 percent and trends another 25 percent.

Exhibit 3

What are the odds? Companies have an 8 percent chance of jumping from the middle to the top.

% of companies staying in or moving out of middle 3 quintiles, n = 1,435



Source: Corporate Performance Analytics by McKinsey

The moves that matter

However, it is your moves—what you do with your endowment and how you respond to trends—that make the biggest difference. Our research found that the following five moves, pursued persistently, can get you to where you want to go:

- *Programmatic M&A.* You need a steady stream of deals every year, each amounting to no more than 30 percent of your market cap but adding over ten years to at least 30 percent of your market cap. Corning, which over the course of a decade moved from the bottom to the top quintile of the power curve, shows the value of disciplined M&A. Corning understands that doing three deals a year means it must maintain a steady pipeline of potential targets, conduct due diligence on 20 companies, and submit about five bids.

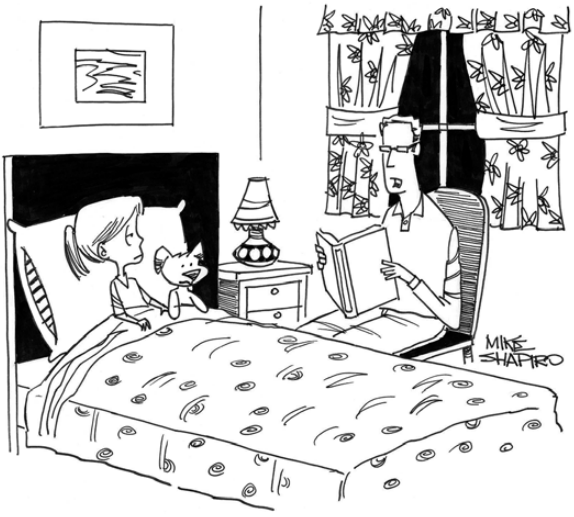
- *Dynamic reallocation of resources.* Winning companies reallocate capital expenditures at a healthy clip, feeding the units that could produce a major move up the power curve while starving those unlikely to surge. The threshold here is reallocating at least 50 percent of capital expenditure among business units over a decade. When Frans van Houten became Philips' CEO in 2011, the company began divesting itself of legacy assets, including its TV and audio businesses. After this portfolio restructuring,

Philips succeeded at reinvigorating its growth engine by reallocating resources to more promising businesses (oral care and healthcare were two priorities) and geographies. Philips started, for example, managing performance and resource allocations at the level of more than 340 business-market combinations, such as power toothbrushes in China and respiratory care in Germany. That led to an acceleration of growth, with the consumer business moving from the company's worst-performing segment to its best-performing one within five years.

- *Strong capital expenditure.* You meet the bar on this lever if you are among the top 20 percent in your industry in your ratio of capital spending to sales. That typically means spending 1.7 times the industry median. Taiwanese semiconductor manufacturer Taiwan Semiconductor Manufacturing Company (TSMC) pulled this lever when the Internet bubble burst and demand for semiconductors dropped sharply. The company bought mission-critical equipment at the trough and was ready to meet the demand as soon as it came back. TSMC had been in a head-to-head race before the down-turn but pulled clear of the competition after it ended because of its invest-ment strategy. That laid the foundation for TSMC to become one of the largest and most successful semiconductor manufacturing pure plays in the world.

- *Strength of productivity program.* This means improving productivity at a rate sufficient to put you at least in the top 30 percent of your industry. Global toy and entertainment company Hasbro successfully achieved the top quintile of the power curve with a big move in productivity. Following a series of performance shortfalls, Hasbro consolidated business units and locations, invested in automated processing and customer self-service, reduced head count, and exited loss-making business units. The com-pany's selling, general, and administrative expenses as a proportion of sales fell from an average of 42 percent to 29 percent within ten years. Sales productivity lifted, too—by a lot. Over the decade, Hasbro shed more than a quarter of its workforce yet still grew revenue by 33 percent.

- *Improvements in differentiation.* For business-model innovation and pricing advantages to raise your chances of moving up the power curve, your gross margin needs to reach the top 30 percent in your industry. German broadcaster ProSieben moved to the top quintile of the power curve by shifting its model for a new era of media. For example, it expanded its addressable client base by using a "media for equity" offering for customers whose business would significantly benefit from mass media but who couldn't afford to pay with cash. Some of ProSieben's innovations were



". . . The third little pig wanted to build a wolf-proof brick house. But the other two pigs thought that would take away resources from their budgets, so they talked him out of it right before the wolf killed all three of them."

costly, sometimes even cannibalizing existing businesses. But, believing the industry would move anyway, the company decided that experimenting with change was a matter of survival first and profitability second. ProSieben's gross margin expanded from 16 percent to 53 percent during our research period.

Greater than the sum of the parts

Big moves are most effective when done in combination—and the worse your endowment or trends, the more moves you need to make. For companies in the middle quintiles, pulling one or two of the five levers more than doubles their odds of rising into the top quintile, from 8 percent to 17 percent. Three big moves boost these odds to 47 percent.

To understand the cumulative power of big moves, consider the experience of Precision Castparts Corp. (PCC). In 2004, the manufacturer of complex metal components and products for the aerospace, power, and industrial markets was lumbering along. Its endowment was unimpressive, with revenues and debt levels in the middle of the pack, and the company had not invested heavily in R&D. PCC's geographic exposure was also limited, though the aerospace industry experienced enormous tailwinds over the following ten years, which helped a lot.

Most important, however, PCC made big moves that collectively shifted its odds of reaching the top quintile significantly. The company did so by surpassing the high-performance thresholds on four of the five levers. For mergers, acquisitions, and divestments, it combined a high value and large volume of deals between 2004 and 2014 through a deliberate and regular program of transactions in the aerospace and power markets.

PCC also reallocated 61 percent of its capital spending among its three major divisions, while managing the rare double feat of both productivity and margin improvements—the only aerospace and defense company in our sample to do so. While nearly doubling its labor productivity, PCC managed to

reduce its overhead ratio by three percentage points. It lifted its gross profit-to-sales ratio from 27 to 35 percent.

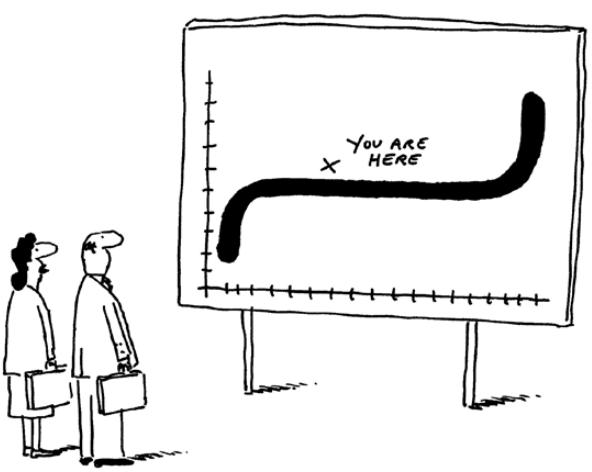
The combination of a positive industry trend and successful execution of multiple moves makes PCC a showcase of a "high odds" strategy and perhaps explains why Berkshire Hathaway agreed in 2015 to buy PCC for $37.2 billion. Could our model have predicted this outcome? Based on the moves PCC made, its odds of rising to the top were 76 percent.

Patterns of movement

You should be mindful of several dynamics when undertaking major strategic moves. First, our research shows that really big moves can "cancel out" the impact of a poor inheritance. Making strong moves with a poor inheritance is about as valuable as making poor moves with a strong inheritance. And even small improvements in odds have a dramatic impact on the expected payoff, owing to the extremely steep rise of the power curve. For example, the probability-weighted expected value of a middle-tier company increasing its odds to 27 percent from the average of 8 percent is $123 million—nearly three times the total average economic profit for midtier companies.

Big moves are also nonlinear, meaning that just pulling a lever does not help; you need to pull it hard enough to make a difference. For instance, productivity improvements that are roughly in line with the improvement rates of your industry won't provide an upward boost. Even if you are improving on all five measures, what matters is how you stack up against your competitors.

And four of the five big moves are asymmetric. In other words, the upside opportunity far outweighs the downside risk. While M&A is often touted as high risk, for example, in reality programmatic M&A not only increases your odds of moving up the curve but simultaneously decreases your odds of sliding down. Capital expenditures is the one exception. By increasing capital expenditures, your chances of going up on the power curve increase, but so do the chances of dropping.



In general, making no bold moves is probably the most dangerous strategy of all. You not only risk stagnation on the power curve but also miss out on the additional reward of growth capital, which mostly flows to the winners.

So how do you set up a strategy process that embraces a data-based outside view in order to tame the social side of strategy and generate winning, big moves? As we show in our book, there are several practical shifts you can make to transform what happens in your strategy room, such as changing the annual strategy-planning exercise into a continual strategy journey, replacing base-case scenarios with momentum cases that extend the past trajectory into the future, and making strong bets on a few breakout opportunities rather than spreading resources across your divisions.

Adjustments such as these, combined with an empirical, objective benchmark for the quality of a strategy that is independent from subjective judgments in the strategy room, will change the conversation at the top of your company. When you know, ahead of time, the chances of your strategy succeeding, and you can see the levers that matter most to your own business, you can make better choices and mitigate the impact of fear, ambition, rivalry, and bias. A good strategy is still hard to shape, but you can at least navigate toward one based on an accurate map. Q

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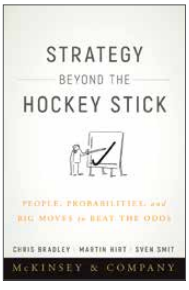


This article is adapted from the authors' new book, *Strategy Beyond the Hockey Stick: People, Probabilities, and Big Moves to Beat the Odds* (Wiley, February 2018).

THE TECH- AND DATA-ENABLED ORGANIZATION OF THE FUTURE

Illustrations by Emiliano Ponzi

In this package

Organizing for the age of urgency

To compete at the speed of digital, you need to unleash your strategy, your structure, and your people.

by Aaron De Smet and Chris Gagnon

Congratulations! Your organization is performing at or near the top of its game, or it has been in the recent past. Perhaps even better, you have a strategy to improve in the near future. Now for the bad news: the good news won't last.

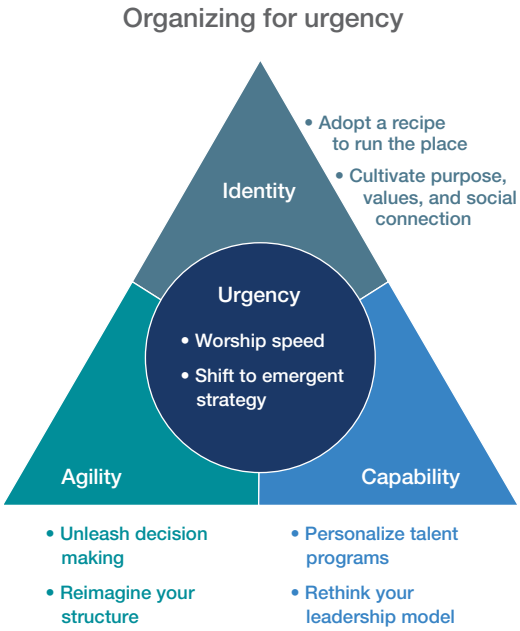
It can't—at least without the right kind of organization. Across industries, barely half of the top performers sustain their leadership position over the course of a decade, according to research by our colleagues in McKinsey's Strategy Practice. The challenges in maintaining dominance are not new; even sectors that digitization has not consigned to oblivion have seen flagships such as Delta Airlines, General Motors, and Owens Corning move from the top into Chapter 11 and then back into leadership positions again.

But of course, technology *is* changing everything. As digitization, advanced analytics, and artificial intelligence (AI) sweep across industries and geographies, they aren't just reshaping the competitive landscape; they're redefining the organizational imperative: adapt or die. The average large firm reorganizes every two to three years, and the average reorganization takes more than 18 months to implement. Wait and see is not an option; it's a death sentence.

As a result, companies are beginning to experiment with increasingly radical approaches. We're struck by a commonality among those who get it right: they create adaptive, fast-moving organizations that can respond quickly and flexibly to new opportunities and challenges *as they arise*. In doing so, they're moving intelligent decision making to the front lines. That's in sharp contrast to the standard, "safer" modus operandi of capturing data, moving it up a hierarchal chain, centrally analyzing it, and sending guidance back. Several of these forward-thinking organizations now starkly describe their decision making as being pushed to the "edges"—to and beyond employees, past the organization's four walls, and out to consumers and partners. The process functions more like a network and less like a chain of command.

In this article, we'll share these emerging elements of the organization of the future. While there is no set formula for success, we've seen versions of these elements at so many companies that we think they provide at least the organizational outline to win (Exhibit 1). Along the way, we'll try to dispel some common misconceptions (*too risky! too inefficient! too time consuming to set up!*) of what such an organization really means. We know you don't want your company to undergo yet another reorg—and another one a few years after that. Consider this a road map out.

Exhibit 1



THE URGENCY IMPERATIVE

A good road map can come with callouts and suggestions, and here's our first: floor it. When you compete in a marketplace that moves so quickly, the default outcome is to fall behind. If your organization is to have any hope of keeping up, it will need to be reconceived as fast, quick to turn, and even quicker to emerge from rapid pit stops and tune-ups. One could almost analogize to a race car—almost, because race cars typically run on a fixed track toward a clear finish line. Your organization's race, by comparison, is toward an unknowable destination. And that race doesn't end.

Worship speed

At the highest-performing companies, speed is the objective function, the operating model, and the cultural bias. And more: speed is an imperative. Walk the halls of leading organizations, and you'll repeatedly hear catch-phrases such as "energy," "metabolic rate," "bias for action," and "clock speed." Jeff Bezos, in his April 2017 letter to Amazon shareholders, highlights making not just "high-quality" decisions but "*high-velocity*" decisions. They go hand in hand. "Most decisions," writes Bezos, "should probably be made with somewhere around 70 percent of the information you wish you had. If you wait for 90 percent, in most cases you're probably being slow." Choosing not to fail fast comes at a price. "If you're good at course correcting," Bezos continues, "being wrong may be less costly than you think, whereas being slow is going to be expensive for sure."[1]

Shift to emergent strategy

Tacking and readjusting quickly are essential, even if the destination is uncertain. In fact, *because* the destination is uncertain you need an "emergent strategy," which entails a relentless quest and not a defined end point. The pursuit itself should be a firm's North Star—a questioning of "how do we add value" that's unceasing but also unsolved, open to exactly how that manifests in terms of specific opportunities and actions.

Too often, decisions about how to create value are made from on high and tend to be "one and done." They're implemented by means of top-down planning, frontline execution, frontline reporting back up the ladder, top-down analysis of gaps, top-down replanning and pushing down mandates to fill those gaps, frontline reexecution, and repeating it all again—a process much too slow and mechanistic to keep up with real-world change. That's particularly the case in organizations with a number of "clay

[1] Jeffrey P. Bezos, "2016 letter to shareholders," April 12, 2017, Amazon, amazon.com.

layers" of middle management, where officers feel compelled to add value by refining, augmenting, synthesizing, piling on, micromanaging, and adjusting information that passes their way—and where personal incentives and cognitive biases inadvertently give rise to hockey-stick forecasts, sandbagging, and poor decision making.

Our colleagues in McKinsey's Strategy Practice have just written a book, *Strategy Beyond the Hockey Stick* (Wiley, February 2018), about how to tame this "social side" of strategy. By understanding the real odds (long) of breaking out from the pack, by making a consistent series of big moves, and by treating these steps as a journey that doesn't end, they show that companies can make strategic breakthroughs. (For more, see "Strategy to beat the odds," on page 30.)

Such an approach requires an organizational platform that allows for an emergent mix of multiple strategies to be formulated and carried out in real time. If the old world was a master composer like Mozart, planning every detail for every instrument, the new world is improvisational jazz. But even older cats can jam. One global chemical manufacturer, for example, had originally been conceived, decades ago, to commercialize a singular scientific breakthrough. When challenged, decades later, to dig deeper into how the company had actually realized high returns after its founding period had passed, leadership discovered that the business's biggest moneymakers were consistently the result of incremental, close-to-the-customer applications. Many of those value-creating innovations had sprung from learning by doing, improvising, and improving—and getting by on a shoestring. In fact, upon further analysis, the company realized that it had been starving incremental (but high-impact) innovation for the new New Thing, with poor returns on investment too often the result. Grasping that insight, leadership decided to flip its resource allocation almost completely. That fundamental shift, hitching its star to emergent strategy, has since generated outperforming value for more than a half dozen years.

AGILITY

The principles behind organizational agility have been around for decades. In its current, most mainstream form, agility is a DevOps description of how IT teams form to address problems, sprint toward solutions, and then reconstitute to work on new challenges. These approaches have made "agile" practical and concrete, and they've given rise to broader applications yielding transformative impact across an entire enterprise. Much like agile software development helps meet the challenge of producing an application

that is already obsolete when finally launched, enterprise agility helps solve the problem of an organization's strategies, resources, structures, and capabilities being obsolete by the time they're finally operational.

Organizing for urgency calls for organizing differently (Exhibit 2). The urgency imperative places a premium on agility: it enables the shift to emergent strategy, while unleashing your people so they can reshape your business in real time. It's also a powerful means of minimizing confusion and complexity in our world of rapid-fire digital communications where everyone can talk with everyone else—and will, gumming up the works if you don't have a sensible set of operating norms in place. Agility is also the ideal way to integrate the power of machine-made decisions, which are going to become increasingly important to your fundamental decision system.

Unleash decision making

In a competitive environment that's changing so rapidly and so profoundly, can any single individual keep up? Not in isolation, and certainly not from the top down. But the right kind of organization—one that taps into a network of individuals, recognizes the outperformance and resilience that a diverse workforce will provide, and deploys technology aggressively and purposefully—can.

To understand how, tap into your own decision system—the human brain—and consider how people actually decide. While neuroscientists can identify specific parts of the brain that are more active under certain circumstances, it's never the case that one discrete neuron, alone, is determinative. Rather, intelligence is an emergent property of the whole system, and every person's "decision system" is a network of multiple, small, iterative processes honed naturally over time.

That's not to say all decisions are created equal; they are anything but, and a failure to categorize often contributes to inefficient or ineffective decision making. In our experience, the best way to understand decisions is to conceive of them as part of a four-category taxonomy. The highest level of decision making, we'd submit, comprises the decisions about how to decide. Call this meta–decision making "greenhouse design." It involves choosing the foundational elements—the structures, governance arrangements, and processes—that define how your organization operates and reflect its core value proposition. This platform, in turn, supports looser, more dynamic elements that can be adapted quickly in the face of new challenges and opportunities. The CEO is absolutely essential for this organizational

Exhibit 2

Organizing for urgency calls for organizing differently.

	From	To
Urgency		
Worship speed	Making a decision when you have 90% of the information	Making a decision once you have 70% of the information
Shift to emergent strategy	Setting your objective as a predicted outcome	Realizing your objective is a relentless, purposeful pursuit of value creation
Agility		
Unleash decision making	Imposing decisions from the top down	Encouraging real-time decisions at the edges of your organization
Reimagine your structure	Maintaining a hierarchical chain of command, with decision-making authority coupled to control	Creating a flatter organization and decoupling title or rank from day-to-day control
Capability		
Personalize talent programs	Offering generalized training for the "average" employee	Customizing training for the individual, in part by using advanced analytics
Rethink your leadership model	Elevating charismatic leaders who get results by force	Recognizing that leadership can come from anyone, regardless of title, and is earned, not appointed
Identity		
Adopt a recipe to run the place	Sampling strategy à la carte from a wide array of approaches and methodologies	Sticking to a strategic prix fixe to select the one approach that best matches how you create value
Cultivate purpose, values, and social connection	Conceiving of your organization as a collection of roles and processes	Aligning the individuals in your enterprise around common principles

"platform definition," which is why some leading executives describe themselves as "gardeners," "city planners," or "architects," rather than "operators" or even "strategists."

The second category of decision making is "big-bet decisions." These infrequent and high-risk decisions have the potential to shape the future of your company. Examples include major acquisitions and game-changing capital investments—both high stakes and inherently risky. Organizations that do well in this decision category focus not only on debiasing but also on designating a single executive sponsor, atomizing decision components into identifiable and more easily solvable parts, standardizing a decision-making approach, and moving as fast as possible. Time, after all, is of the essence.

Less conspicuous but still high stakes are determinations in a third category: "cross-cutting decisions." These often look like big decisions but are actually a series of smaller, interconnected choices made by different groups and individuals as part of a collaborative, end-to-end decision process. Such decisions include pricing, sales and operations planning (S&OP), new-product launches, and portfolio management. These types of determinations are necessarily cross-functional and often highly iterative. The challenge is to bring together multiple parties who often have different priorities, so they can provide the right input at the right time, without bureaucratic watering down.

The final category is made up of determinations that are pushed out to the edges of your organization. These are the "delegated decisions" and "ad hoc decisions." Delegated decisions are high frequency and low risk (in other words, even if long-term impact is high, bad decisions can be undone or corrected long before significant consequences arise). They can be handled effectively by an individual or a small natural working team, with limited input from other parts of the organization. Such decisions also increasingly can be delegated to algorithms (think instant recommendations on YouTube or route planning at UPS). Ad hoc decisions are less frequent but still low stakes; they arise unexpectedly, but frontline employee judgment should be supported by more senior managers through an ethos that Jeff Bezos calls "disagree and commit" and Zappos's Tony Hsieh encourages as "safe enough to try."

Reimagine your structure

The more interconnected your organization, and the more that decision making can be diffused, the easier it will be to sustain high performance in a world of uncertainty, speed, and disruption. Accelerating, unpredictable,

and shifting currents of information are precisely *not* what a tall command chain is designed to confront, especially in a turbulent external environment. Those dynamics can render your firm's advantages in numbers, tools, and training irrelevant. That's a key reason why even the most hierarchical chain of command—the US military—moved to decentralize decision authority to help beat back Al Qaeda's Iraqi-based forces.[2]

Of course, hierarchies will continue to exist, and it's right that certain functions (think risk management, legal, treasury) should be centralized. In a world growing more complex by the moment, there are compelling reasons for strata of specializations and subspecializations—the very sort of dedicated expertise that should be teamed for what we've described earlier as cross-cutting decisions. "Flattening," without more, is not a comprehensive fix.

What does work is to free your initiatives and decisions from the constraining hands of *unnecessary* hierarchy. While some level of prioritization and resource allocation must be coordinated centrally, many actions and decisions are best taken where the work is done at the front line, close to the customer. To pull that off, eliminate superfluous management levels, decouple decisions from control, and let go.

That calls for getting serious about letting your sensors, machine and human, work their shared mojo as information providers and decision makers. The human element is not a feel-good add-on. Winning organizations—from the 2017 World Series Champion Houston Astros, who value player "heart" and talent-evaluator intuition, to Zappos, whose passionate customer-service agents have cultivated a passionately loyal customer base—are analytics powerhouses, but they rely on inspired individuals to outpace the competition. These organizations have also figured out that flatter makes it much easier to operate in agile ways, to speed information along, and to integrate disparate sources of it in ways that boost the odds of making decisions that serve the interests of the company as a whole, not just of isolated, self-interested cells.

CAPABILITY

In order to operate with urgency and pursue the agility that makes high performance possible, you're likely going to have to fill some serious capability gaps along the way. What's more, many of the critical skills your people need—as individuals, team members, and leaders—are changing rapidly as a result of workplace automation and AI. As less complex work becomes increasingly

[2] General Stanley McChrystal, Tantum Collins, David Silverman, and Chris Fussell, *Team of Teams: New Rules of Engagement for a Complex World*, New York, NY: Portfolio, 2015.

automated, workers will need to be able not just to perform in concert with machines but also to adapt to uncertainty. And the more that information-rich tools are used (and the more effective they become), the harder it will be to achieve the proper balance between person and machine—a challenge that amplifies, in turn, the importance of continuous learning, employee development, and consistent leadership.

Personalize talent programs

When direction comes primarily from "the boss," your company will need more bosses to keep on course. That's one reason so many organizations are too tall and bureaucratic. But if capabilities bubble up from within, and learning is personalized for individuals and not the masses, employees can act more urgently and, usually, more effectively.

Fortunately, organizations are gaining new tools—especially in people analytics—that will enable them to manage and develop their people with greater precision than ever before. Examples include a fast-food restaurant chain that, after extensive testing, was able to identify and teach behaviors that would inspire colleagues; rigorous research and statistical analyses used by Alphabet to inform (but not replace) its engineers' human judgment about people decisions; and, in the case of one insurer, identifying which employees would benefit most from which types of learning opportunities.

Rethink your leadership model

Central to talent development is a company's leadership model. Leadership can come from anyone, not just from those in positions of formal authority. Think about your own firm: sometimes an employee can be a leader and sometimes a follower, because while no one employee knows everything, many are likely at the leading edge of *something*. What's more, leaders in agile organizations lead less by control than by influence. In one workshop we frequently

conduct, we ask executives how they would solve a given issue. Most are direct—they identify the problem and then fix it. A smaller group will drill down to the problem's root cause and fix that instead. Only a very few take a more holistic approach; they consider how to create the conditions in which an ecosystem can be largely self-managing, where individuals and tools can learn and problems can be avoided before they manifest.

This, we believe, is what the urgency and uncertainty of the competitive future will demand. The traditional model of a charismatic leader who gets results by force of will has long proved expensive and is fast becoming outdated. Leaders should strive, instead, to empower the organization as a whole, to be felt but not seen, to be inspiring but not indispensable—and not to insist that everyone else should be just like them. Such leadership rests on the ability to adapt and on congruence with the essence of your organization.

IDENTITY

All of which leads into a fundamental challenge for urgency: If you build this kind of "control light" organization, and it's moving that fast—how do you keep your bullet train from running off the rails? Our research shows that speed needs to be channeled into stable processes, tasks, and roles if you're going to stay healthy as you move quickly. Realistically, lots of those sources of stability are going to get upended by workplace automation, as we've noted before. As well, operating with the urgency and agility we're describing, and overhauling organizational capabilities constantly to keep and exceed competitive pace, can seem unsettling. And resource reallocation plainly changes people's lives. It's hard, therefore, to keep your organization pulling together when there's so much ambiguity, so much shifting around, and too little sense of why.

As digitization, advanced analytics, and AI sweep across industries and geographies, they aren't just reshaping the competitive landscape; they're redefining the organizational imperative: adapt or die.

Adopt a recipe to run the place

While there's no pat answer to this uncertainty, following a clear recipe is an effective way to start. By its very definition, a recipe is a defined set of conditions and constraints. In siloed firms, one sees a wide array of processes and practices, executed in dramatically different fashion across the organization (and sometimes within the same silo). It makes for an incongruous hash, with ingredients from management books over the last 20 years—a pinch of this and a dash of that.

By contrast, the healthiest firms—those most capable of sustaining performance and renewing over time—have a much simpler approach: they don't sample à la carte. Our research shows that four distinct recipes are particularly effective, and having the discipline to stick with any one of them is critical. In fact, organizational discipline is one of the foundations of both corporate health and operational performance.

Nor are "health" and "operational results" binary choices. To keep from losing their way, organizations must prioritize both at all times. That adds up to a virtuous cycle that accelerates and enhances performance, even for fairly mundane initiatives such as squeezing a bit more margin from better pricing or lowering costs through more effective procurement. It also helps ground the company and the people who comprise it, even in times of momentous change.

Cultivate purpose, values, and social connection

If you conceive of your organization as more than just a collection of roles and processes, you'll be far more prepared for the uncertainty ahead. Aligning around common principles is a large part of what an organization of the future is all about: participants making decisions under defined rules of engagement, collaborating to create value, and earning the credibility to lead rather than having "leadership" be imposed from on high.

Employees reach higher when their energies are channeled toward a higher purpose. Because different people find inspiration from different sources, it takes range to strike a chord that will resonate with almost everyone. Smart organizations hit every note—and mean it. That calls for walking the talk in, among other areas, race and gender diversity, social impact, and diversity of political expression. Some employees are most inspired by personal development (and, it must be said, monetary compensation); others find passion in objectives geared more toward their working team, the company as a whole, its customers, and even society at large. Cultivating purpose requires

you to sharpen your organization's sense of mission and strengthen your employees' social connection.

There's an old quip that "everybody talks about the weather, but nobody does anything about it." With reorganizations, it's too often the reverse: everybody does a reorg, but nobody likes to talk about it. That's because reorganizations are hard to get right, distract everybody from senior leadership on down, and have real consequences for meeting investor expectations. And even if you're game for continual top-down revisions, mantras such as "The only constant around here is change!" run the risk of bewildering employees.

Ironically, shifting to urgency can stave off the ceaseless reorganization cycling. In the face of today's massive disruptions, an ethos of urgency actually serves to smooth gyrations between "hurry up" and "settle in." Of course, urgency alone can also be a recipe for dysfunction. But combine urgency with agility, capability, and identity, and you've got an organization that can play fast and long. The future will be both. Q

Aaron De Smet is a senior partner in McKinsey's Houston office, and **Chris Gagnon** is a senior partner in the New Jersey office.

Data as jet fuel: An interview with Boeing's CIO

It isn't always comfortable, but data analytics is helping Boeing reach new heights.

Boeing CIO Ted Colbert is something of an evangelist for the power of data analytics. He recently spoke with McKinsey's Aamer Baig about how he has been spreading the word within Boeing, and why even companies overflowing with analytical talent sometimes have to work hard to reap its full rewards.

The *Quarterly*: *Does a company like Boeing, renowned for its engineering prowess, have a head start when it comes to harnessing the power of data analytics?*

Ted Colbert: To some extent, yes. We have a company full of engineers, mathematicians, scientists, and statisticians who achieve amazing things. And data analytics is certainly not a new field to the company. When I first started to raise its growing importance, we probably had about 800 people we could classify as data scientists, which was a great start. But when we started to ask how data driven our decisions were, whether we really used the insights we had to drive productivity and the capabilities of the company, we quickly discovered there was much more we could be doing.

For example, we'd been using data-science capabilities to improve maintenance decisions for a decade. But we hadn't been pulling data from the factory floor to understand how well Boeing's production system was working. Take the 787. I visited our factory in Everett [Washington] at a time when we were under pressure to improve productivity. I wanted to better understand how the mechanics worked. I was told, quite reasonably, that they followed processes that are documented in a procedures manual, and everything anyone did was logged in a system, as required for certification. We took a more concerted effort to find improvements for factory-floor disruption, such as mechanics spending a quarter of their time identifying parts, plans, and tools to start their jobs.

At first, many people told me there was nothing new in what I was saying about data analytics. "We already do that," was the common response. It's only when you can produce these kind of proof points in areas that matter that the light comes on for people—when they are under pressure to drive margins, for example, but realize that the playbook they've been using for years just doesn't deliver anymore. It changes the mind-set. People come to understand that there is a ton of richness trapped below all the capability that already exists in the company.

Getting to that understanding isn't always a comfortable journey. For example, we wove together about 13 systems to show how much inventory was sitting in our systems that didn't have a demand pull. In a company our size, you might expect it to be worth tens of millions of dollars. But we found it added up to hundreds of millions of dollars. That made a few people very uneasy, and their first instinct was to dispute the data. Let's face it, when you highlight this kind of stuff, you are highlighting the need for cultural change. But Boeing is a 100-year-old company, and I don't see my role as one of simply reinforcing how great it is. Rather, it's to figure out where truth lies in data that will help us flourish for the next 100 years.

The *Quarterly*: *How do you move from demonstrating data analytics' power in a handful of projects, to embedding it across a company the size of Boeing?*

Ted Colbert: Demand for data-analytics resources mushrooms as you demonstrate its value. At one time, we had over 100 data-analytics projects in the queue related to improving productivity, be it in design, engineering, manufacturing, or product support. But you have to be very strategic and deliberate about how to scale up. On the one hand, you have to build

momentum with a portfolio of projects—some small, some medium-size, and a few in bigger, important areas. At the same time, you have to think long term. The portfolio might yield tens of millions of dollars here, and maybe a couple hundred million there—and you still could be only scratching the surface. Analytics will take billions off the bottom line if you figure out how people across the entire organization can grasp the opportunity—and how to democratize the capability.

That can be tricky, because what you don't want is people trying to go create their own data platforms all over the place. It's that fragmentation that went wrong in the IT world 20 years ago and that makes it so hard today to get at data. So you need to keep working on projects that prove the power of data analytics and at the same time, in the background, plan the foundational architecture and work toward a common platform. That platform will eventually allow you to stratify data-analytics work. You can still put the most expensive, smartest data scientists on the biggest problems, but you have unleashed the power of the platform to one and all.

The *Quarterly*: *A high-performing digital culture is one that is agile, that can move quickly to embrace technological developments, all the while testing new ideas and products and services, and learning in the process. How do you square that with the way of working at a company like Boeing, whose products take decades to develop?*

Ted Colbert: It's a fundamental issue. Boeing's DNA is built around a long business cycle and one that puts safety first. So whether you are developing airplanes, fighter jets, or satellites, progress can be barely perceptible, like a giant cog rotating. Digital developments, on the other hand, are tiny cogs, moving 100 times faster. My job is to make sure both function together—that the smaller cogs don't break the big one. Often that means isolating our "fail fast" activities.

Boeing's services business is essentially a digital business, and it's often a better place to learn than our commercial and defense businesses. If we give our engineers and other people an opportunity to work there, it will help move the culture forward. Ultimately you *can* introduce agile ways of working and speed up processes even for products that are as complex and important as ours—and the result will be a better product. But it helps to begin with things that are far away from that big cog and work our way toward it over time.

There is another level of complication for us, too. At Boeing, we start designing new products decades in advance. We don't continuously roll out new ones that can be tweaked with our latest know-how. Let's say we're looking ahead to a new plane we're likely to build in two or three decades' time. The engineers would want to know, today, the efficiency-enhancing tools that would be available in order to build their business case for the plane. I can't just say, "Trust me, we'll be using machine learning in the design process." No one can sign up to big productivity gains if there is any doubt they will materialize. It would destroy the whole cost and sales model.

We can't completely solve this. It comes back to proof points. So we are setting up a series of what we call pathfinders that will demonstrate data analytics' worth. These bring data-analytic capabilities and agile ways of working to bear on mature production programs such as the 737, where we need to raise the rate of production, and the 787, where there's an opportunity for additional margin expansion. This is the only way we are going to get buy-in to future programs.

TED COLBERT

Vital statistics

Born in 1974
Married, with 2 children

Education

Completed the Dual Degree Engineering Program at the Georgia Institute of Technology and Morehouse College with degrees in industrial and systems engineering and interdisciplinary science

Career highlights

Boeing
(2009–present)

Senior vice president and CIO
(2016–present)

Chief information officer
(2013–present)

Citigroup
(2007–09)
Senior vice president of enterprise architecture

Ford Motor Company
Spent 11 years with the company's information-technology organization

Fast facts

Serves on the board of directors for the Thurgood Marshall College Fund

Received the 2017 Morehouse College Bennie Service Award for Excellence in Business and the 2016 National Society of Black Engineers Golden Torch Legacy Award

The *Quarterly*: *Has Boeing's hiring culture changed? Traditionally, Boeing's senior managers have been internal promotions—people who have been with the company throughout their careers. Is that model still tenable?*

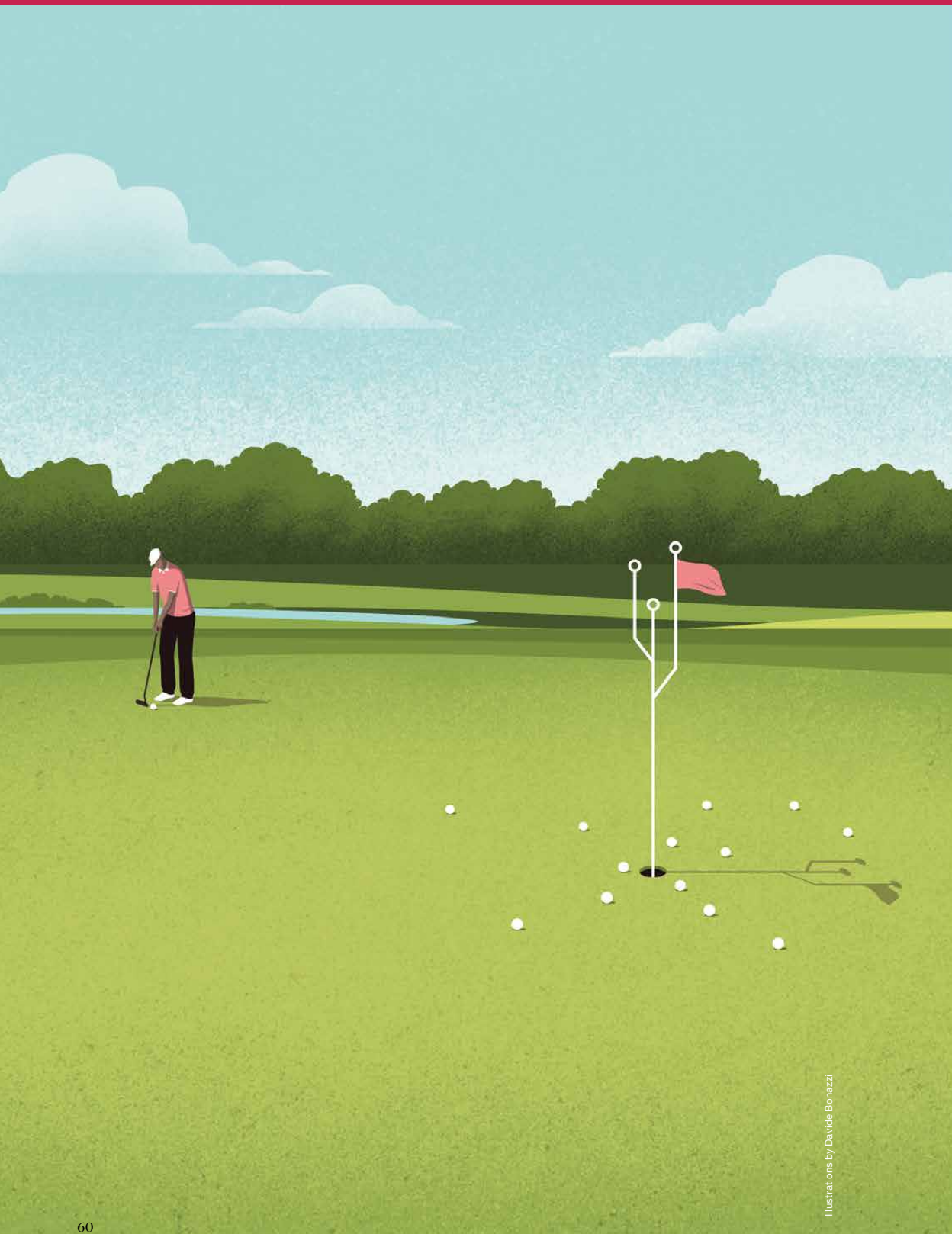
Ted Colbert: What keeps me awake at night is whether we have the right talent. On one of our projects, I simply couldn't find someone on the business side who understood all the end-to-end processes well enough to deliver. So you absolutely have to build the skills of the people who know Boeing well, who have so much expertise. And if you want them to work differently, you also have to build credibility with them. Many have been around for 20 or 30 years. That can be hard for people like myself from outside the industry—I came via the car industry and banking. We do the usual things like trips to Silicon Valley to demonstrate different working environments. But fundamentally, the only way to change minds is to prove that there's value in doing things differently.

The *Quarterly*: *What would success look like for you in a couple of years?*

Ted Colbert: Reaching escape velocity! By that I mean that I don't want to find myself pushing as hard as I've been pushing the last couple years for changing the way we work. If that were the case, gravity would still be pulling us back toward the status quo. I want to be a catalyst for change. I want to have established the foundational capabilities that will help senior business leaders harness the power of digital analytics to better deliver on their objectives. Then I can step back and watch take-off. Q

Ted Colbert is the CIO of Boeing. This interview was conducted by **Aamer Baig,** a senior partner in McKinsey's Chicago office.

REACHING FOR THE DIGITAL PRIZE



Illustrations by Davide Bonazzi

In this package

Why digital strategies fail

Most digital strategies don't reflect how digital is changing economic fundamentals, industry dynamics, or what it means to compete. Companies should watch out for five pitfalls.

by Jacques Bughin, Tanguy Catlin, Martin Hirt, and Paul Willmott

The processing power of today's smartphones are several thousand times greater than that of the computers that landed a man on the moon in 1969. These devices connect the majority of the human population, and they're only ten years old.[1]

In that short period, smartphones have become intertwined with our lives in countless ways. Few of us get around without the help of ridesharing and navigation apps such as Lyft and Waze. On vacation, novel marine-transport apps enable us to hitch a ride from local boat owners to reach an island. While we're away, we can also read our email, connect with friends back home, check to make sure we turned the heat down, make some changes to our investment portfolio, and buy travel insurance for the return trip. Maybe we'll browse the Internet for personalized movie recommendations or for help choosing a birthday gift that we forgot to buy before leaving. We also can create and continually update a vacation photo gallery—and even make a few old-fashioned phone calls.

Then we go back to work—where the recognition and embrace of digital is far less complete. Our work involves advising the leaders of large

[1] Early versions of the smartphone date to the mid-1990s, but today's powerful, multipurpose devices originated with the iPhone's launch, in 2007.

organizations. And as we look at this small device and all the digital change and revolutionary potential within it, we feel the urge to send every CEO we know a wake-up call. Many think that having a few digital initiatives in the air constitutes a digital strategy—it does not. Going forward, digital strategy needs to be a heck of a lot different from what they have today, or they're not going to make it.

We find that a surprisingly large number underestimate the increasing momentum of digitization, the behavioral changes and technology driving it, and, perhaps most of all, the scale of the disruption bearing down on them. Many companies are still locked into strategy-development processes that churn along on annual cycles. Only 8 percent of companies we surveyed recently said their current business model would remain economically viable if their industry keeps digitizing at its current course and speed.

How can this be, at a moment when virtually every company in the world is worried about its digital future? In other words, *why* are so many digital strategies failing? The answer has to do with the magnitude of the disruptive economic force digital has become and its incompatibility with traditional economic, strategic, and operating models. This article unpacks five issues that, in our experience, are particularly problematic. We hope they will awaken a sense of urgency and point toward how to do better.

PITFALL 1: FUZZY DEFINITIONS

When we talk with leaders about what they mean by digital, some view it as the upgraded term for what their IT function does. Others focus on digital marketing or sales. But very few have a broad, holistic view of what digital really means. We view digital as the nearly instant, free, and flawless ability to connect people, devices, and physical objects anywhere. By 2025, some 20 billion devices will be connected, nearly three times the world population. Over the past two years, such devices have churned out 90 percent of the data ever produced. Mining this data greatly enhances the power of analytics, which leads directly to dramatically higher levels of automation—both of processes and, ultimately, of decisions. All this gives birth to brand-new business models.[2] Think about the opportunities that telematics have created for the insurance industry. Connected cars collect real-time information about a customer's driving behavior. The data allow insurers to price the risk associated with a driver automatically and more accurately, creating an opportunity to offer direct, pay-as-you-go coverage and bypassing today's agents.

[2] See Andrew McAfee and Erik Brynjolfsson, *Machine, Platform, Crowd: Harnessing Our Digital Future*, New York, NY: W. W. Norton & Company, 2017.

Lacking a clear definition of digital, companies struggle to connect digital strategy to their business, leaving them adrift in the fast-churning waters of digital adoption and change. What's happened with the smartphone over the past ten years should haunt you—and no industry will be immune.

PITFALL 2: MISUNDERSTANDING THE ECONOMICS OF DIGITAL

Many of us learned a set of core economic principles years ago and saw the power of their application early and often in our careers. (For more on the changing economics of digital competition, see the infographic on pages 66–67.) This built intuition—which often clashes with the new economic realities of digital competition. Consider these three:

Digital is destroying economic rent

One of the first concepts we learned in microeconomics was economic rent—profit earned in excess of a company's cost of capital. Digital is confounding the best-laid plans to capture surplus by creating—on average—more value for customers than for firms. This is big and scary news for companies and industries hoping to convert digital forces into economic advantage. Instead, they find digital unbundling profitable product and service offerings, freeing customers to buy only what they need. Digital also renders distribution intermediaries obsolete (how healthy is your nearest big-box store?), with limitless choice and price transparency. And digital offerings can be reproduced almost freely, instantly, and perfectly, shifting value to hyperscale players while driving marginal costs to zero and compressing prices.

Competition of this nature already has siphoned off 40 percent of incumbents' revenue growth and 25 percent of their growth in earnings before interest and taxes (EBIT), as they cut prices to defend what they still have or redouble their innovation investment in a scramble to catch up. "In-the-moment" metrics, meanwhile, can be a mirage: a company that tracks and maintains its performance relative to its usual competitors seems to be keeping pace, even as overall economic performance deteriorates.

There are myriad examples where these dynamics have already played out. In the travel industry, airlines and other providers once paid travel agents to source customers. That all changed with the Internet, and consumers now get the same free services that they once received from travel agents anytime, anyplace, at the swipe of a finger—not to mention recommendations for hotels and destinations that bubble up from the "crowd" rather than experts. In enterprise hardware, companies once maintained servers, storage, application services, and databases at physical data centers. Cloud-service offerings from Amazon, Google, and Microsoft, among others, have made

it possible to forgo those capital investments. Corporate buyers, especially smaller ones, won because the scale economies enjoyed by these giants in the cloud mean that the all-in costs of buying storage and computing power from them can be less than those incurred running a data center. Some hardware makers lost.

INSURANCE
GETTING A BETTER GRIP ON CONSUMER SURPLUS

If you set a digital strategy without focusing squarely on the potential for customers to reap massive gains, you are likely to be blindsided. Consider the insurance sector, where digital competitors are poised to disintermediate agents and, at the same time, intensify competition with lower prices and higher levels of service. One major insurer is fighting back by writing and marketing its own digital policies. This entails risks, starting with the alienation of agencies that have traditionally distributed its products. But the insurer strongly believes that smart digital approaches will enable better pricing and superior customer experience compared with that currently received from agents, and it sees no reason to cede this battlefield to someone else.

The lesson from these cases: Customers were the biggest winners, and the companies that captured the value that was left were often from a completely different sector than the one where the original value pool had resided. So executives need to learn quickly how to compete, create value for customers, and keep some for themselves in a world of shrinking profit pools.

Digital is driving winner-takes-all economics

Just as sobering as the shift of profit pools to customers is the fact that when scale and network effects dominate markets, economic value rises to the top. It's no longer distributed across the usual (large) number of participants. (Think about how Amazon's market capitalization towers above that of other retailers, or how the iPhone regularly captures over 90 percent of smartphone industry profits.) This means that a company whose strategic goal is to maintain share relative to peers could be doomed—unless the company is already the market leader.

A range of McKinsey research shows how these dynamics are playing out. At the highest level, our colleagues' research on economic profit distribution highlights the existence of a power curve that has been getting steeper over the past decade or so and is characterized by big winners and losers at the top and bottom, respectively (see "Strategy to beat the odds," on page 30). Our research on digital revenue growth, meanwhile, shows it turning sharply

negative for the bottom three quartiles of companies, while increasing for the top quartile. The negative effects of digital competition on a company's growth in earnings before interest, taxes, depreciation, and amortization (EBITDA), meanwhile, are twice as large for the bottom three-quarters of companies as for those at the top.

A small number of winners—often in high tech and media—are actually doing better in the digital era than they were before. They marshal huge volumes of customer data drawn from their scale and network advantages. That triggers a virtuous cycle in which information helps identify looming threats and the best partners in defending value chains under digital pressure. In this environment, incumbents often find themselves snared in some common traps. They assume market share will remain stable, that profitable niches will remain defendable, and that it's possible to maintain leadership by outgrowing traditional rivals rather than zeroing in on the digital models that are winning share.

JOHN DEERE
STAYING AHEAD OF THE DIGITAL THREATS

Farming-equipment manufacturer John Deere is responding to the potential for digital entrants to sweep up value as sensors, data analytics, and artificial intelligence boost farming productivity beyond what has been feasible previously. That could commoditize farming "hardware" such as tractors and harvesting equipment. John Deere is trying to stay ahead of this shift by creating a data-driven service business that collects soil samples and analyzes weather patterns to help farmers optimize crop yields. Sensors in tractors and other machinery provide data for predictive maintenance; automated sprinkler systems sync up with weather data; and an open-software platform lets third parties build new service apps. As the company's chairman and chief executive officer, Samuel R. Allen, told shareholders recently, "Precision agriculture may evolve to a point that farmers will be able to monitor, manage, and measure the status of virtually every plant in the field."

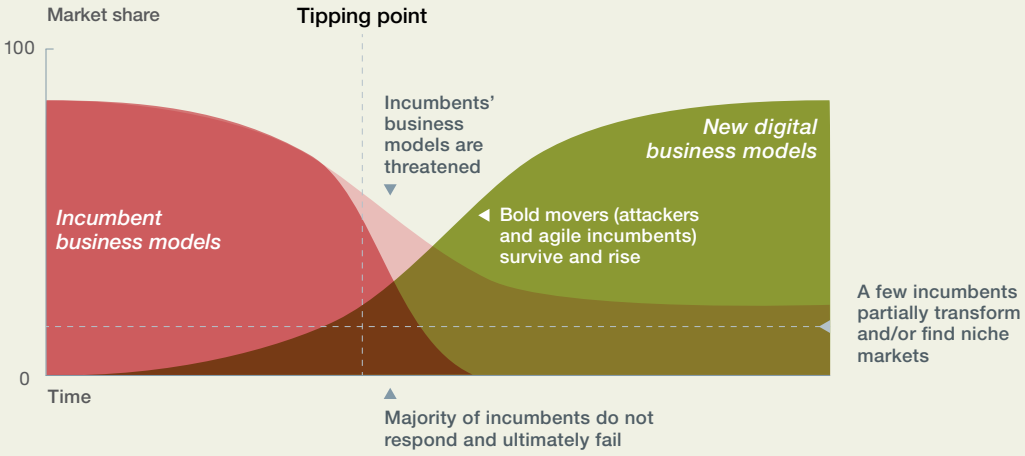
Although still in the early days, the company's moves position it to lead in the new business of data-enabled agriculture while differentiating its traditional products and services.

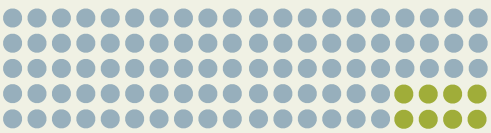
This phenomenon of major industry shakeouts isn't new, of course. Well before digital, we saw industry disruptions in automobiles, PC manufacturing, tires, televisions, and penicillin. The number of producers typically peaked, and then fell by 70 to 97 percent.[3] The issue now is that digital is causing such disruptions to happen faster and more frequently.

[3] Boyan Jovanovic and Glenn M. MacDonald, "The life cycle of a competitive industry," *The Journal of Political Economy*, April 1994, Volume 102, Number 2, pp. 322–47.

Don't underestimate how digital disrupts the nature of competition.

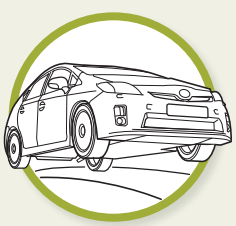
Disruption is always dangerous, but digital disruptions are happening faster than ever.





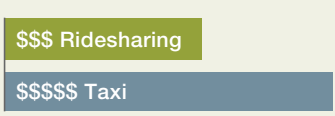
8% of companies believe their business model will remain economically viable through digitization

Digital competition shrinks value. Customers win, and companies lose. Products/services become obsolete, and value pools consolidate.



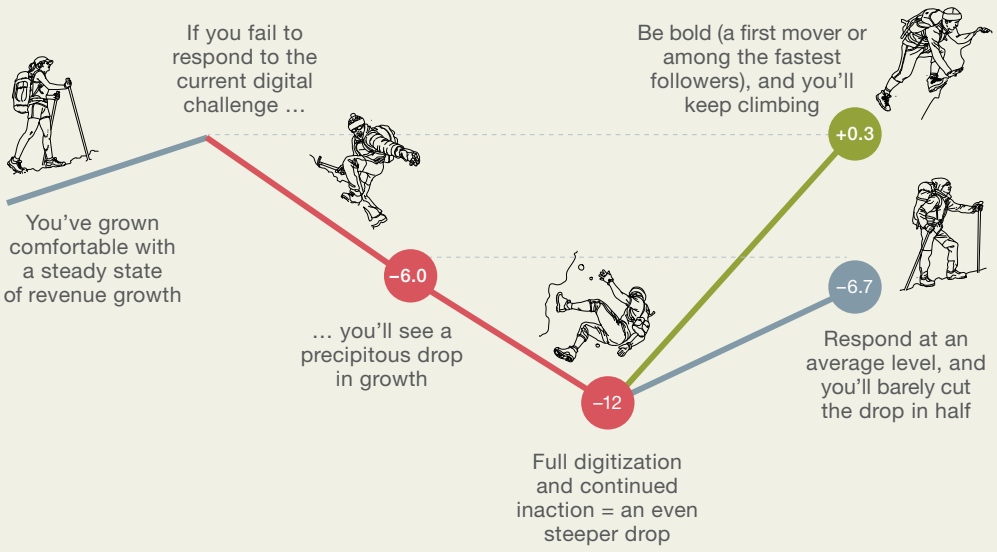
A ridesharing service is 40% cheaper than a regular cab for a 5-mile trip into Los Angeles

When was the last time you used a travel agent, bought a GPS device, or carried a point-and-shoot camera separate from your phone?

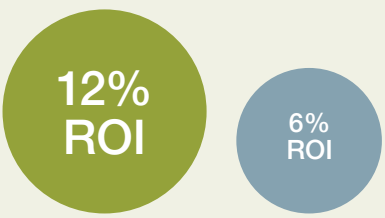


Growth rates will plummet. To survive, companies must be first movers …

Percentage-point change in 3-year revenue growth



… and the payoff will go to those who move boldly.



Play in new sectors or compete in new digital ways

Invest in digital to protect your core

Winners will think in terms of ecosystems.

By 2025, almost a third of total global sales will come from **ecosystems.**

! Companies need to change where and how they play—by creating their own network or by partnering with companies within and beyond industry borders.

Source: McKinsey Digital Global Survey, 2016 and 2017; McKinsey analysis

Digital rewards first movers and some superfast followers

In the past, when companies witnessed rising levels of uncertainty and volatility in their industry, a perfectly rational strategic response was to observe for a little while, letting others incur the costs of experimentation and then moving as the dust settled. Such an approach represented a bet on the company's ability to "outexecute" competitors. In digital scrums, though, it is first movers and *very* fast followers that gain a huge advantage over their competitors. We found that the three-year revenue growth (of over 12 percent) for the fleetest was nearly twice that of companies playing it safe with average reactions to digital competition.

Why is that? First movers and the fastest followers develop a learning advantage. They relentlessly test and learn, launch early prototypes, and refine results in real time—cutting down the development time in some sectors from several months to a few days. They also scale up platforms and generate information networks powered by artificial intelligence at a pace that far outstrips the capabilities of lower-pulsed organizations. As a result, they are often pushing ahead on version 3.0 or 4.0 offerings before followers have launched their "me too" version 1.0 models. Early movers embed information across their business model, particularly in information-intensive functions such as R&D, marketing and sales, and internal operations. They benefit, too, from word of mouth from early adopters. In short, first movers gain an advantage because they can skate to where the puck is headed.

How Tesla captured first-mover value in electric vehicles offers a lesson in the discomfiting effects of a wait-and-see posture. Four years ago, incumbent automakers could have purchased Tesla for about $4 billion. No one made the move, and Tesla sped ahead. Since then, companies have poured money into their own electric-vehicle efforts in a dash to compete with Tesla's lead in key dimensions. Over the past two years alone, competitors have spent more than $20 billion on sensor technologies and R&D.

PITFALL 3: OVERLOOKING ECOSYSTEMS

Understanding the new economic rules will move you ahead, but only so far. Digital means that strategies developed solely in the context of a company's industry are likely to face severe challenges. Traditional approaches such as tracking rivals' moves closely and using that knowledge to fine-tune overall direction or optimize value chains are increasingly perilous.

Industries will soon be ecosystems

Platforms that allow digital players to move easily across industry and sector borders are destroying the traditional model with its familiar lines of sight.

BMW AND QANTAS
MEETING THE NEED FOR SPEED

In an industry where long product life cycles have been the norm, BMW has moved from an annual model cycle to one with continual improvements throughout the year. This has helped it to learn and apply digital and other technology advances at a faster pace than that of some competitors that have stayed with traditional cycle times. "All aspects of our products—whether design, handling, or everyday usage—will be modeled more closely than ever before on the customer's needs," Klaus Fröhlich, BMW's board of management member responsible for development, noted recently.

Moving fast sometimes necessitates competing with oneself. Anticipating increased cost pressures and a faster competitive landscape as the pace of digitization in travel and tourism progressed, Qantas Airways launched its stand-alone lower-fare Jetstar. Intensive use of digital technology in booking, app-based loyalty programs, automated check-in, and baggage service, as well as digitization in other service and operations arenas, prompted the creation of the Jetstar brand, which is differentiated by lower fares and a better customer experience.

To speed up its response time and disrupt (rather than follow) the industry, Qantas was open to cannibalizing its flagship brand. Today, Jetstar's margins on its earnings before interest and taxes (EBIT) exceed those of the Qantas brand.

Grocery stores in the United States, for example, now need to aim their strategies toward the moves of Amazon's platform, not just the chain down the street, thanks to the Whole Foods acquisition. Apple Pay and other platform-cum-banks are entering the competitive set of financial institutions. In China, Tencent and Alibaba are expanding their ecosystems. They are now platform enterprises that link traditional and digital companies (and their suppliers) in the insurance, healthcare, real-estate, and other industries. A big benefit: they can also aggregate millions of customers across these industries.

How ecosystems enable improbable combinations of attributes

Can you imagine a competitor that offers the largest level of inventory, fastest delivery time, greatest customer experience, and lower cost, all at once? If you think back to your MBA strategy class, the answer would probably be no. In the textbook case, the choice was between costlier products with high-quality service and higher inventory levels or cheaper products with lower service levels and thinner inventories. Digital-platform and -ecosystem economics upend the fundamentals of supply and demand. In this terrain, the best companies have the scale to reach a nearly limitless customer

base, use artificial intelligence and other tools to engineer exquisite levels of service, and benefit from often frictionless supply lines. Improbable business models become a reality. Facebook is now a major media player while (until recently) producing no content. Uber and Airbnb sell global mobility and lodging without owning cars or hotels.

This will all accelerate. Our research shows that an emerging set of digital ecosystems could account for more than $60 trillion in revenues by 2025, or more than 30 percent of global corporate revenues. In a world of ecosystems, as industry boundaries blur, strategy needs a much broader frame of reference. CEOs need a wider lens when assessing would-be competitors—or partners. Indeed, in an ecosystem environment, today's competitor may turn out to be a partner or "frenemy." Failure to grasp this means that you will miss opportunities and underplay threats.

While it's true that not all businesses are able to operate in nearly frictionless digital form, platforms are fast rewiring even physical markets, thus redefining how traditional companies need to respond. Look around and you will see the new digital structures collapsing industry barriers, opening avenues for cross-functional products and services, and mashing up previously segregated markets and value pools. With vast scale from placing customers at the center of their digital activity, ecosystem leaders have captured value that was difficult to imagine a decade ago. Seven of the top 12 largest companies by market capitalization—Alibaba, Alphabet (Google), Amazon, Apple, Facebook, Microsoft, and Tencent—are ecosystem players. What's not

INTUIT
BUILDING AN ECOSYSTEM BY ACQUISITION

Intuit began taking an ecosystem view of its markets when a strategic review showed that fintech start-ups had the potential to target its customers with digital products. The review also showed ways the company could flex its financial power and scale. Leadership decided to acquire new digital assets to expand beyond its existing small-business and tax products, in an effort to reach digitally adept consumers who were happy to use software apps to help manage their money as well as to get a reading on their overall financial health.

Three offerings—Mint (for consumers), QuickBooks (for small businesses), and TurboTax (for both)—have been integrated with one login, and the company offers banks the ability to integrate customer accounts with its products, allowing customers easier access to online bill paying.

encouraging is how far incumbents need to travel: our research shows that only 3 percent of them have adopted an offensive platform strategy.

PITFALL 4: OVERINDEXING ON THE 'USUAL SUSPECTS'

Most companies worry about the threats posed by digital natives, whose moves get most of the attention—and the disruptive nature of their innovative business models certainly merits some anxiety. Excessive focus on the usual suspects is perilous, though, because incumbents, too, are digitizing and shaking up competitive dynamics. And the consumer orientation of many digital leaders makes it easy to overlook the growing importance of digital in business-to-business (B2B) markets.

Digitizing incumbents are very dangerous

Incumbents are quite capable of self-cannibalizing and disrupting the status quo. In many industries, especially regulated ones such as banking or insurance, once an incumbent (really) gets going, that's when the wheels come off. After all, incumbents control the lion's share of most markets at the outset and have brand recognition across a large customer base. When they begin moving with an offensive, innovative strategy, they tip the balance. Digitization goes from being an incremental affair to a headlong rush as incumbents disrupt multiple reaches of the value chain. Digital natives generally zero in on one segment.

Our research confirms this. Incumbents moving boldly command a 20 percent share, on average, of digitizing markets. That compares with only 5 percent for digital natives on the prowl. Using another measure, we found that revved-up

TELEFÓNICA
LEVERAGING INCUMBENCY

After a wide-ranging strategic review, Telefónica saw that it was vulnerable to digital players that were offering mobile customers lower-cost plans and more flexible models. In an effort to meet the challenges, the company launched an independent "brownfield" start-up, giffgaff. Its hallmark was an online-first model for customer support that uses community-based digital forums to resolve customer queries. Incumbency offered an important advantage: one of the company's key assets was its O2 digital network, which provided resources and technical capabilities in support of giffgaff's innovative business model.

incumbents create as much risk to the revenues of traditional players as digital attackers do. And it's often incumbents' moves that push an industry to the tipping point. That's when the ranks of slow movers get exposed to life-threatening competition.

The B2B opportunity

The importance of B2B digitization, and its competitive implications, is easy to overlook because the digital shifts under way are less immediately obvious than those in B2C sectors and value chains. However, B2B companies can be just as disruptive. In the industries we studied, more B2B companies had digitized their core offerings and operations over the past three years than had B2C players. Digitizing B2B players are lowering costs and improving the reach and quality of their offerings. The Internet of Things, combined with advanced analytics, enables leading-edge manufacturers to predict the maintenance needs of capital goods, extending their life and creating a new runway for industrial productivity. Robotic process automation (RPA) has quietly digitized 50 to 80 percent of back-office operations in some industries. Artificial intelligence and augmented reality are beginning to raise manufacturing yields and quality. Meanwhile, blockchain's digitized verification of transactions promises to revolutionize complex and paper-intensive processes, with successful applications already cropping up in smart grids and financial trading. Should the opportunities associated with shifts like these be inspirational for incumbents? Threatening? The answer is both.

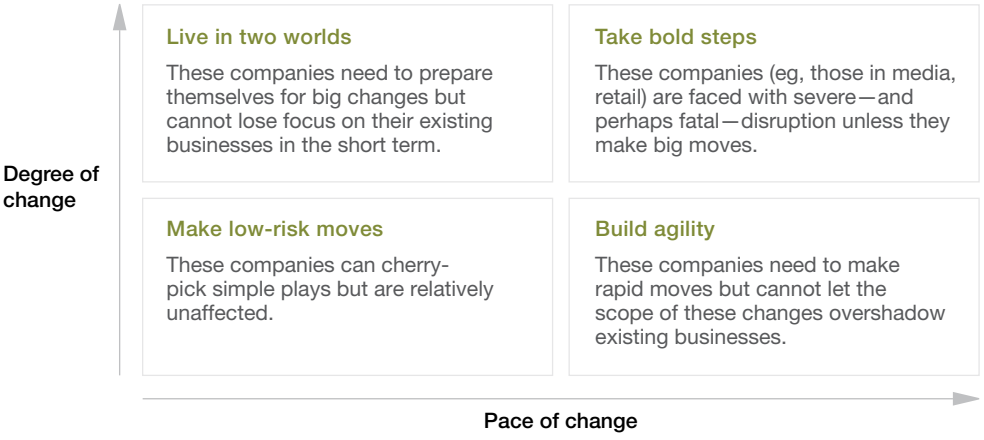
PITFALL 5: MISSING THE DUALITY OF DIGITAL

The most common response to digital threats we encounter is the following: "If I'm going to be disrupted, then I need to create something completely new." Understandably, that becomes the driving impetus for strategy. Yet for most companies, the pace of disruption is uneven, and they can't just walk away from existing businesses. They need to digitize their current businesses *and* innovate new models.

Think of a basic two-by-two matrix such as the exhibit on the following page, which shows the magnitude and pace of digital disruption. Where incumbents fall in the matrix determines how they calibrate their dual response. For those facing massive and rapid disruption, bold moves across the board are imperative to stay alive. Retail and media industries find themselves in this quadrant. Others are experiencing variations in the speed and scale of disruption; to respond to the ebbs and flows, those companies need to develop a better field of vision for threats and a capacity for more agile action. Keep in mind that transforming the core leads to much lower costs and

Exhibit

Since the extent and speed of disruption varies, companies will need to calibrate their response.



greater customer satisfaction for existing products and services (for example, when digitization shrinks mortgage approvals from weeks to days), thus magnifying the impact of incumbents' strategic advantages in people, brand, and existing customers and their scale over attackers.

Beyond this dual mission, companies face another set of choices that seems binary at first. As we have indicated, the competitive cost of moving too slowly puts a high priority on setting an aggressive digital agenda. Yet senior leaders tell us that their ability to *execute* their strategy—amid a welter of cultural cross-currents—is what they worry about most. So they struggle over where to place their energies—placing game-changing bets or remaking the place. The fact is that strategy and execution can no longer be tackled separately or compartmentalized. The pressures of digital mean that you need to adapt both simultaneously and iteratively to succeed.

Needless to say, the organizational implications are profound. Start with people. Our colleagues estimate that half the tasks performed by today's full-time workforce may ultimately become obsolete as digital competition intensifies.[4] New skills in analytics, design, and technology must be acquired to step up the speed and scale of change. Also needed are new roles such as a more diverse set of digital product owners and agile-implementation guides. And a central organizational question remains: whether to separate efforts to digitize core operations from the perhaps more creative realm of digital innovation.

[4] See "What the future of work will mean for jobs, skills, and wages," McKinsey Global Institute, November 2017, McKinsey.com.

While the details of getting this balance right will vary by company, two broad principles apply:

- *Bold aspiration.* The first-mover and winner-takes-all dynamics we described earlier demand big investments in where to play and often major changes to business models. Our latest research shows that the boldest companies, those we call *digital reinventors*, play well beyond the margins. They invest at much higher levels in technology, are more likely to make digitally related acquisitions, and are much more aggressive at investing in business-model innovation. This inspired boldness also turns out to be a big performance differentiator.

- *Highly adaptive.* Opportunities to move boldly often arise as a result of changing circumstances and require a willingness to pivot. The watchwords are failing fast and often and innovating even faster—in other words, learning from mistakes. Together they allow a nuanced sensing of market direction, rapid reaction, and a more unified approach to implementation. Adaptive players flesh out initial ideas through pilots. Minimum viable products trump overly polished, theoretical business cases. Many companies, however, have trouble freeing themselves from the mind-sets that take root in operational silos. This hinders risk taking and makes bold action difficult. It also diminishes the vital contextual awareness needed to gauge how close a market is to a competitive break point and what the disruption will mean to core businesses.

As digital disruption accelerates, we often hear a sense of urgency among executives—but it rarely reaches the level of specificity needed to address the disconnects we've described in the five aforementioned pitfalls. Leaders are far more likely to describe initiatives—"taking our business to the cloud" or "leveraging the Internet of Things"—than they are to face the new realities of digital competition head-on: "I need to develop a strategy to become number one, and I need to get there very quickly by creating enormous value to customers, redefining my role in an ecosystem, and offering new business-value propositions while driving significant improvement in my existing business."

Such recognition of the challenge is a first step for leaders. The next one is to develop a digital strategy that responds. While that's a topic for a separate article, we hope it's clear, from our description of the reasons many digital strategies are struggling today, that the pillars of strategy (where and how to

compete) remain the cornerstones in the digital era. Clearly, though, that's just the starting point, so we will leave you with four elements that could help frame the strategy effort you will need to address the hard truths we had laid out here.

First there's the *who*. The breadth of digital means that strategy exercises today need to involve the entire management team, not just the head of strategy. The pace of change requires new, hard thinking on *when* to set direction. Annual strategy reviews need to be compressed to a quarterly time frame, with real-time refinements and sprints to respond to triggering events. Ever more complex competitive, customer, and stakeholder environments mean that the *what* of strategy needs updating to include role playing, scenario-planning exercises, and war games. Traditional frameworks such as Porter's Five Forces will no longer suffice. Finally, the importance of strategic agility means that, now more than ever, the "soft stuff" will determine the *how* of strategy. This will enable the organization to sense strategic opportunities in real time and to be prepared to pivot as it tests, learns, and adapts. Q

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Why digital transformation is now on the CEO's shoulders

Big data, the Internet of Things, and artificial intelligence hold such disruptive power that they have inverted the dynamics of technology leadership.

by Thomas M. Siebel

When science and technology meet social and economic systems, you tend to see something akin to what the late Stephen Jay Gould called "punctuated equilibrium" in his description of evolutionary biology. Something that has been stable for a long period is suddenly disrupted radically—and then settles into a new equilibrium.[1] Analogues across social and economic history include the discovery of fire, the domestication of dogs, the emergence of agricultural techniques, and, in more recent times, the Gutenberg printing press, the Jacquard loom, urban electrification, the automobile, the microprocessor, and the Internet. Each of these innovations collided with a society that had been in a period of relative stasis—followed by massive disruption.

Punctuated equilibrium is useful as a framework for thinking about disruption in today's economy. US auto technology has been relatively static since the passage of the federal interstate-highway act, in 1956. Now the

[1] See Stephen Jay Gould, *Punctuated Equilibrium*, Cambridge, MA: Harvard University Press, 2007. Gould pointed out that fossil records show that species change does not advance gradually but often massively and disruptively. After the mass extinctions that have occurred several times across evolutionary eras, a minority of species survived and the voids in the ecosystem rapidly filled with massive speciation. Gould's theory addresses the discontinuity in fossil records that puzzled Charles Darwin.

synchronous arrival of Tesla, Uber, and autonomous vehicles is creating chaos. When it's over, a new equilibrium will emerge. Landline operators were massively disrupted by cell phones, which in turn were upended by the introduction of the iPhone, in 2007—which, in the following decade, has settled into a new stasis, with handheld computing changing the very nature of interpersonal communication.

The evidence suggests that we are seeing a mass disruption in the corporate world like Gould's recurring episodes of mass species extinction. Since 2000, over 50 percent of Fortune 500 companies have been acquired, merged, or declared bankruptcy, with no end in sight. In their wake, we are seeing a mass "speciation" of innovative corporate entities with largely new DNA, such as Amazon, Box, Facebook, Square, Twilio, Uber, WeWork, and Zappos.

Mass-extinction events don't just happen for no reason. In the current extinction event, the causal factor is digital transformation.

AWASH IN INFORMATION

Digital transformation is everywhere on the agendas of corporate boards and has risen to the top of CEOs' strategic plans. (For insights into how difficult it can be to shape an effective digital strategy, see "Why digital strategies fail," on page 61.) Before the ubiquity of the personal computer or the Internet, the late Harvard sociologist Daniel Bell predicted the advent of the Information Age in his seminal work *The Coming of Post-Industrial Society*.[2] The resulting structural change in the global economy, he wrote, would be on the order of the Industrial Revolution. In the subsequent four decades, the dynamics of Moore's law and the associated technological advances of minicomputers, relational databases, computers, the Internet, and the smartphone have created a thriving $2 trillion information-technology industry—much as Bell foretold.

In the 21st century, Bell's dynamic is accelerating, with the introduction of new disruptive technologies, including big data, artificial intelligence (AI), elastic cloud computing (the cloud), and the Internet of Things (IoT). The smart grid is a compelling example of these forces at work. Today's electric-power grid—composed of billions of electric meters, transformers, capacitors, phasor measurement units, and power lines—is perhaps the largest and most complex machine ever developed.[3] An estimated $2 trillion is being spent this decade to "sensor" that value chain by upgrading or replacing

[2] Daniel Bell, *The Coming of Post-Industrial Society: A Venture in Social Forecasting*, New York, NY: Basic Books, 1973.

[3] George Constable et al., *A Century of Innovation: Twenty Engineering Achievements that Transformed our Lives*, Washington, DC: Joseph Henry Press, 2003.

the multitude of devices in the grid infrastructure so that all of them are remotely machine addressable.[4]

When a power grid is fully connected, utilities can aggregate, evaluate, and correlate the interactions and relationships of vast quantities of data from all manner of devices—plus weather, load, and generation-capacity information—in near real time. They can then apply AI machine-learning algorithms to those data to optimize the operation of the grid, reduce the cost of operation, enhance resiliency, increase reliability, harden cybersecurity, enable a bidirectional power flow, and reduce greenhouse-gas emissions. The power of IoT, cloud computing, and AI spells the *digital transformation* of the utility industry.

A virtuous cycle is at work here. The network effects of interconnected and sensored customers, local power production, and storage (all ever cheaper) make more data available for analysis, rendering the deep-learning algorithms of AI more accurate and making for an increasingly efficient smart grid. Meanwhile, as big data sets become staggeringly large, they change the nature of business decisions. Historically, computation was performed on data samples, statistical methods were employed to draw inferences from those samples, and the inferences were in turn used to inform business decisions. Big data means we perform calculations on *all* the data; there is no sampling error. This enables AI—a previously unattainable class of computation that uses machine and deep learning to develop self-learning algorithms—to perform precise predictive and prescriptive analytics.[5]

The benefits are breathtaking. All value chains will be disrupted: defense, education, financial services, government services, healthcare, manufacturing, oil and gas, retail, telecommunications, and more.[6] To give some flavor to this:

- *Healthcare.* Soon all medical devices will be sensored, as will patients. Healthcare records and genome sequences will be digitized. Sensors will remotely monitor pulse, blood chemistry, hormone levels, blood pressure, temperature, and brain waves. With AI, disease onset can be accurately predicted and prevented. AI-augmented best medical practices will be more uniformly applied.

[4] Derived from *Estimating the Costs and Benefits of the Smart Grid: A Preliminary Estimate of the Investment Requirements and the Resultant Benefits of a Fully Functioning Smart Grid*, Electric Power Research Institute, March 2011.

[5] See "How artificial intelligence can deliver real value to companies," McKinsey Global Institute, June 2017, McKinsey.com.

[6] See "Unlocking the potential of the Internet of Things," McKinsey Global Institute, June 2015, McKinsey.com.

- *Oil and gas.* Operators will use predictive maintenance to monitor production assets and predict and prevent device failures, from submersible oil pumps to offshore oil rigs. The result will be a lower cost of production and a lower environmental impact.

- *Manufacturing.* Companies are employing IoT-enabled inventory optimization to lower inventory carrying costs, predictive maintenance to lower the cost of production and increase product reliability, and supply-network risk mitigation to assure timely product delivery and manufacturing efficiency.

THE NEW ENGINE OF CHANGE: CEOS

Perhaps the most unique aspect of this technology trend is that digital transformation is being driven from the top, personally mandated by the CEO. This is something new.

In the past 70 years of computing, the world advanced from the vacuum tube to the transistor to the semiconductor, from mainframe computing to minicomputing to personal computing to the Internet. Software evolved from bespoke custom programming to on-premises, packaged enterprise application software and then to software as a service (SaaS)—cloud-resident solutions. Among the fruits: increased productivity and profitability, a lower cost of operation, and economic growth.

I witnessed many of these tech-adoption cycles over the past 30 years. With the promise of performance improvements and productivity increases, such innovations were introduced to industry through the IT organization. Over months or years, and after multiple trials and evaluations, each gained the attention of the chief information officer, who was responsible for technology adoption. The CEO was periodically briefed on the cost and result.

With the 21st-century digital transformation, the adoption cycle has inverted. What I'm seeing now is that, almost invariably, global corporate transformations are initiated and propelled by the CEO. Visionary CEOs, individually, are the engines of massive change that is unprecedented in the history of information technology—possibly unprecedented in the history of commerce.

Something fundamentally important is happening, and it's something that corporate leaders find highly motivating—and urgent. Michael Porter of the Harvard Business School speculates that the new world of smart, connected devices represents a sea change in the fundamental dynamics

of competition.[7] Porter suggests that the Internet of Things isn't simply a matter of competitive advantage; it is existential. More darkly, John Chambers of Cisco Systems predicts that 40 percent of today's businesses will fail in the next ten years; 70 percent will attempt to transform themselves digitally, but only 30 percent will succeed. "If I am not making you sweat," he told an executive audience, "I should be."[8]

The competitive effects are playing out in the marketplace. In autos, think of Tesla as IoT on wheels. Tesla's market capitalization is roughly equivalent to that of General Motors even though its revenue is less than one-twentieth of GM's. Tesla collects terabytes of data from its vehicles and uses machine learning to improve predictive maintenance, self-driving capabilities, and the driving experience of its cars significantly and continuously.[9] The more miles driven, the more data Tesla collects, and the more it grows as a competitive force. A consumer can configure and purchase a customized new Tesla from the company's website in eight minutes. In retail, Amazon is digitally transforming the industry with data, AI, and network effects. Its share of the US e-commerce market is 34 percent and could increase to 50 percent by 2021.[10]

In response, some farsighted CEOs are revamping their playbooks. Isabelle Kocher, CEO of Engie, an integrated energy company based in Paris, has assembled a C-suite team to step up the transformation of the company. Together they have updated its strategy with new business targets that include specific expectations for digital value creation. Other CEOs we work with are thinking through scenarios to anticipate future disruption, asking questions like "what are our customers really buying, do they really need us, or could a digital competitor provide a better insight or product at a lower cost?" They're using these "what if" cases to break out of cloistered mind-sets and reallocate investments for future digital efforts. One healthcare CEO used scenarios to craft a road map for hundreds of next-generation application improvements across its businesses. Where new talent is required to bolster C-level efforts, CEOs are recruiting for roles such as chief digital officer with the authority and budget to make things happen.

Other CEOs are seeking inspiration by organizing visits to the headwaters of disruption, at companies like Apple, Tesla, and Uber. (My company has

[7] Michael E. Porter and James E. Heppelmann, "How smart, connected products are transforming competition," *Harvard Business Review*, November 2014; and Michael E. Porter and James E. Heppelmann, "How smart, connected products are transforming companies," *Harvard Business Review*, October 2015, hbr.org.

[8] Julie Bort, "Retiring Cisco CEO delivers dire prediction: 40 percent of companies will be dead in 10 years," *Business Insider*, June 2015, businessinsider.com.

[9] Kirsten Korosec, "Why Morgan Stanley is so bullish on Tesla and the Model 3," *Fortune*, March 2017, fortune.com.

[10] Phil Wahba, "Amazon will make up 50 percent of all US e-commerce by 2021," *Fortune*, April 2017, fortune.com.

hosted more than 30 such visits in 2017 alone.) They're retooling executive perspectives with boot camps on digital innovation. They're also reaching across company and industry borders to share and promulgate best practices. In Germany, leading industry CEOs formed a working group, Industrie 4.0, to advise the federal government on industrial policy needed for the "fourth industrial revolution," grounded in IoT and AI. Hundreds of leading companies have formed the Industrial Internet Consortium to accelerate the adoption of "cyberphysical systems" in energy, healthcare, manufacturing, smart cities, and transportation.

Digital transformation is about sweeping change. It changes everything about how products are designed, manufactured, sold, delivered, and serviced—and it forces CEOs to rethink how companies execute, with new business processes, management practices, and information systems, as well as everything about the nature of customer relationships. I'm seeing leaders who get this. They're all over it: they want to launch five transformation initiatives right now; they're talking to me and every digital leader they know about where the technology threats are coming from; and they're hiring the best people to advise them. Yet I'm shocked by—even fearful for—the many CEOs I know who seem to be asleep at the switch. They just don't see the massive disruption headed their way from digital threats, seen or unseen, and they don't seem to understand it will happen very quickly.

So when I see CEOs who may be experimenting here and there with AI or the cloud, I tell them that's not enough. It's not about shiny objects. Tinkering is insufficient. My advice is that they should be talking about this all the time, with their boards, in the C-suite—and mobilizing the entire company. For boards, if this isn't on your agenda, then you've got the wrong agenda. If your CEO isn't talking about how to ensure the survival of the enterprise amid digital disruption, well, maybe you've got the wrong person in the job. This may sound extreme, but it's not.

It's increasingly clear that we're entering a highly disruptive extinction event. Many enterprises that fail to transform themselves will disappear. But as in evolutionary speciation, many new and unanticipated enterprises will emerge, and existing ones will be transformed with new business models. The existential threat is exceeded only by the opportunity. Q

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SIGN IN

DIGITAL SNAPSHOTS: FOUR INDUSTRIES IN TRANSITION

It's no surprise that digital technologies have altered today's competitive playbook. But just how much change is afoot? McKinsey research on the outlook for four industries shows an extensive range that varies by sector. In automobiles and banking, a new clutch of ecosystems is set to shape the global business environment. And in two more traditional industries, pulp and paper and engineering and construction, digital is giving productivity a big boost.

The automotive ecosystem shifts into gear

An analysis of mobility investments reveals how technologies and players are beginning to interact, and where new opportunities are starting to appear.

by Matthias Kässer, Thibaut Müller, and Andreas Tschiesner

As digitization reshapes traditional industry boundaries, many are betting that an "automotive ecosystem" will be one of the first to develop. But what will it look like in practice, and how will we know when such a competitive shift really takes place?

As we have recently described,[1] the coming ecosystems will comprise diverse players who provide digitally accessed, multi-industry solutions based on emerging technologies. In *automotive*, four such technologies known by the acronym ACES—autonomous driving, *connected* to the Internet of Things, *electric*, and *shared* mobility—are likely to be key. A constellation of different players, including OEMs and their suppliers, competing "frenemies," and unexpected attackers, will aim to capture the opportunities these and other innovations will present.

Thanks to the findings of the Start-up and Investment Landscape Analysis (SILA), McKinsey's proprietary, self-optimizing big data engine, we can now paint a more detailed picture of the evolving battleground. Through SILA's semantic analysis of keywords and network analytics of relevant companies,

[1] See Venkat Atluri, Miklós Dietz, and Nicolaus Henke, "Competing in a world of sectors without borders," *McKinsey Quarterly*, July 2017, McKinsey.com.

clusters, and industry moves within the investment landscape, we identified ten technology clusters with more than a thousand companies combined that have received external investments since 2010 of about $111 billion. This figure does not include internal R&D expenses by automotive and technology companies, but it does include acquisitions and stakes in other businesses made by these companies.

In the past decade, the rate of mobility investments has increased nearly sixfold, and the median deal size has more than tripled. In 2016 alone, investments amounted to $31 billion, a little less than half of the total R&D spend by all automotive OEMs ($77 billion). Around 60 percent of the total investment volume went into very large, industry-shaping deals, whereas the rest went into a huge number of smaller deals. Notably, these investments were focused not on products but on the technologies underlying the changes in mobility. In other words, investors are betting on an ecosystem.

No less compelling is the evidence as to who the investors are. More than 90 percent of the investments identified by SILA have been made by tech companies, on the one hand, and venture-capital (VC) and private-equity (PE) firms, on the other. These two sectors are investing about equal amounts (that is, slightly more than 45 percent of the total investments); OEMs and major suppliers make up the remainder. And while VC and PE firms are making these investments because they expect significant growth and will likely look to exit in the foreseeable future, tech companies seem intent on staying put—staking out emerging control points and getting ahead of critical trends.

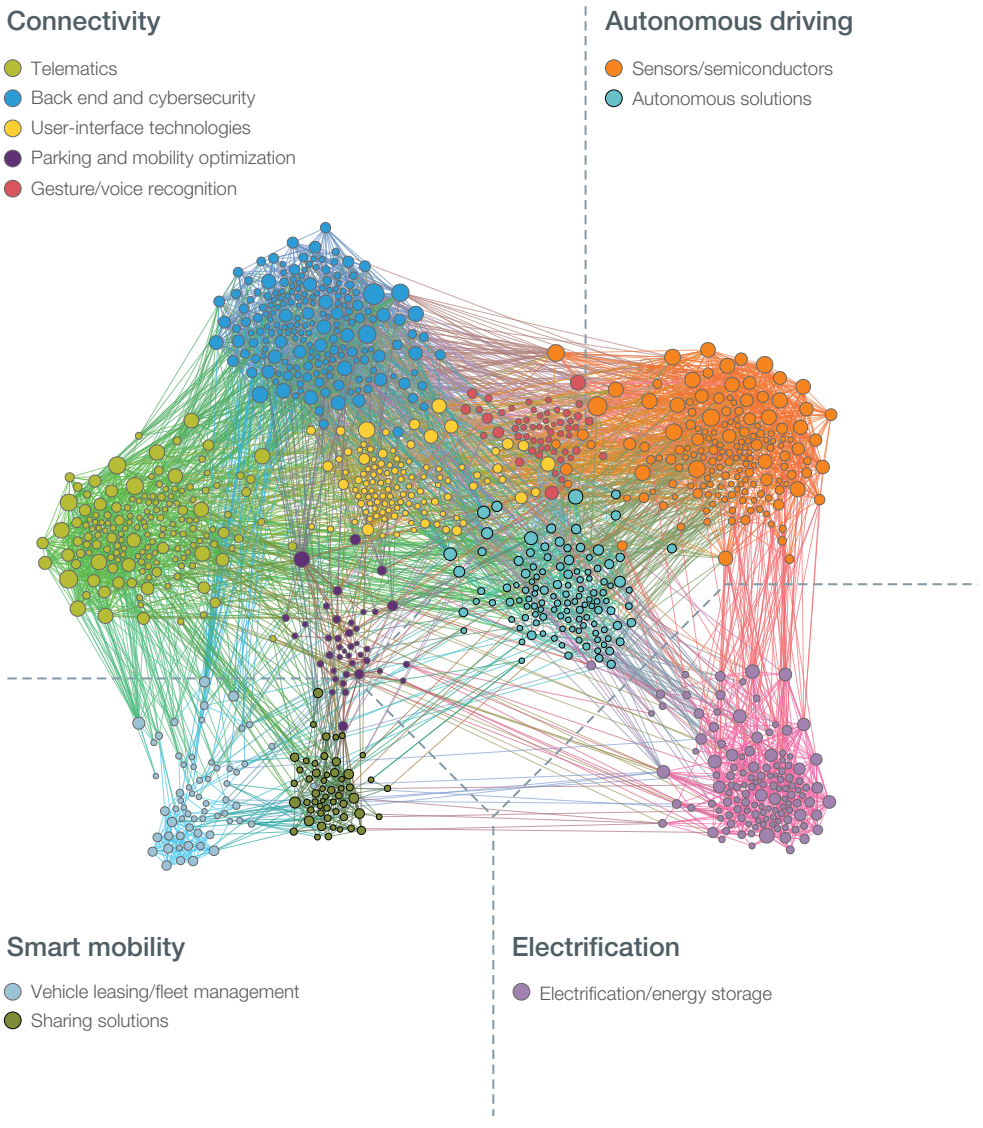
Our SILA analysis shows ten major clusters based on the four ACES technologies (exhibit). Among these technologies, autonomous driving received the largest amount of funding. Sharing solutions came in second, with

A mobility ecosystem is quickly taking shape across the world. And this ecosystem is more than just “Automotive Industry 2.0.”

Exhibit

Mapping mobility start-ups and investments in the evolving automotive ecosystem shows activities across ten clusters.

10 clusters loosely categorized into 4 areas, includes >1,000 companies with investments of ~$111 billion, 2010–17



Source: Capital IQ; PitchBook Data; McKinsey Center for Future Mobility

around one-third of the funding—surprisingly little, given the media attention. In both areas, the investments were dominated by a few large investments in major companies (for example, Didi, Mobileye, and Uber); autonomous driving also had a long tail of smaller investments in technology start-ups.

The picture is very different in the connectivity cluster, where investments have focused almost entirely on specialized small and midsize companies. Electrification and energy-storage investments are smaller than investments in other technologies, most likely because automotive companies are investing in these technologies in-house.

The analysis also reveals strong links between the different ACES clusters (as shown by their proximity on the node map), which emphasizes the underlying technologies' wide-ranging applicability. For example, machine learning is the underlying technology for both autonomous driving and voice-recognition software, among others. This suggests that companies should consider opportunities in light of the technology to be used rather than the offerings to be developed.

Not surprisingly, more than half of the start-ups currently receiving investment are based in the United States, which leads both in the number of companies and in investment volumes. China follows and Europe lags well behind. But as the SILA data show, a mobility ecosystem is quickly taking shape across the world. And this ecosystem is more than just "Automotive Industry 2.0." Leading in the new landscape will require contending with multiple new players—many not from a traditional automotive background—and integrating different capabilities. For traditional OEMs and suppliers, as well as new entrants, it will be essential to adopt an ecosystem mind-set. Q

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The authors wish to thank the McKinsey Center for Future Mobility (MCFM) for their contributions to this article. For more information about MCFM, visit McKinsey.com/mcfm.

Banking needs an ecosystem play

To regain ground lost to challengers, the industry must digitize core operations and adapt to an era of markets without borders.

by Miklós Dietz, Joydeep Sengupta, and Nicole Zhou

Digital competition threatens to upend business models across sectors. So what's happening in banking—with attackers targeting some of the most profitable income streams, so-called platform companies entering the fray, and many incumbent players struggling to respond—is a stark reminder for all senior executives of what's at stake.

Fast-moving fintechs, many of them start-ups, launched the first salvo in banking using smartphone apps, cloud-based infrastructure, and intuitive interactions to lure banks' customers. Fintechs forced banks to innovate their digital offerings and even their business models. While this first wave of intrusion has mostly abated, platform companies such as China's Tencent, Japanese retailer Rakuten, and Amazon in the United States are now using their customer knowledge, scale advantage, and data capabilities to target a range of retail, corporate, and commercial segments. Such companies use information from their huge base of customers to build ecosystems—networks that span industries and functional capabilities and enable them to attract customers from adjacent and previously stand-alone industries at high speed and low cost. In banking, for instance, using data analytics and other capabilities, digital players can make credit decisions nearly instantly.

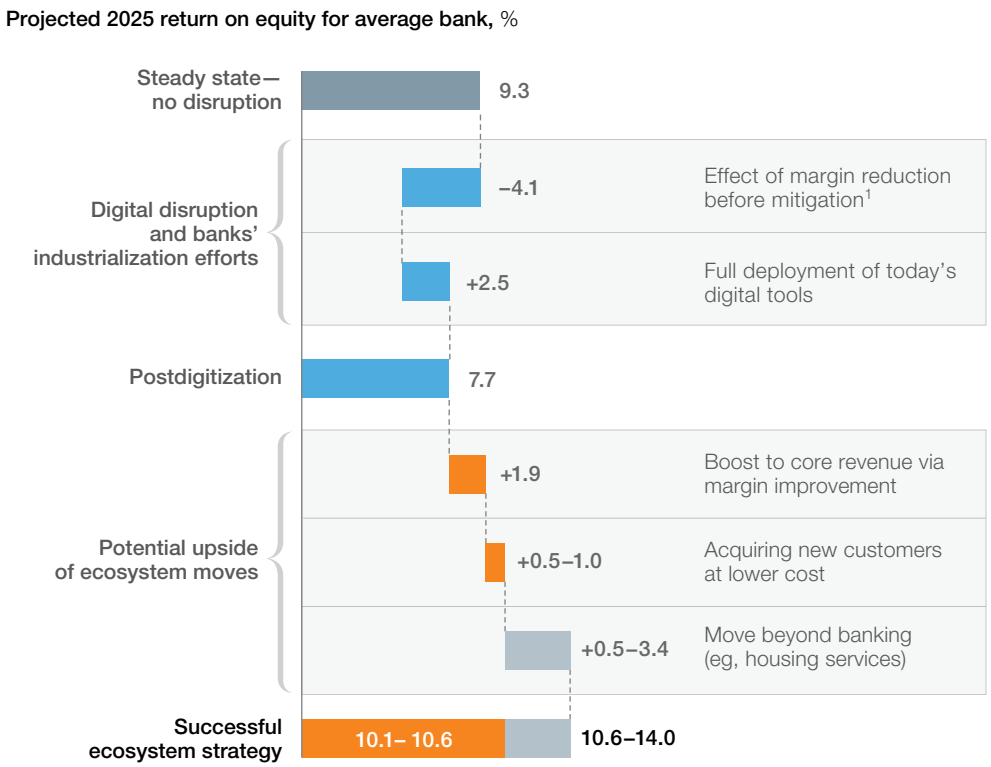
THE HIT TO PERFORMANCE

Using proprietary data across banking segments and geographies, we looked at the extent to which current and future digital competition may potentially damage returns and the degree to which technology choices are important. We found that attackers—whether fintechs or platform players—favor incumbent banks' choicest businesses, namely fee-based offerings such as transactions and payments as well as asset management. At the moment, these produce 47 percent of banking revenues but an outsized 65 percent of profits and a return on equity (ROE) of 20 percent. There is relatively less interest in banks' "manufacturing" areas, the core finance and lending businesses that pivot off balance sheets. These represent 53 percent of revenues and 35 percent of profits and have an ROE of 4.4 percent.

Absent any mitigating actions, we estimate that the ongoing digitization of the industry could cost banks more than four percentage points of ROE by 2025 (exhibit)—an unsustainable loss that will drop returns well below

Exhibit

Banks that execute a successful ecosystem strategy could restore their return on equity to double digits.



[1] Average results across sectors and geographies, generally more severe in consumer finance, payments, and asset/wealth management sectors (up to –20% or more in United Kingdom and Japan).

Source: S&P Global Market Intelligence; Global Banking Pools and Panorama by McKinsey

even the cheapest cost of capital. Banks could win back some of that erosion by better deploying core technologies now being used against them—"industrializing" operations with digital automation or using new digital-marketing tools and analytics more effectively—but on its own, this will not be enough to recover the lost ground.

ECOSYSTEM PLAY

Our research shows that, for the past several years, banking returns have been stuck between 8 and 10 percent. The best option for many banks to lift returns to something like the go-go years of the early 2000s—to say nothing of the tremendous margins that digital firms now command—will be to embrace the ecosystem environment. They must use their inherent advantages, including customer trust, regulatory knowledge, a big customer base, and unexploited data. Many banks could scan their markets and regions and then join these new business systems—and banks with strong digital capabilities might even build an ecosystem, enlisting other financial and nonfinancial players to join them.

In a basic ecosystem "play," platform power helps banks retain their core customers and improves cross-selling. Banks will be much more conspicuous to digitally minded customers and will be able to offer products better suited to customer needs—even as better data help banks make sharper underwriting decisions. In our estimate, these improvements can add close to two percentage points to ROE. Further ROE increases are possible as networks of ecosystem partners and access to more data lower costs of customer acquisition, in some cases to as little as 1 percent of historical costs.

For some banks with the necessary digital "chops" and insights into potential opportunities, a deeper ecosystem strategy can be even more decisive. Many banks are already surveying related revenue pools, ranging from housing and

In a basic ecosystem "play," platform power helps banks retain their core customers and improves cross-selling.

transportation to participation in B2B and B2C marketplaces. A medium-size bank, for example, in partnership with regional real-estate developers and agents, might capture 15 percent of ecosystem revenues in home sales, financing, and aftermarket services such as moving, decorating, insurance, and so on. Even this small slice could be enough to lift returns into the midteens again.

Over time, digitization will sharply reduce banking revenue pools. The "vertical" business system may be in its final lap, but by shifting today's organizations to ecosystems, banks can claim their share of the expanded revenue pools in markets that transcend industry boundaries. Q

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The authors wish to thank Matthieu Lemerle, Asheet Mehta, and Miklós Radnai for their contributions to this research.

For the full report from which this article is adapted, see "Remaking the bank for an ecosystem world," on McKinsey.com.

Pulp and paper: Where digital help far outweighs the hurt

While the industry's prospects vary by product and region, digital offers opportunities across the board to improve costs—and capture new growth.

by Peter Berg and Oskar Lingqvist

With the strong tide pulling readers away from paper to digital modes of communication, it's no surprise that paper demand has suffered. But for the paper and forest-products industry overall, digital is giving as well as taking away. Most conspicuously, ever-increasing online purchasing is generating new sales of fiber-based transport packaging. Less visibly, digital technologies are driving across-the-board opportunities to improve efficiency throughout the value chain.

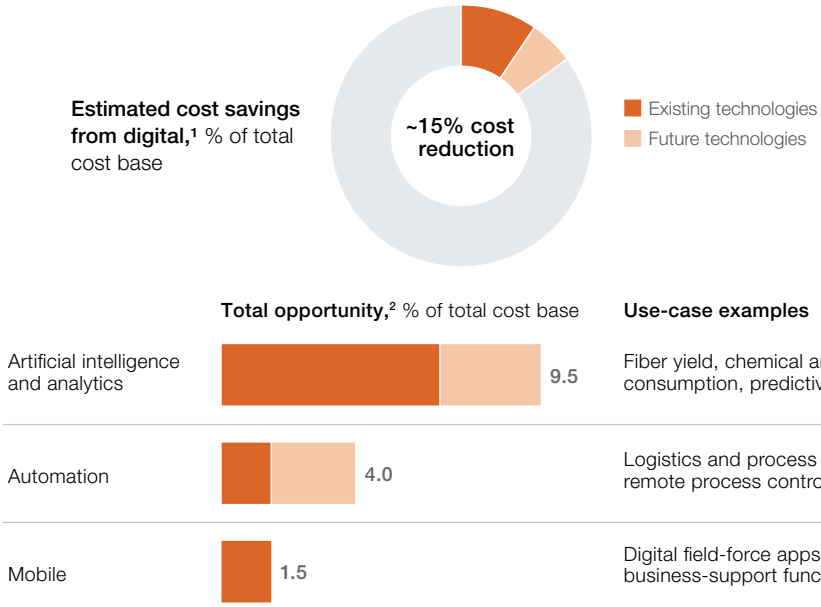
Paper and board producers already collect a lot of data, and companies that are able to apply advanced analytics and artificial intelligence to it can learn how to better run their plants. Improvements include predictive maintenance, which helps keep machinery running, as well as more stable production processes, which in turn lead to lower consumption of energy and bleaching chemicals. Remote process controls for mills and other uses of automation can also reduce costs.

The exhibit shows our rough estimate of the new benefits accruing from adoption of existing technologies at the plant level for pulp and paper

Exhibit

The digital revolution offers cost-improvement opportunities.

Example: pulp and paper manufacturing, all figures are approximate



[1] In addition to cost savings, digital applications in predictive maintenance, throughput debottlenecking, and quality control could improve overall equipment effectiveness by ~5 percentage points.
[2] Excluding purchasing, marketing and sales, and upstream areas such as forestry.

manufacturing—based on what is already starting to be achieved. It also offers a cautious interpretation of potential gains, as digital technologies evolve and are applied to new areas in plant operations. Meanwhile, digital has potential elsewhere in the industry. In forestry, drones are already boosting the precision with which tree growth is monitored, harvesting decisions are made, and logging crews are deployed. Downstream, there are new product-development opportunities, for example, in packaging that can be better traced or that incorporates new security features. Digital also opens the potential for more efficient customer interactions and even direct B2C relationships between paper-product makers and end consumers, for example, in tissue products.

While opportunities exist across the technology spectrum, perhaps unsurprisingly, data-intensive applications involving artificial intelligence and advanced analytics offer the biggest opportunities for gains.

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For a more complete set of findings, see "Pulp, paper, and packaging in the next decade: Transformational change," on McKinsey.com.

A digital upgrade for engineering and construction

Construction-technology start-ups are helping the industry tackle long-standing productivity problems.

by Jose Luis Blanco, Andrew Mullin, and Mukund Sridhar

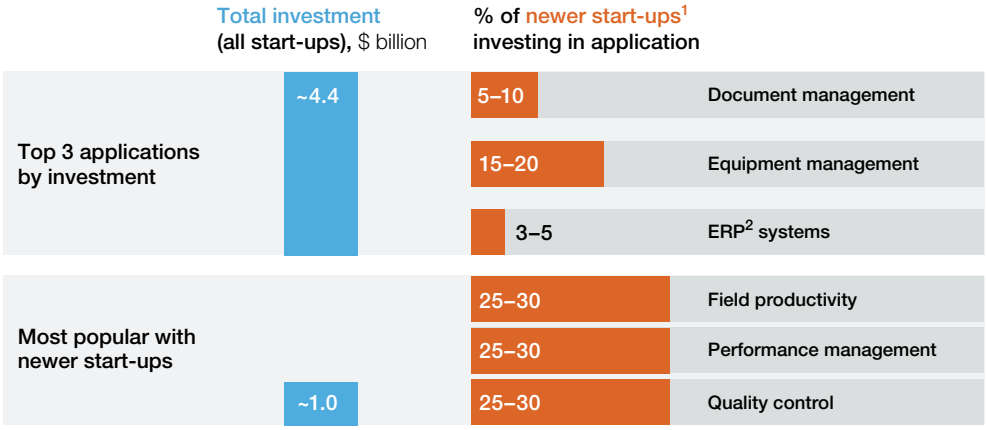
Engineering and construction companies have struggled with low productivity for decades. But digital solutions, many developed by specialized technology start-ups, are helping the industry identify and extract new sources of value.

To better understand the evolving productivity landscape, we examined the products of more than 1,000 construction-software start-ups (representing $10 billion in investment funding) between 2011 and 2017. Those start-ups have brought to market thousands of innovative project tools, whose capabilities include everything from improved quality control to predictive analytics. New ones are emerging all the time, and the mix of capabilities on offer appears to be changing.

Overall, the preponderance of tools created by these companies has been for the construction phase, with far fewer aimed at design, preconstruction, operations, or management. Many start-ups have focused on basic collaboration tools that compile or share project information (such as document-management solutions) or core back-office digitization (such as enterprise-resource-planning systems).

Exhibit

When it comes to investing in construction technologies, newer start-ups break rank with others in their choice of tools.



[1] Those founded in past 5 years.
[2] ERP = enterprise resource planning.

The priorities of newer start-ups—those actually founded in the last five years—suggest digital productivity opportunities are becoming richer. Almost 30 percent of those companies offer on-site performance-management and field-productivity tools. Quality-control tools, including GPS and images to monitor sites, also ranked high: 27 percent of recent start-ups offer them (exhibit). More advanced tools are in demand, including predictive analytics to help manage projects, the use of drones and the Internet of Things for monitoring, and wearable and virtual-reality technologies to improve safety.

With productivity within the construction sector about half that of the total economy, digital solutions alone will not close the gap. But as the range of digital possibilities grows, the importance of engaging with the start-ups offering them will, too. Q

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The authors wish to thank Kaustubh Pandya for his contributions to this article.

For the full article, see "The new age of engineering and construction technology," on McKinsey.com.

AI can eliminate the need for large, labeled data sets. Here, a CycleGAN application learns from a small set of data how to translate bears into pandas.

What AI can and can't do (yet) for your business

Artificial intelligence is a moving target. Here's how to take better aim.

by Michael Chui, James Manyika, and Mehdi Miremadi

Artificial intelligence (AI) seems to be everywhere. We experience it at home and on our phones. Before we know it—if entrepreneurs and business innovators are to be believed—AI will be in just about every product and service we buy and use. In addition, its application to business problem solving is growing in leaps and bounds. And at the same time, concerns about AI's implications are rising: we worry about the impact of AI-enabled automation on the workplace, employment, and society.

A reality sometimes lost amid both the fears and the headline triumphs, such as Alexa, Siri, and AlphaGo, is that the AI technologies themselves—namely, machine learning and its subset, deep learning—have plenty of limitations that will still require considerable effort to overcome. This is an article about those limitations, aimed at helping executives better understand what may be holding back their AI efforts. Along the way, we will also highlight promising advances that are poised to address some of the limitations and create a new wave of opportunities.

Our perspectives rest on a combination of work at the front lines—researching, analyzing, and assessing hundreds of real-world use cases—and our collaborations with some of the thought leaders, pioneering scientists, and engineers working at the frontiers of AI. We've sought to distill this experience to help executives

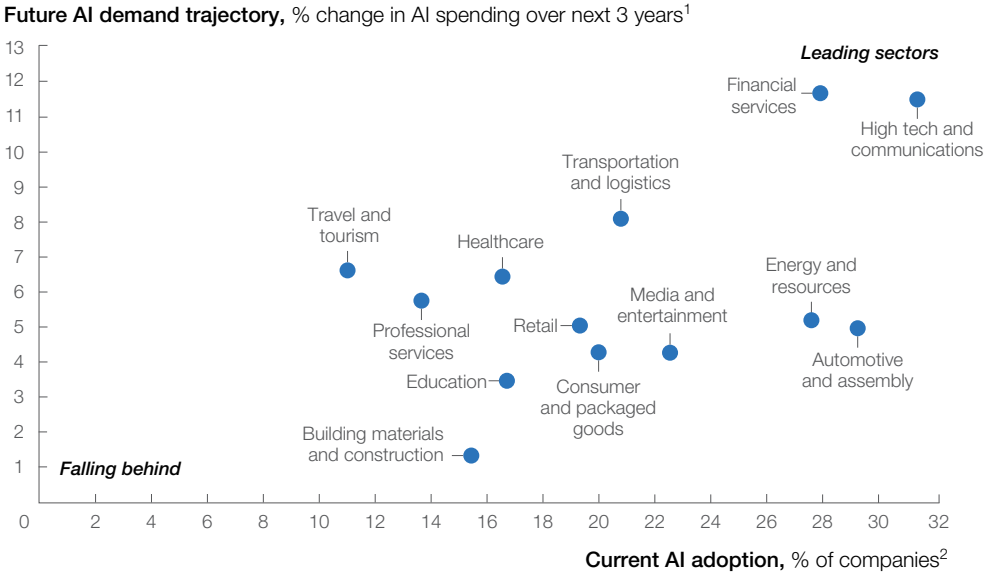
who often, in our experience, are exposed only to their own initiatives and not well calibrated as to where the frontier is or what the pace setters are already doing with AI.

Simply put, AI's challenges and limitations are creating a "moving target" problem for leaders: It is hard to reach a leading edge that's always advancing. It is also disappointing when AI efforts run into real-world barriers, which can lessen the appetite for further investment or encourage a wait-and-see attitude, while others charge ahead. As recent McKinsey Global Institute research indicates, there's a yawning divide between leaders and laggards in the application of AI both across and within sectors (Exhibit 1).

Executives hoping to narrow the gap must be able to address AI in an informed way. In other words, they need to understand not just where AI can boost innovation, insight, and decision making; lead to revenue growth; and capture of efficiencies—but also where AI *can't* yet provide value. What's more, they must appreciate the relationship and distinctions between

Exhibit 1

Leaders in the adoption of AI also intend to invest more in the near future compared with laggards.



[1] Estimated average, weighted by company size; demand trajectory based on midpoint of range selected by survey respondent.
[2] Adopting 1 or more AI technologies at scale or in business core; weighted by company size.

Source: McKinsey Global Institute (MGI) AI adoption and use survey; MGI analysis

technical constraints and organizational ones, such as cultural barriers; a dearth of personnel capable of building business-ready, AI-powered applications; and the "last mile" challenge of embedding AI in products and processes. If you want to become a leader who understands some of the critical technical challenges slowing AI's advance and is prepared to exploit promising developments that could overcome those limitations and potentially bend the trajectory of AI—read on.

CHALLENGES, LIMITATIONS, AND OPPORTUNITIES

A useful starting point is to understand recent advances in deep-learning techniques. Arguably the most exciting developments in AI, these advances are delivering jumps in the accuracy of classification and prediction, and are doing so without the usual "feature engineering" associated with traditional supervised learning. Deep learning uses large-scale neural networks that can contain millions of simulated "neurons" structured in layers. The most common networks are called convolutional neural networks (CNNs) and recurrent neural networks (RNNs). These neural networks learn through the use of training data and backpropagation algorithms.

While much progress has been made, more still needs to be done.[1] A critical step is to fit the AI approach to the problem and the availability of data. Since these systems are "trained" rather than programmed, the various processes often require huge amounts of labeled data to perform complex tasks accurately. Obtaining large data sets can be difficult. In some domains, they may simply not be available, but even when available, the labeling efforts can require enormous human resources.

Further, it can be difficult to discern how a mathematical model trained by deep learning arrives at a particular prediction, recommendation, or decision. A black box, even one that does what it's supposed to, may have limited utility, especially where the predictions or decisions impact society and hold ramifications that can affect individual well-being. In such cases, users sometimes need to know the "whys" behind the workings, such as why an algorithm reached its recommendations—from making factual findings with legal repercussions to arriving at business decisions, such as lending, that have regulatory repercussions—and why certain factors (and not others) were so critical in a given instance.

[1] Stuart Russell et al., "Research priorities for robust and beneficial artificial intelligence," *AI Magazine*, Winter 2015, Volume 36, Number 4, pp. 105–14, aaai.org.

Let's explore five interconnected ways in which these limitations, and the solutions emerging to address them, are starting to play out.

Limitation 1: Data labeling

Most current AI models are trained through "supervised learning." This means that humans must label and categorize the underlying data, which can be a sizable and error-prone chore. For example, companies developing self-driving-car technologies are hiring hundreds of people to manually annotate hours of video feeds from prototype vehicles to help train these systems. At the same time, promising new techniques are emerging, such as in-stream supervision (demonstrated by Eric Horvitz and his colleagues at Microsoft Research), in which data can be labeled in the course of natural usage.[2] Unsupervised or semisupervised approaches reduce the need for large, labeled data sets. Two promising techniques are reinforcement learning and generative adversarial networks.

Reinforcement learning. This unsupervised technique allows algorithms to learn tasks simply by trial and error. The methodology hearkens to a "carrot and stick" approach: for every attempt an algorithm makes at performing a task, it receives a "reward" (such as a higher score) if the behavior is successful or a "punishment" if it isn't. With repetition, performance improves, in many cases surpassing human capabilities—so long as the learning environment is representative of the real world.

Reinforcement learning has famously been used in training computers to play games—most recently, in conjunction with deep-learning techniques. In May 2017, for example, it helped the AI system AlphaGo to defeat world champion Ke Jie in the game of Go. In another example, Microsoft has fielded decision services that draw on reinforcement learning and adapt to user preferences. The potential application of reinforcement learning cuts across many business arenas. Possibilities include an AI-driven trading portfolio that acquires or loses points for gains or losses in value, respectively; a product-recommendation engine that receives points for every recommendation-driven sale; and truck-routing software that receives a reward for on-time deliveries or reducing fuel consumption.

Reinforcement learning can also help AI transcend the natural and social limitations of human labeling by developing previously unimagined solutions and strategies that even seasoned practitioners might never have

[2] Eric Horvitz, "Machine learning, reasoning, and intelligence in daily life: Directions and challenges," *Proceedings of Artificial Intelligence Techniques for Ambient Intelligence*, Hyderabad, India, January 2007.

considered. Recently, for example, the system AlphaGo Zero, using a novel form of reinforcement learning, defeated its predecessor AlphaGo after learning to play Go from scratch. That meant starting with completely random play against itself rather than training on Go games played by and with humans.[3]

Generative adversarial networks (GANs). In this semisupervised learning method, two networks compete against each other to improve and refine their understanding of a concept. To recognize what birds look like, for example, one network attempts to distinguish between genuine and fake images of birds, and its opposing network attempts to trick it by producing what look very much like images of birds, but aren't. As the two networks square off, each model's representation of a bird becomes more accurate.

The ability of GANs to generate increasingly believable examples of data can significantly reduce the need for data sets labeled by humans. Training an algorithm to identify different types of tumors from medical images, for example, would typically require millions of human-labeled images with the type or stage of a given tumor. By using a GAN trained to generate increasingly realistic images of different types of tumors, researchers could train a tumor-detection algorithm that combines a much smaller human-labeled data set with the GAN's output.

While the application of GANs in precise disease diagnoses is still a way off, researchers have begun using GANs in increasingly sophisticated contexts. These include understanding and producing artwork in the style of a particular artist and using satellite imagery, along with an understanding of geographical features, to create up-to-date maps of rapidly developing areas.

Limitation 2: Obtaining massive training data sets

It has already been shown that simple AI techniques using linear models can, in some cases, approximate the power of experts in medicine and other fields.[4] The current wave of machine learning, however, requires training data sets that are not only labeled but also sufficiently large and comprehensive. Deep-learning methods call for thousands of data records for models to become relatively good at classification tasks and, in some cases, millions for them to perform at the level of humans.[5]

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[3] Demis Hassabis et al., *AlphaGo Zero: Learning from scratch*, deepmind.com.

[4] Robyn M. Dawes, "The robust beauty of improper linear models in decision making," *American Psychologist*, July 1979, Volume 34, Number 7, pp. 571–82.

[5] Ian Goodfellow, Yoshua Bengio, and Aaron Courville, *Deep Learning*, Cambridge, MA: MIT Press, 2016.

The complication is that massive data sets can be difficult to obtain or create for many business use cases (think: limited clinical-trial data to predict treatment outcomes more accurately). And each minor variation in an assigned task could require another large data set to conduct even more training. For example, teaching an autonomous vehicle to navigate a mining site where the weather continually changes will require a data set that encompasses the different environmental conditions the vehicle might encounter.

One-shot learning is a technique that could reduce the need for large data sets, allowing an AI model to learn about a subject when it's given a small number of real-world demonstrations or examples (even one, in some cases). AI's capabilities will move closer to those of humans, who can recognize multiple instances of a category relatively accurately after having been shown just a single sample—for example, of a pickup truck. In this still-developing methodology, data scientists would first pre-train a model in a simulated virtual environment that presents variants of a task or, in the case of image recognition, of what an object looks like. Then, after being shown just a few real-world variations that the AI model did *not* see in virtual training, the model would draw on its knowledge to reach the right solution.[6]

This sort of one-shot learning could eventually help power a system to scan texts for copyright violations or to identify a corporate logo in a video after being shown just one labeled example. Today, such applications are only in their early stages. But their utility and efficiency may well expand the use of AI quickly, across multiple industries.

Limitation 3: The explainability problem

Explainability is not a new issue for AI systems.[7] But it has grown along with the success and adoption of deep learning, which has given rise both to more diverse and advanced applications and to more opaqueness. Larger and more complex models make it hard to explain, in human terms, why a certain decision was reached (and even harder when it was reached in real time). This is one reason that adoption of some AI tools remains low in application areas where explainability is useful or indeed required. Furthermore, as the application of AI expands, regulatory requirements could also drive the need for more explainable AI models.[8]

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[6] Yan Duan et al., *One-shot imitation learning*, December 2017, arxiv.org.

[7] Eric Horvitz et al., "The use of a heuristic problem-solving hierarchy to facilitate the explanation of hypothesis-directed reasoning," *Proceedings of Medinfo*, October 1986, pp. 27–31.

[8] See, for example, the European Union's proposed General Data Protection Regulation, which would introduce new requirements for the use of data.

Two nascent approaches that hold promise for increasing model transparency are local interpretable model-agnostic explanations (LIME) and attention techniques (Exhibit 2). LIME attempts to identify which parts of input data a trained model relies on most to make predictions in developing a proxy interpretable model. This technique considers certain segments of data at a time and observes the resulting changes in prediction to fine-tune the proxy model and develop a more refined interpretation (for example, by excluding eyes rather than, say, noses to test which are more important for facial recognition). Attention techniques visualize those pieces of input data that a model considers most as it makes a particular decision (such as focusing on a mouth to determine if an image depicts a human being).

Exhibit 2

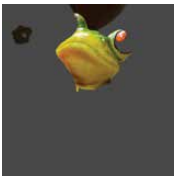
New techniques hold promise for making AI more transparent.

LIME[1]

is a sensitivity analysis that reveals which parts of an input matter most to the eventual output.

Turning off all but a few interpretable components of this image reveals the probability that the model will identify …

… a tree frog
54%



… billiard balls
7%

… a balloon
5%

Attention

shines a spotlight on where the model is looking when it makes a particular decision.

Words relevant to food quality …

The fajita we tried was tasteless and burned and the mole sauce was way too sweet.

… or to service

They have one of the fastest delivery times in the city.

[1] LIME = local interpretable model-agnostic explanations.

Source: Carlos Guestrin, Marco Tulio Ribeiro, and Sameer Singh, "Introduction to local interpretable model-agnostic explanations (LIME)," August 12, 2016, O'Reilly, oreilly.com; Minlie Huang, Yequan Wang, Li Zhao, and Xiaoyan Zhu, *Attention-based LSTM for aspect-level sentiment classification*, Tsinghua University; Pixabay

Another technique that has been used for some time is the application of generalized additive models (GAMs). By using single-feature models, GAMs limit interactions between features, thereby making each one more easily interpretable by users.[9] Employing these techniques, among others, to demystify AI decisions is expected to go a long way toward increasing the adoption of AI.

Limitation 4: Generalizability of learning

Unlike the way humans learn, AI models have difficulty carrying their experiences from one set of circumstances to another. In effect, whatever a model has achieved for a given use case remains applicable to that use case only. As a result, companies must repeatedly commit resources to train yet another model, even when the use cases are very similar.

One promising response to this challenge is transfer learning.[10] In this approach, an AI model is trained to accomplish a certain task and then quickly applies that learning to a similar but distinct activity. DeepMind researchers have also shown promising results with transfer learning in experiments in which training done in simulation is then transferred to real robotic arms.[11]

As transfer learning and other generalized approaches mature, they could help organizations build new applications more quickly and imbue existing applications with more diverse functionality. In creating a virtual personal assistant, for example, transfer learning could generalize user preferences in one area (such as music) to others (books). And users are not restricted to digital natives. Transfer learning can enable an oil-and-gas producer, for instance, to expand its use of AI algorithms trained to provide predictive maintenance for wells to other equipment, such as pipelines and drilling platforms. Transfer learning even has the potential to revolutionize business intelligence: consider a data-analyzing AI tool that understands how to optimize airline revenues and can then adapt its model to changes in weather or local economics.

Another approach is the use of something approximating a generalized structure that can be applied in multiple problems. DeepMind's AlphaZero,

[9] Yin Lou, Rich Caruana, and Johannes Gehrke, "Intelligible models for classification and regression," *Proceedings of the 18th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining,* New York: ACM, 2012, pp. 150–58.

[10] For an earlier example application, see John Guttag, Eric Horvitz, and Jenna Wiens, "A study in transfer learning: Leveraging data from multiple hospitals to enhance hospital-specific predictions," *Journal of the American Medical Informatics Association*, 2014, Volume 21, Number 4, pp. 699–706.

[11] Andrei A. Rusu et al., *Sim-to-real robot learning from pixels with progressive nets*, October 2016, arxiv.org.

for example, has made use of the same structure for three different games: it has been possible to train a new model with that generalized structure to learn chess in a single day, and it then soundly beat a world-champion chess program.[12]

Finally, consider the possibilities in emerging meta-learning techniques that attempt to automate the design of machine-learning models. The Google Brain team, for example, uses AutoML to automate the design of neural networks for classifying images in large-scale data sets. These techniques now perform as well as those designed by humans.[13] That's a promising development, particularly as talent continues to be in short supply for many organizations. It's also possible that meta-learning approaches will surpass human capabilities and yield even better results. Importantly, however, these techniques are still in their early days.

Limitation 5: Bias in data and algorithms

So far, we've focused on limitations that could be overcome through technical solutions already in the works, some of which we have described. Bias is a different kind of challenge. Potentially devastating social repercussions can arise when human predilections (conscious or unaware) are brought to bear in choosing which data points to use and which to disregard. Furthermore, when the process and frequency of data collection itself are uneven across groups and observed behaviors, it's easy for problems to arise in how algorithms analyze that data, learn, and make predictions.[14] Negative consequences can include misinformed recruiting decisions, misrepresented scientific or medical prognoses, distorted financial models and criminal-justice decisions, and misapplied (virtual) fingers on legal scales.[15] In many cases, these biases go unrecognized or disregarded under the veil of "advanced data sciences," "proprietary data and algorithms," or "objective analysis."

As we deploy machine learning and AI algorithms in new areas, there probably will be more instances in which these issues of potential bias become baked into data sets and algorithms. Such biases have a tendency to stay embedded because recognizing them, and taking steps to address them, requires a deep

[12] David Silver et al., *Mastering chess and shogi by self-play with a general reinforcement learning algorithm*, December 2017, arxiv.org.

[13] *Google Research Blog*, "AutoML for large scale image classification and object detection," blog entry by Barret Zoph, Vijay Vasudevan, Jonathon Shlens, and Quoc Le, November 2, 2017, research.googleblog.com.

[14] Jon Kleinberg, Sendhil Mullainathan, and Manish Raghavan, *Inherent trade-offs in the fair determination of risk scores*, November 2016, arxiv.org.

[15] See the work of Julia Angwin, Jeff Larson, Surya Mattu, Lauren Kirchner, and Terry Parris Jr. of ProPublica.

mastery of data-science techniques, as well as a more meta-understanding of existing social forces, including data collection. In all, debiasing is proving to be among the most daunting obstacles, and certainly the most socially fraught, to date.

There are now multiple research efforts under way, as well as efforts to capture best practices, that address these issues in academic, nonprofit, and private-sector research. It's none too soon, because the challenge is likely to become even more critical, and more questions will arise. Consider, for example, the fact that many of these learning and statistically based predictive approaches implicitly assume that the future will be like the past. What should we do in sociocultural settings where efforts are under way to spur change—and where making decisions based on past behavior could inhibit progress (or, worse, build in resistance to change)? A wide variety of leaders, including business leaders, may soon be called upon to answer such questions.

HITTING THE MOVING TARGET

Solutions to the limitations we have described, along with the widespread commercial implementation of many of the advances described here, could be years away. But the breathtaking range of possibilities from AI adoption suggests that the greatest constraint for AI may be imagination. Here are a few suggestions for leaders striving to stay ahead of—or at least not fall too far behind—the curve:

Do your homework, get calibrated, and keep up. While most executives won't need to know the difference between convolutional and recurrent neural networks, you should have a general familiarity with the capabilities of today's tools, a sense of where short-term advances are likely to occur, and a perspective on what's further beyond the horizon. Tap your data-science and machine-learning experts for their knowledge, talk to some AI pioneers to get calibrated, and attend an AI conference or two to help you get the real facts; news outlets can be helpful, but they can also be part of the hype machine. Ongoing tracking studies by knowledgeable practitioners, such as the AI Index (a project of the Stanford-based One Hundred Year Study on Artificial Intelligence), are another helpful way to keep up.[16]

Adopt a sophisticated data strategy. AI algorithms need assistance to unlock the valuable insights lurking in the data your systems generate. You can help by developing a comprehensive data strategy that focuses not only on the

[16] See the AI Index (aiindex.org) and the One Hundred Year Study (ai100.stanford.edu).

AI's challenges and limitations are creating a "moving target" problem for leaders: It is hard to reach a leading edge that's always advancing.

technology required to pool data from disparate systems but also on data availability and acquisition, data labeling, and data governance. Although newer techniques promise to reduce the amount of data required for training AI algorithms, data-hungry supervised learning remains the most prevalent technique today. And even techniques that aim to minimize the amount of data required still need *some* data. So a key part of this is fully knowing your own data points and how to leverage them.

Think laterally. Transfer-learning techniques remain in their infancy, but there are ways to leverage an AI solution in more than one area. If you solve a problem such as predictive maintenance for large warehouse equipment, can you also apply the same solution to consumer products? Can an effective next-product-to-buy solution be used in more than one distribution channel? Encourage business units to share knowledge that may reveal ways to use your best AI solutions and thinking in more than one area of the company.

Be a trailblazer. Keeping up with today's AI technologies and use cases is not enough to remain competitive for the long haul. Engage your data-science staff or partner with outside experts to solve a high-impact use case with nascent techniques, such as the ones discussed in this article, that are poised for a breakthrough. Further, stay informed about what's possible and what's available. Many machine-learning tools, data sets, and trained models for standard applications (including speech, vision, and emotion detection) are being made widely available. Sometimes they come in open source and in other cases through application programming interfaces (APIs) created by pioneering researchers and companies. Keep an eye on such possibilities to boost your odds of staking out a first-mover or early-adopter advantage.

The promise of AI is immense, and the technologies, tools, and processes needed to fulfill that promise haven't fully arrived. If you think you can let the technology develop and then be a successful fast follower, think again. It's very difficult to leapfrog from a standing start, particularly when the target is moving so rapidly and you don't understand what AI tools can and can't do now. With researchers and AI pioneers poised to solve some of today's thorniest problems, it's time to start understanding what is happening at the AI frontier so you can position your organization to learn, exploit, and maybe even advance the new possibilities. Q

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About the artwork: Bear and panda images provided by software engineer Tatsuya Hatanaka. For more on CycleGAN, see Jun-Yan Zhu et al., *Unpaired image-to-image translation using cycle-consistent adversarial networks*, November 2017, arxiv.org.

The four questions to ask when serving on a nonprofit board

Directors need to probe, nudge, and prod to make sure the organization achieves its full potential.

by William F. Meehan III and Kim Starkey Jonker

Sooner or later, you may follow in the footsteps of countless business leaders onto the board of one or more nonprofit organizations. Maybe it's the board of a local institution you care about personally, such as a small-scale theater, public radio station, or your child's school. It also could be a national or even global organization—an international development group, a major university, or the like.

Whatever the board, it's an opportunity to make a difference, provided you're prepared. Some of that opportunity stems from the growing potential of these organizations to generate social impact. Even as the cash-strapped public sector retrenches, nonprofits are poised to enjoy new sources of financial support: some $59 trillion will move from US households into other hands between 2007 and 2061, according to one estimate. Nonprofits also can leverage new sets of tools, including robust digital infrastructure.

The nature of the opportunity runs deeper, though. Our research, as well as that of others, shows that a great many nonprofit boards are underdelivering. A majority of respondents to a 2015 survey on nonprofit governance,

conducted by researchers at Stanford University, said they did not believe that their fellow board members were very experienced or very engaged in their work. More than two-thirds of directors said their organization had faced one or more serious governance-related problems over the years—a finding reinforced by a survey we conducted with more than 3,000 stakeholders in the nonprofit sector, 56 percent of whom indicated that their organizations struggled with board governance.

If you know how to probe, nudge, and prod, you can help your board perform better. Doing so starts with courage. In our experience, nonprofit board members are often reluctant to contribute actively to discussions for fear that they will appear uninformed or cause an embarrassing ruckus. To be effective, you must overcome that fear. And then you must ask questions. Ask all your questions, even ones you fear might seem stupid, and keep asking them until you figure out what the smart questions are. Then demand answers to the smart questions. If you don't get good answers to your smart questions, or if you don't get support from your fellow board members when you ask those questions, then resign.

While many questions will be specific to your organization, there are four crucial ones that apply to all nonprofits. We'll lay those out in this article, which builds on a model of strategic nonprofit leadership we've distilled in our book, *Engine of Impact: Essentials of Strategic Leadership in the Nonprofit Sector* (Stanford Business Books, November 2017). As we show in the book, board effectiveness is a critical enabler of all the components that, collectively, are indispensable to the achievement of a nonprofit's potential. Happily, it's one that you can start helping with the moment you get on a board.

QUESTION 1: ARE WE SUCCUMBING TO MISSION CREEP?

Companies in the private sector have a built-in sense of focus: they exist to maximize shareholder value. Because nonprofits lack that clarity of purpose, they need a crystal-clear mission statement that can unite stakeholders with different—and often competing—goals and expectations. When a mission statement is clearly formulated, it guides decisions about which programs and projects to undertake, which to avoid, and which to exit.

In too many cases, though, nonprofits develop mission statements that are vague or too lofty. In fact, many board members do not know or fully understand their organization's mission. When BoardSource asked nonprofit board members and CEOs to "grade your board's performance in understanding your organization's mission," only 50 percent of respondents gave their board an A.

An unintended consequence of such fuzziness is mission creep, a debilitating virus that takes nonprofits far beyond their core competencies. It's worth remembering that a fundamental axiom of strategy in the corporate sector is that more focused strategies outperform less focused ones. If a for-profit bakery decided to begin making not just bread and pastry but also tennis rackets, software, and pianos, people would raise an eyebrow. When that kind of expansion happens in the nonprofit sector, no one blinks. Often mission creep arises from a compelling funding opportunity. For example, a neighborhood after-school tutoring organization that decides to offer midnight basketball can invariably trace that decision to a top donor's special enthusiasm for midnight basketball.

Helping an organization avoid such problems is one of the main duties of a nonprofit board. Too often, board members just accept that a nonprofit's mission "is what it is." Even in cases where an organization has a clear and well-focused mission statement, board members and senior staff should thoroughly review that statement every three to five years. In doing so, they will sharpen both their understanding of the mission and their commitment to maintaining it.

The board of Helen Keller International (HKI) periodically reviews its mission in this way as part of its strategic planning. According to its mission statement, HKI "saves and improves the sight and lives of the world's most vulnerable by combating the causes and consequences of blindness, poor health and malnutrition." (The interventions are linked; malnutrition is a leading cause of blindness.) President and CEO Kathy Spahn says the organization requires board members to visit programs in Africa and Asia at least once every three years, allowing them "to come back not only inspired and passionate about our mission, but also with a deep understanding of what is involved in executing on that mission." That approach has paid off. When a devastating cyclone struck in Bangladesh, for example, the HKI board ensured that the organization limited its role to helping villagers reestablish home gardens and did not attempt to provide emergency food supplies. Emergency relief is not HKI's mission or core competency.

QUESTION 2: HOW IS OUR 'THEORY OF CHANGE' INFORMING OUR STRATEGY?

Board members who are used to robust strategy formulation in the private sector are often surprised by how nonprofit organizations struggle to translate their mission into a concrete plan for marshaling and deploying resources. In many cases, boards themselves are part of the problem. Only 20 percent of respondents in the BoardSource survey said that they would give an A to their board's ability to adopt and follow a strategic plan.

One way to make the strategic conversation more concrete is to probe on a nonprofit's "theory of change." A theory of change is a rigorous description of exactly how an organization's work—its portfolio of initiatives and interventions—will help achieve the given mission. Often discussed in the nonprofit world, but infrequently employed as a tool for ensuring strategic coherence, a theory of change is a step-by-step outline, ideally informed by empirical evidence, of how organizational activity will translate into impact for beneficiaries.

When reviewing any proposed activity, you should ask the executives and program officers of the nonprofit, "How does this activity align with a logical, achievable theory of change?" When you are clear on the answer to that question, you can do a better job of assessing that individual initiative. You are also better able to have a coherent conversation about big-picture strategic issues that may be rumbling beneath the surface, such as the degree to which your strategy incorporates a clear-eyed view of potential competitors and collaborators, or the sustainability of your revenue model. These are critical issues that a business leader naturally would ask about in a corporate setting but that can seem out of place unless they are integrated with a theory of change.

Landesa, an organization that has worked in more than 50 countries to obtain land rights for the rural poor, consciously divides its theory of change into five discrete steps, each of which is informed by empirical evidence. Here, for example, is how it articulates the final step: "A small group of focused professionals working collaboratively with governments and other stakeholders can help to change and implement laws and policies that provide opportunity to the world's poorest women and men." Landesa also developed a graphical picture of its theory of change that uses arrows depicting causality to delineate specific goals, activities, outcomes, and impact.

For Landesa, as for most organizations, the process of developing and obtaining stakeholder agreement on its theory of change has been as important as the end product. Tim Hanstad, former president and CEO of Landesa, who is now a special adviser to the organization, explains: "Some of our richest discussions as an organization—with management, staff, board members, and donors—have occurred during the process of developing . . . our theory of change. . . . We are forced to ask ourselves as a group, 'What evidence do we have that our intervention will bring about the intended results?'" Landesa not only has a sound theory of change; it also uses that tool. "We have an

internal process—called the Project Life Cycle process—that requires every new project concept and design to be justified by our theory of change," Hanstad says.

QUESTION 3: HOW ARE WE EVALUATING OUR IMPACT?

Corporate boards enjoy the benefit of a range of financial metrics, including a company's share price, to help them evaluate their performance. Without them, nonprofit boards unsurprisingly tend to fall short in this area: in the 2015 BoardSource survey, for example, only 13 percent of respondents gave their board an A for monitoring organizational performance and impact, and 38 percent gave their board a C or worse.

If you are serious about helping your nonprofit achieve its mission, you need to insist on regular impact measurement, not as a pro forma obligation but as part of a dynamic feedback loop that helps drive organizational strategy. Far from being a mere box to tick, evaluation can drive a virtuous cycle in which an organization tests its theory of change and strategy and then improves its programs in response to what it learns.

In recent years, randomized controlled trials (RCTs)—studies that test an intervention against a counterfactual case in which it is not in effect—have emerged as a powerful way to demonstrate whether a nonprofit intervention actually works. Boards should encourage this approach. Pratham, an organization that works to improve learning outcomes among children in India, has embraced RCTs with the full support of its directors. Over a 12-year period, the organization completed 11 such evaluations. "The RCT process is expensive, but the value is enormous because it builds internal capacity," said Madhav Chavan, Pratham's founder. "After we started doing the RCTs, our entire organization started understanding data much better, and we acquired down the line a better understanding of how to think of impact." Through its investment in this approach, Pratham has shown a definitive, causal link between its program and the impact on beneficiaries—and in turn this has helped unlock millions of dollars in funding.

QUESTION 4: DO WE HAVE THE RIGHT 'FUEL' TO DRIVE OUR ORGANIZATION?

A nonprofit is more than its mission, strategy, and impact. It's also a living, breathing organism that requires "fuel"—great people, an effective organization, sufficient funding, and the like—to operate. As a nonprofit board member, you need to check your organization's "fuel gauges" on a regular basis.

This should start with a clear-eyed view of the board itself. Significant mismatches between a nonprofit's mission and the composition of its board are common. An egregious example arose on the board of an international poverty-alleviation organization that, for nearly a decade, consisted only of a handful of the founders' childhood friends, all of whom were based in the United States and none of whom had any substantive experience or relevant professional expertise in international poverty alleviation. How could such a board operate as anything other than a rubber stamp for the decisions of the organization's executives?

If you find yourself on a board like this, you have a duty to speak up, and to vote with your feet if you don't see progress. You may be surprised at the receptiveness of your fellow directors, whose time is valuable and who may be harboring similar feelings but remaining quiet out of politeness or habit. As you work through these issues, heed the venerable principle of the three Ws: work, wisdom, and wealth. You and your fellow board members should ask, "Do we have members who offer their time, energy, and insight to committee work, fund-raising events, outreach to donors, and the like? Do we have members whose special talent or area of expertise will help us achieve our mission? And do we have members who can and will support the organization financially?" While this last topic may be uncomfortable, helping your organization to raise money—whether through direct giving, providing introductions to prospective donors, or continually examining your organization's overall approach to fund-raising—is the only way to sustain its impact.

Keeping an eye on the fuel gauge also means regularly asking at board meetings, "Does our organization have the people needed to achieve our mission?" Board members have a special duty to insist on both paying highly effective executives appropriately, so they can be retained, and ensuring that underperforming employees move on. The latter is an area where nonprofits particularly struggle. In our Stanford survey, only about half of nonprofit executives, staff, and board members agreed with the assertion that underperforming employees "do not stay for long in my organization." But as every manager in the for-profit sector knows, removing laggards, when done responsibly, not only improves organizational efficiency but sends a powerful signal about organizational values.

Serving on a nonprofit board in the years ahead represents an extraordinary opportunity for impact on society, and on the nonprofit itself. But if you want to be an effective strategic leader, you can't settle for a regimen of reading board books and showing up for quarterly meetings. You must engage fully on your organization's mission; seize opportunities to observe frontline work; and, at each board meeting, take every chance to confront the big, long-term issues by asking tough questions. The best quip that we ever heard on this subject conveys a vital truth: "I have no objection to a good discussion breaking out in the middle of a board meeting." Q

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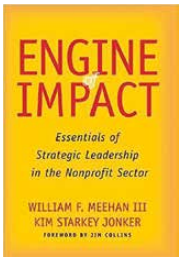

This article is adapted from the authors' recent book, *Engine of Impact: Essentials of Strategic Leadership in the Nonprofit Sector* (Stanford Business Books, November 2017).

Working across many cultures at Western Union

The CEO of the global money-transfer company explains how it brings in the multicultural voice of the consumer through a broadly diverse team of top executives.

When Western Union Holdings CEO Hikmet Ersek rang the opening bell of the New York Stock Exchange in May 2015, it marked 150 years since the WU ticker was the first listed on Wall Street. Few businesses are as long lived. Western Union is one of only two companies still left from the original 11 in the Dow Jones Transportation Average.

Since its founding, Western Union has played a prominent role in American culture and commerce. The company built the first transcontinental telegraph line across the United States in 1861, issued one of the first consumer charge cards in 1914, launched the first domestic commercial satellite into orbit in 1974, and sold the first prepaid telephone card in 1993—not to mention sending the first CandyGram in 1959. Some of the world's great tragedies have played out by Western Union telegraph. These include the last message sent from the *Titanic*, a distress call reading: "SOS SOS CQD CQD Titanic.[1] We are sinking fast. Passengers are being put into boats. Titanic."

You can't send a telegram by Western Union anymore, but the company continues to thrive at the forefront of the cross-border, cross-currency money-transfer and payments industry. Across more than 200 countries and territories, the company has more than half a million agent locations, and it offers services through more

[1] CQD was the contemporary maritime distress signal meaning "Come Quickly: Distress."

than 150,000 ATMs and kiosks, along with the ability to send money to billions of accounts. In 2016, Western Union completed 268 million consumer-to-consumer transactions and 523 million business payments worldwide, moving more than $150 billion of principal for consumers and businesses.

McKinsey's Kausik Rajgopal and Lang Davison recently sat down with Western Union's CEO to talk about its multicultural customer base (and leadership team), finding the simplicity within complexity, and how Ersek surprised everybody with his choice to lead the company's digital innovation lab in San Francisco.

The *Quarterly*: *Western Union has a big global network of agents on the ground in a wide variety of countries. What makes this network distinctive?*

Hikmet Ersek: For one thing, our customers aren't like those of many other companies. We actually have two types of people we serve, the sender of the money and the person who receives it. For example, the sender could be an immigrant from a rural part of Tamil Nadu, who's left India to find work in Canada. In this case, we have to understand that his relatives—the receivers—are in Tamil Nadu. They're not in Punjab; they're not in Pakistan. And that understanding has to drive where and how we open locations in Tamil Nadu, as well as where and how we open them in Canada. That's a bit more complex than opening a typical retail location.

But what really sets us apart is the interplay between our digital business and the retail network. Our senders can send money from the phone in their hand, and the receiver can pick it up in cash. NGOs [nongovernmental organizations] can send money from their global headquarters in London, and their fieldworkers can pick it up in cash in a conflict zone. In India, parents of a university student in Canada can give cash to our agent in Mumbai, and the tuition payment is made to the university's bank account.

In order to build a unique physical and digital network like this, you can't sit in a corner office in Denver or San Francisco. You have to be in and understand the diverse marketplaces in the world. There is a lot of fundamental prework that has to occur before you can open anything. First you have to negotiate with the reserve banks. You have to talk things over with the regulators. You have to find the right agent for the location. And you have to begin all this with the voice of the customer in your head.

Many people say the voice of the CEO is very powerful. I don't think so. The voice of the customer has more power. But if you can combine both voices in your day-to-day actions, it's even stronger.

The *Quarterly*: *You have built this network during a unique historical time, too.*

Hikmet Ersek: Yes, to be fair, we have been lucky. Globalization has helped us—the expansion and mobility not only of goods and information but also of the global workforce. The increased movement of people across borders has been very helpful to our expansion. Globalization has also helped us have a unique brand. People may not speak English, but they recognize Western Union. Ours is a global language for moving money to support your loved ones. That's Western Union.

The *Quarterly*: *That would seem to put a premium on multicultural skills within the organization.*

Hikmet Ersek: It does. Our customers have broadly diverse religious celebrations, school systems, languages, and beliefs. A multicultural understanding of these differences is required if we are to stay close to our customers—not only the senders and receivers of money but also the bankers, regulators, and agents. You need a multicultural competence simply to select the right agent for a given location, or to create the right app for a given country, one that reflects our brand in the right way. Cultural differences are complex, and therefore our business is, too. Thank God it's complex. If it weren't then maybe we wouldn't be so successful.

The *Quarterly*: *What kind of management approach do you need for this unique customer context?*

Hikmet Ersek: Our people need their own multicultural competency if they are to understand the diverse needs of our customers. I call it "cultural dancing." You don't have to be Filipino to have that competence. You don't have to be Indian or Turkish. But you do have to be open-minded to people's needs and willing to step away from the perspective with which you see the world.

You also have to be willing to look beneath the surface, to look beyond the apparent first meaning of the words someone is using. Because the person speaking may not be using their primary language, it's up to the listener to actively participate in finding out what the person actually means by what they say. If you're only used to your home culture, you don't have to do that. You can take things more at face value. But if you grew up in a multicultural environment, you think to yourself, "Maybe they didn't mean it exactly like it sounds. Maybe there's a second thought, a second meaning behind the first one." That openness is important if you are on my leadership team.

By the way, I find that people in the US are more multicultural than they are given credit for. The business leaders in the US adapt themselves more easily than do those of some other countries. Perhaps one reason is that the US is built with and by immigrants. This country has an understanding of immigrants and an openness to diverse cultures that isn't always present in other countries. I hope that doesn't get put aside in the new political environment that seems to be emerging in the US.

The *Quarterly*: *Your customers are diverse. And your leadership team is similarly diverse, right?*

Hikmet Ersek: Among the nine executives that make up my top leadership team, we have 13 nationalities. These leaders have together worked in more than 40 cities globally—from Kabul to London, from Frankfurt to Riyadh. So they're truly international, but they also have deep market experience, which enables them to stay connected to our diverse customer base.

The *Quarterly*: *How does that diversity play out in your leadership assignments and in the roles you ask your leaders to take on?*

Hikmet Ersek: I'll give you an example. A few years ago, we decided to open a new office in San Francisco with a team that would be responsible for building WU Digital, Western Union's digital and mobile business, a start-up within the broader company responsible for reinventing and expanding our money-transfer business for the mobile age. Who did I pick to lead this new effort? Not a cool, new tech genius from the Bay Area and Silicon Valley. I picked the leader of our Africa business, Khalid Fellahi. I picked someone who has the multicultural competence we're talking about, the understanding of our diverse customer base and their needs. Even a new start-up within the company has to begin with the voice of the customer, and

"Our people need their own multicultural competency if they are to understand the diverse needs of our customers. I call it 'cultural dancing.'"

HIKMET ERSEK

Vital statistics
Born in Istanbul, Turkey

Married, with with 2 children and 1 grandson

Education
Holds a master's degree in economics and business administration from Vienna University of Economics and Business

Career highlights
Western Union Holdings
(1999–present)
President, CEO, and director

General Electric
(1996–99)
National executive for Austria and Slovenia

Europay/MasterCard
(1986–96)
Sales and business development

Fast facts
Recognized as one of the "most socially responsible chief executives" by *Corporate Responsibility Magazine*, receiving its Responsible CEO of the Year Award in 2012

Recipient of the Austrian of the Year Award in 2016 and serves as the Austrian Honorary Consul for Colorado and Wyoming

Member of the International Business Council of the World Economic Forum and the Business Roundtable

Citizen of both Austria and Turkey; advocates for migrant and refugee rights worldwide

that's what we got with Khalid. With that in place, he then hired 250 smart people from Silicon Valley, including the many engineers the effort needed. Now our digital business is the fastest-growing part of Western Union.

Many companies or investors would never dream of pulling a leader out of Africa to establish and run a multimillion-dollar digital business in the heart of the Silicon Valley. In fact, many people, both inside the company and out, said, "What are you doing?" Even Khalid was surprised. But I believe that if you understand the voice of the customer, then everything else will follow thereafter. And I think this decision was the right one, since WU.com has been growing in the double digits.

The *Quarterly*: *Are there downsides to being multicultural?*

Hikmet Ersek: Well, the upside to multiculturalism is you tend to learn quickly. But the downside, to generalize, at least, is that multicultural executives tend to be a bit less disciplined. Something about dancing between cultures that means you can sometimes be less disciplined. Or at least that it doesn't come naturally; you have to learn it. You may have an ability to be forward looking and visionary, but you have to look backward, too, in order to fix what's less efficient and effective. So the question becomes how you combine those two things in an organizational culture.

I was fortunate to have been trained in one of the best places, General Electric, where I spent the first years of my career. Jack Welch was one of the first guys to bring Six Sigma to Europe. And Six Sigma is all about discipline, even if it's not exclusively that.

The *Quarterly*: *Does that mean, that you've brought Six Sigma into Western Union?*

Hikmet Ersek: We're developing our own version of it, yes, with something called the WU Way. The WU Way is a kind of lean-management process-optimization environment, a disciplined approach based on the voice of the customer that can help this multicultural organization increase the discipline it needs.

RAPID REFLECTIONS
FROM HIKMET ERSEK

1 IF YOU WEREN'T CEO, WHAT OTHER JOB WOULD YOU DO FOR A DAY?
A professional basketball coach. I played semipro basketball in Europe years ago, and I still love the sport.

2 IS THERE A COMMON PIECE OF LEADERSHIP ADVICE THAT YOU THINK IS WRONG OR MISLEADING?
Many of us were taught that managers and CEOs should be the experts. But the truth is that leaders who don't trust and empower their people lose in the long term.

3 WHAT IS THE MOST INTERESTING THING THAT YOU HAVE LEARNED ABOUT ANOTHER CULTURE?
Being culturally competent means being a good listener and being humble when interacting with others.

4 WHAT MEMORY STANDS OUT THE MOST FROM YOUR EARLY YEARS GROWING UP AS A CHILD FROM A MULTICULTURAL BACKGROUND IN EUROPE?
Celebrating both Christmas and Eid with my family gave me flexibility for life.

The *Quarterly*: *One area the company has had to instill discipline is in the culture of compliance, given the regulated environment in which you operate. And in 2017, Western Union paid a $586 million fine imposed by the US Justice Department and Federal Trade Commission. Can you discuss some of the things you've done with regard to compliance?*

Hikmet Ersek: When I became CEO in 2010, it became clear that compliance was one of the first strategic areas that we needed to invest in. The regulatory environment only continues to get more complex, and we needed to invest in the relationships and infrastructure to ensure we could succeed.

We announced the settlement in 2017, but the truth is that the conduct at issue mainly occurred more than five years ago. Over the past five years, we've made significant enhancements and investments in our programs, and today we invest 3.5 to 4.0 percent of our revenue in compliance. Part of this investment is in employees—more than 2,000 are dedicated to compliance—and in sophisticated technology to help keep "bad money" out of the system. We also strengthened our agent and customer education, and we put in place a new compliance governance structure.

Today, I think we all can see that globalization looks different than it did in 2010, and part of what that means is that there is less harmonization of regulations than many might have imagined. What that means for WU is that we believe these compliance investments can become a long-term competitive advantage. We're one of the world's most global companies, yet we have the relationships and infrastructure to successfully navigate local regulations—across more than 200 countries and territories.

The *Quarterly*: *Did that mean creating a compliance department?*

Hikmet Ersek: We already had a compliance department, but we decided that compliance had to be part of our culture as a whole, and not just the responsibility of one department. So we created a compliance committee at the board level, and then we looked to instill a culture of compliance at the other levels of the company, too. The same way everybody in a company is a brand ambassador, well, everyone has to be a compliance ambassador. And they have to carry out their daily activities with the discipline needed for compliance. For instance, every employee has to complete a compliance training class and become certified. And the tests are not easy, either.

It wasn't popular on Wall Street, by the way. Our stock took a hit when we announced we'd be investing about 3 to 5 percent of revenues in compliance activities. It took a while to tell the story, to convince them that we could create a long-term competitive advantage.

The *Quarterly*: *Describe your own growth as an executive.*

Hikmet Ersek: One of my biggest growth areas has been to learn to put my own ego aside. Don't think that I was always like that. I learned it. It's something that you learn over the years. I may have my own ideas about something—for instance, about the importance of the WU Way—but I have to carry that to my team, taking the time to do that properly. The notion is to make your idea their idea. Then, once the idea takes hold, you can't say, "Well, it was my idea in the first place."

In the past, I would have said, "Hey, it was my idea first! Don't forget me! I want to have the credit!" Right? You develop over the years. Or you don't. Some people never develop. But being multicultural helps in this regard. You learn to adapt yourself more easily, to learn and to grow.

The *Quarterly*: *What else have you learned over the years?*

Hikmet Ersek: One thing I've learned is that leaders have to balance the complexity of the world by keeping things simple. Many people will show you how complex or how difficult an issue is. In some cases, they may be right, but most of the time it is their insecurity or they are just afraid to solve a problem.

As a leader, especially as a business leader, in a complex environment, it is important to keep things simple. If you have products and services that are too difficult to market and do not match customer needs, you will lose. The advice from me would be to create products and services that are simple for the customers. That will make you successful. The communication and the marketing of the complicated products and services, whatever they are—spaceships, medicine, hamburgers, or financial funds—has to be simple. Also, the company's vision and goals for the employees, shareholders, board members, and all its other stakeholders must be stated simply so that all over the globe, in any culture, in any language, the intent of the message and the direction of the company are clear.

The *Quarterly*: *How do you go about making things simple?*

Hikmet Ersek: I do it by asking "why." Asking why has been a recurring theme throughout my business life. During the Jack Welch period at GE, I went through the Six Sigma training and learned the concept of asking "why" five times. Asking why generates simple solutions that overcome complexities.

By asking why, you can be innovative, even within a long-established business, where your own success risks blinding you to future opportunities and transformation. I started the transformation at Western Union—into the digital era and into the compliance era—by asking the question why, and it kicked off an entirely new set of business solutions for our company to offer. Q

Hikmet Ersek is the president, CEO, and director of Western Union. This interview was conducted by **Lang Davison,** a member of McKinsey Publishing who is based in McKinsey's Seattle office, and **Kausik Rajgopal,** a senior partner in the Silicon Valley office.

HOW COMPANIES CAN GUARD AGAINST GENDER FATIGUE

Show you are serious about basics such as mentoring and work–life flexibility—then hold yourself accountable.

Dominic Barton is the global managing partner of McKinsey & Company.

Lareina Yee is a senior partner in McKinsey's San Francisco office.

Most of the corporate world has set a bold aspiration to achieve equality for women in the workplace. Ninety percent of US companies in our latest research, for example, say they are "very committed" to this goal, and just about all of them are taking action.

It's also obvious that we're still in the early stages of the journey: Currently, just 20 percent of C-suite executives in the United States are female. Although that figure is inching up—from 19 percent a year ago—more than one CEO has confided to us, "We're implementing all the best practices, but the numbers aren't moving fast enough, and I'm worried about maintaining the energy we need to keep going."

The good news is there are ways to counter change fatigue. Our third annual *Women in the Workplace* report, developed in collaboration with LeanIn.Org, shows the importance of executing the basics with conviction. The experience of 70,000 surveyed employees, coupled with performance benchmarking of the 222 participating companies, shines a light on bolder actions we see from companies that are top performers in employing and promoting women.

Break through on the basics

Many companies have put in place the right building blocks: They're developing a business case, tracking gender representation across the workforce, and developing training, flexibility, and networking programs. Breaking through on the basics isn't easy, though.

Consider the metrics: Some 85 percent of companies surveyed track gender representation. Yet less than a third set targets, and transparency is rarer still. Most companies say they share a majority of diversity metrics with senior leaders, but just 23 percent do so with managers, and a mere 8 percent with all employees. It's the same with the business case: 78 percent of companies say they articulate one, but only 16 percent back up the case with data.

Top-performing companies are executing with greater intensity and have the results to show for it. For example, while many managers work with their teams to identify development opportunities, top companies also have programs aimed specifically at boosting the mentorship of women and their promotion rates.

Or consider flexibility: The top-performing companies in our research are more than twice as likely as those at the bottom to offer emergency backup childcare services; three times as likely to offer on-site childcare; and more likely to offer extended maternity and paternity leave, as well as programs to smooth the transition to and from extended leave. Moves such as these build broad-based enthusiasm because they help men and women alike.

Maintaining momentum

Despite these encouraging signs, the overall picture is one of uneven results, which sometimes breeds skepticism. Barely half of the men and women in our survey expressed confidence that their company is doing what it takes to advance women. To keep organizational uncertainty from slowing progress, leaders should take additional steps like these:

- *Hold yourself accountable.* A majority of companies say they don't hold their senior leaders accountable for performance against gender-diversity metrics, or use financial incentives to encourage action. Employees notice: less than 20 percent in the survey said they saw leaders regularly being held accountable for performance on gender diversity. If you want to help keep your organization on track, show your people that senior leaders are taking responsibility for the outcomes of the initiatives they are driving. Forty percent of the companies in our survey do emphasize top-management accountability, and many of them are seeing much better results.

- *Make men part of the solution.* Less than half of men report that advancing women is an important priority for them. Leaders hoping to bring them on board need to show, through actions, not just words, how things can be different: the data show that when men think their company or direct manager is highly committed, or get explicit guidance from a senior leader on how to improve, they are more likely to embrace the cause.

- *Emphasize race and gender.* Sometimes change efforts benefit from widening the lens, such as addressing the reality that there is still a disquieting racial component to gender bias. Just 3 percent of C-suite

roles are held by Asian, black, Latina, or other women of color. Black women face the longest odds. Promotion rates for them are 50 percent below those of white women, and only 23 percent of black women say managers help them navigate organizational politics, compared with 36 percent for white women. These challenges are a critical, too-often overlooked piece of the gender puzzle that demand their own attention, commitment, and solutions.

In the first year of our research, we shared data suggesting that American corporations were 100 years from parity at the top. Two years later, even if the top-performing companies are still early in the journey, they're providing the clues on how to break through. That's encouraging: The data is getting clearer, and the answers are in front of us. If we stay committed, lead boldly, and execute relentlessly, we can build momentum and accelerate change. Q

This article first appeared in the *Wall Street Journal*.

Read the full report, *Women in the Workplace 2017*, conducted by LeanIn.Org and McKinsey, on womenintheworkplace.com.

The most dangerous strategy? Make no bold moves

"Occasionally, in the strategy room we'll see things as they really are and where they're going, and come up with a truly bold plan. Your job will be to talk us out of it."

For more on the social side of strategy and the power of bold moves, see "Strategy to beat the odds," on page 30, which is adapted from *Strategy Beyond the Hockey Stick: People, Probabilities, and Big Moves to Beat the Odds* (Wiley, February 2018), by Chris Bradley, Martin Hirt, and Sven Smit.

Highlights

Welcome to the strategy room: How to tame the social side of strategy and make big, winning moves

What AI can and can't do (yet) for your business

Organizing for the age of urgency: It's the only way to compete at the speed of digital

The four questions to ask when serving on a nonprofit board

Data as jet fuel: Boeing's CIO on harnessing the power of data analytics

Shaking up the leadership model in higher education

Reaching for the digital prize: Snapshots of four industries in transition

How companies can guard against gender fatigue

Western Union's CEO on the link between diversity in the top team and serving multicultural consumers