McKinsey&Company

McKinsey Quarterly

2015 Number 3

Published since 1964
by McKinsey & Company,
55 East 52nd Street,
New York, New York 10022.

Cover illustration by
Charles Williams

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McKinsey Quarterly
2015 Number 3

This Quarter

Here's news for executives looking to reinvent their companies in the digital age—your peers think disruption will unseat four of ten industry leaders within five years, according to a recent survey by the Global Center for Digital Business Transformation.

Few should be surprised. On the road to digital maturity, established companies often seem stuck in first gear. The difficulties begin with strategy: unrealistic ambitions get in the way of more targeted strategic responses. Even when strategies hit the mark, companies often lack the capabilities needed to carry them out at scale. And fast, agile organizational cultures—the kind that compensate for other shortcomings—are still more aspiration than reality.

This issue of the *Quarterly* takes stock of the digital performance of today's big corporations, noting that many of them suffer from a low Digital Quotient, or DQ—the firm's overall metric for digital maturity. Those that continue to struggle must build organizations and cultures capable of realizing realistic and well-aligned digital strategies, argue Paul and his colleagues Tanguy Catlin and Jay Scanlan in "Raising your Digital Quotient."

One way to make rapid progress in the digitizing world will be to harness the increased potential of artificial intelligence. In "An executive's guide to machine learning," Cristina and her colleague Dorian Pyle look to help top managers make a confident start toward the coming era of greater human–machine collaboration. In

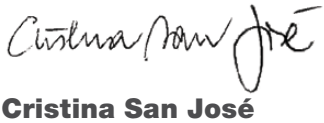
the fairly near future, self-motivating, self-contained (and often self-programming) machine-based agents will carry out set objectives autonomously, without any direct human supervision.

The greater participation of machines is only one factor that will increase the importance of trust in the digital world, according to Tucker Bailey, James M. Kaplan, and Chris Rezek. In their article, "Repelling the cyberattackers," these authors assert that companies need to move beyond considering cybersecurity as a control function and adopt a more integrated, resilient approach. This will require top executives to engage more deeply with questions of cybersecurity than most are doing today.

Throughout it all, the rapid pace of digital transformation gives pride of place to innovation. Two articles in this issue focus on crucial aspects of the innovation process. "The simple rules of disciplined innovation," by McKinsey alumnus Donald Sull, now at the Massachusetts Institute of Technology's Sloan School of Management, helps executives embrace the apparent paradox that constraints on the innovation process help rather than hinder creativity. And in "Disrupting beliefs: A new approach to business-model innovation," Marc de Jong and Menno van Dijk show that prevailing conventions about how to make money in an industry can be turned on their head.

Taken as a whole, we hope these articles will provide new impetus to executives as they continue their difficult journey toward digital reinvention.

Paul Willmott
Director, London office



Cristina San José
Principal, Madrid office

On the cover

Features

Innovating with discipline

Leading Edge

Closing Views

McKinsey Quarterly

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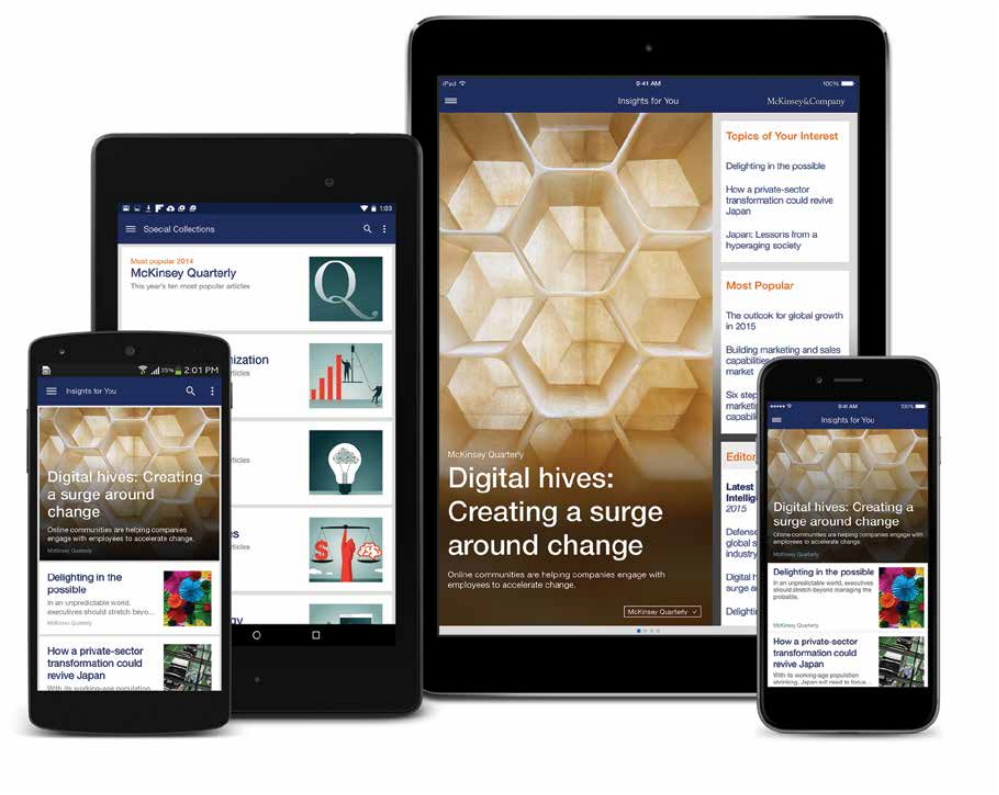

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Getting a sharper picture of social media's influence

Jacques Bughin

New research shows that buzz plays a greater role than previously thought in getting consumers to buy and that the pool of the most effective influencers is largely untapped.

Over the past decade, marketers have increasingly turned to social-media networks like Facebook and Twitter to create buzz around their products. But what impact do tweets and other recommendations have on sales, and how can companies get a bigger return on their investments in these important channels?

To get a clearer view, we examined the purchase decisions of 20,000 European consumers, across 30 product areas and more than 100 brands, in 2013 and 2014. Respondents were asked how significantly social media influenced their decision journeys and about instances when they themselves recommended products.[1] We found that the impact of social media on buying decisions is greater than previously estimated and growing fast, but that its influence varies significantly across product categories. Moreover, only a small slice of social influencers are creating the buzz.

A growing importance

Social recommendations induced an average of 26 percent of purchases across all product categories, according

to our data. That's substantially higher than the 10 to 15 percent others have estimated.[2] For the 30 product categories we studied, roughly two-thirds of the impact was *direct*; that is, recommendations played a critical role at the point of purchase. The remaining third was *indirect*: social media had an effect at earlier decision-journey touch points—for example, when a recommendation created initial awareness of a product or interactions with friends or other influencers helped consumers to compare product attributes or to evaluate higher-value features. We found that in 2014, consumers made 10 percent more purchases on the back of social-media recommendations than they had in 2013.

Nuances are essential

Consumers, we found, access social media to very different degrees in different product categories. At the low end, only about 15 percent of our respondents reported using social media in choosing utility services. For other categories, such as travel, investment services, and over-the-counter drugs, 40 to 50 percent of consumers looked to social recommendations.

Product categories tend to have their own discrete groups of influencers. Our data showed that the overlap of recommenders between any two consumer categories was very small—a maximum of 15 percent for any two pairs of products we analyzed. Timing matters as well: a first-time purchaser, for example, is roughly 50 percent more likely to turn to social media than a repeat buyer.

While the role of digital influence is expanding, the analog world remains important. Among the more than 100 brands we studied, about half of the recommendations were made offline—in person or by phone. Offline conversations were up to 40 percent more likely than digital interactions to influence purchase decisions of products such as insurance or utilities.

Power influencers and the long tail

Our research shows that a small number of active influencers accounted for a disproportionate share of total recommendations (exhibit). These power users are even more significant for product categories such as shoes and clothing: 5 percent of the recommenders accounted for 45 percent of the social influence generated. The upshot is that in most product categories, there's a substantial long tail of less active recommenders who could be spurred on to greater engagement.

Navigating in a changing environment

As companies look to maximize returns from their social strategies, they can both encourage would-be customers to engage in more social interactions and inspire more influencers to express enthusiasm for their products.

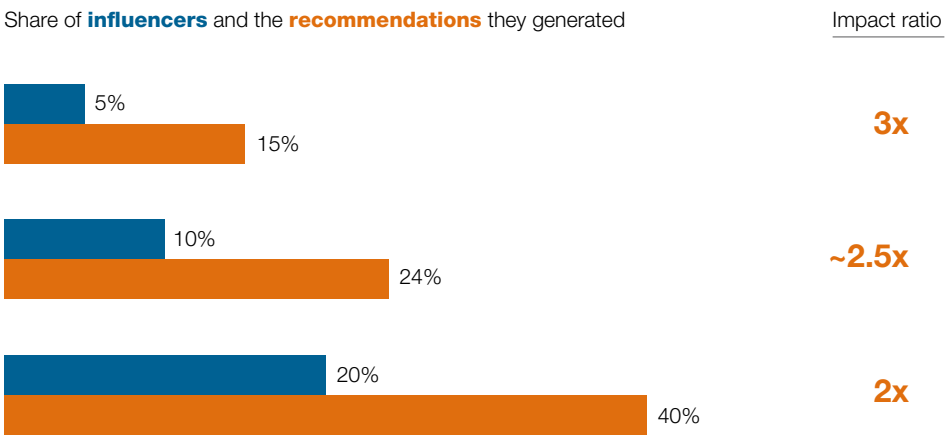
On the demand side, our research suggests that online articles written by journalists prompt consumers to seek out social media to further inform purchases (and that public-relations spending to generate such articles may be a worthwhile investment). Consumers who use search engines to gain some initial knowledge of a product are also more likely to tune in to social media before a purchase. Companies that spend effectively on search-engine optimization (to move their product mentions to the top of search results) can expect to benefit from a greater social-media impact, as well.

Television advertising, by contrast, tends to act as a substitute for social media rather than complementing it. Relatively few customers were prompted to seek out social influences after viewing a TV spot.[3]

On the supply side, prompting the long tail of less active influencers may require creativity and a greater use of data analytics. Our research found, paradoxically, that if companies allowed endorsements only, they generated a less strong response than companies that invited any sort of comment. Positive remarks were three times more

Exhibit

Top influencers accounted for a disproportionate share of total product recommendations.



Source: 2013–14 McKinsey interviews of 20,000 European consumers across 30 product areas and more than 100 brands

numerous than negative ones, and some companies demonstrated that they could turn negative vibes to their advantage by responding quickly.

Other companies are amplifying positive noise by making the recommenders' data "speak." Through machine learning and the application of advanced analytics to recommenders' profiles, they obtain a granular understanding of product preferences and purchasing behavior. That analysis becomes a key input into sophisticated recommendation engines that identify *potential* customers and send them messages such as "purchasers like you bought this appliance" at key points along the decision journey. These engines are highly effective at converting customers,[4] though with an important caveat: the influence the engines generate can be as much as 75 percent lower if messages aren't highly personalized and targeted.

• • •

The pathways of social influence are shifting constantly. Looking ahead, better mobile devices and more robust social applications will make it even easier to share experiences about products and services. Companies can't afford to fall behind this powerful curve.

[1] The research compiled social and demographic information, as well as data on social interactions on Facebook, Twitter, and other social networks. The data gathered cover a range of decision-journey touch points leading up to purchases, as well as social activities after purchase.

[2] See *Connected Marketing: The Viral, Buzz and Word of Mouth Revolution*, edited by Justin Kirby and Paul Marsden, Oxford, UK: Butterworth-Heinemann, 2006.

[3] Interestingly, this contrasts with consumers' use of social media to comment on TV-show episodes. See "Living social: How second screens are helping TV make fans," Nielsen, August 4, 2014, nielsen.com.

[4] Others have estimated that these engines are responsible for more than 50 percent of purchases or viewer activity at digital leaders such as Amazon and Netflix. See JP Mangalindan, "Amazon's recommendation secret," *Fortune*, July 30, 2012, fortune.com; and Tom Vanderbilt, "The science behind the Netflix algorithms that decide what you'll watch next," *Wired*, August 7, 2013, wired.com.

Jacques Bughin is a director in McKinsey's Brussels office.

Mapping the value of diversification

Francisco Caudillo, Skief Houben, and JehanZeb Noor

Expanding your focus tends to add more value in emerging economies than in developed ones.

Creating value through diversification is significantly easier in emerging economies than in developed ones.

In fact, when we compared the returns of more than 4,500 companies around the world with their level of diversification,[1] we found that in emerging economies, the most diversified companies created the highest excess returns, 3.6 percent, compared with –2.7 percent for pure players (Exhibit 1). By contrast, in developed economies, we uncovered almost no difference in excess TRS[2] for any degree of focus or diversification. These findings are relevant for more than 70 percent of large companies around the world already operating in more than two industries, and for anyone else considering diversification moves.

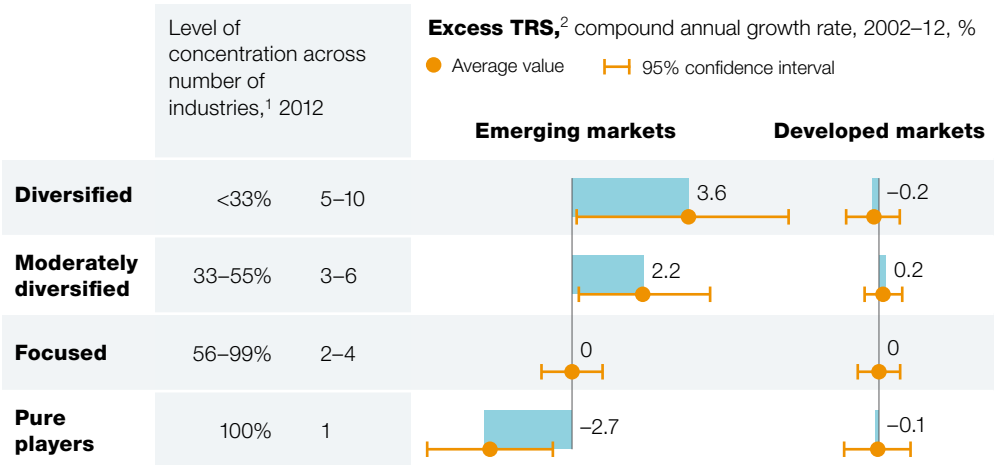
This isn't to say that diversifying, in itself, is either bad or good; what matters is whether a company can add value. Nor are cause and effect clear. Underlying market and ownership structures could play a role, though. For instance, the fierce competition for capital in developed economies probably ensures that market dynamics allocate resources to the best owners, so diversification without cash synergies across businesses confers little or no advantage. In contrast, many diversified companies in emerging economies are family owned or controlled, which can ensure opportunities to reinvest, better access to local and regional governments or to regulatory insights, and the ability to attract talent (Exhibit 2). That translates into higher revenues, profits, and returns to shareholders.

[1] Using the Standard Industrial Classification system.
[2] Total returns to shareholders.

Francisco Caudillo is a specialist in McKinsey's Miami office, **Skief Houben** is an associate principal in the Amsterdam office, and **JehanZeb Noor** is a principal in the Chicago office.

Exhibit 1

Diversification creates more value in emerging economies than in developed ones.

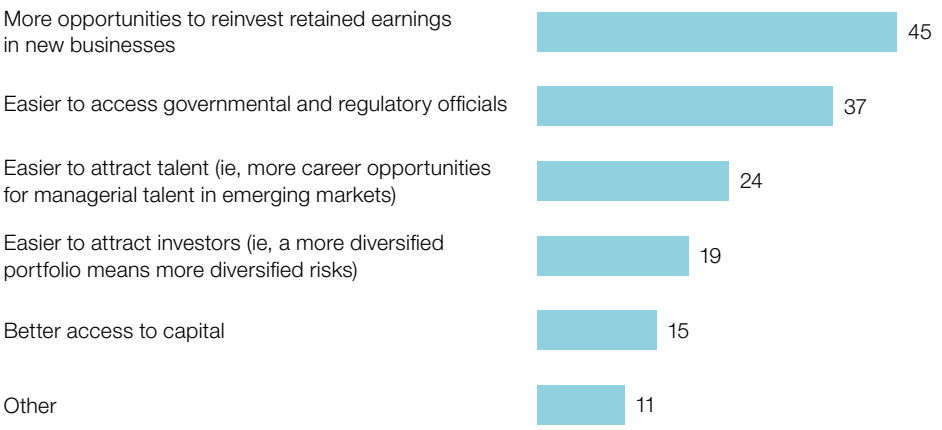


[1] For 4,576 global companies with revenues >€1 billion in 2012, excluding financial industries. Level of concentration calculated by Herfindahl-Hirschman Index; number of industries based on the Standard Industrial Classification system.
[2] TRS = total returns to shareholders; excess TRS calculated as company TRS minus reference TRS based on 10 high-level industries (Global Industry Classification Standard) per developed or emerging market.

Exhibit 2

Respondents from diversified companies in the emerging world report that they have structural advantages that help them create value.

% of emerging-market respondents; multiple answers allowed, n = 149



Source: McKinsey survey on growth beyond the core, Nov 2014

More from less: Making resources more productive

Markus Hammer and Ken Somers

For industrial manufacturers, resources remain a huge financial and managerial cost. A change in perspective can lead to real breakthroughs in reducing resource consumption.

The struggle to make the most of the world's resources has many fronts—something worth remembering even as headlines trumpet the supposed end of the "commodity supercycle." In fact, the vast majority of the world's manufacturers have a wealth of opportunities to make more money and increase returns to shareholders by using fewer resources. Their full range of options includes maximizing the use of raw materials, minimizing harmful emissions, cutting water loss, and reducing or avoiding waste streams through recycling and energy recovery.[1] (For more on the five interdependent beliefs underlying these options, see "Manufacturing growth through resource productivity," on mckinsey.com.)

Our experience shows that details count. We hope that by presenting some vivid examples of these concepts in action, this article will stir the imaginations of senior leaders about the possibilities for using resources more productively.

Think lean

The lean ideas first advanced in the Toyota production system gave organizations a new way to recognize and root out waste. Applying that same rigor to a specific form of it—energy and materials—lies at the center of resource productivity. (For more on lean and energy efficiency, see "Bringing lean thinking to energy," on mckinsey.com.)

In practice, these methods often involve following a product through a factory or service operation. That's known as value-stream mapping, which can be illustrated by a Sankey diagram that highlights streams of resource waste—in this case, the analysis of a familiar process: baking cakes for a school fund-raiser. Exhibit 1 tracks inputs, such as ingredients and electricity for running the oven, as well as losses, such as heat leakage from the oven. Currently only one loss is recovered, and that only partially: apple cores are used to feed chickens. Could the oven lose less heat in baking? Could eggshells be added to garden compost?

What if the oven ran on gas instead of electricity or the electricity came from a solar panel whose cost has already been paid?

Think limits

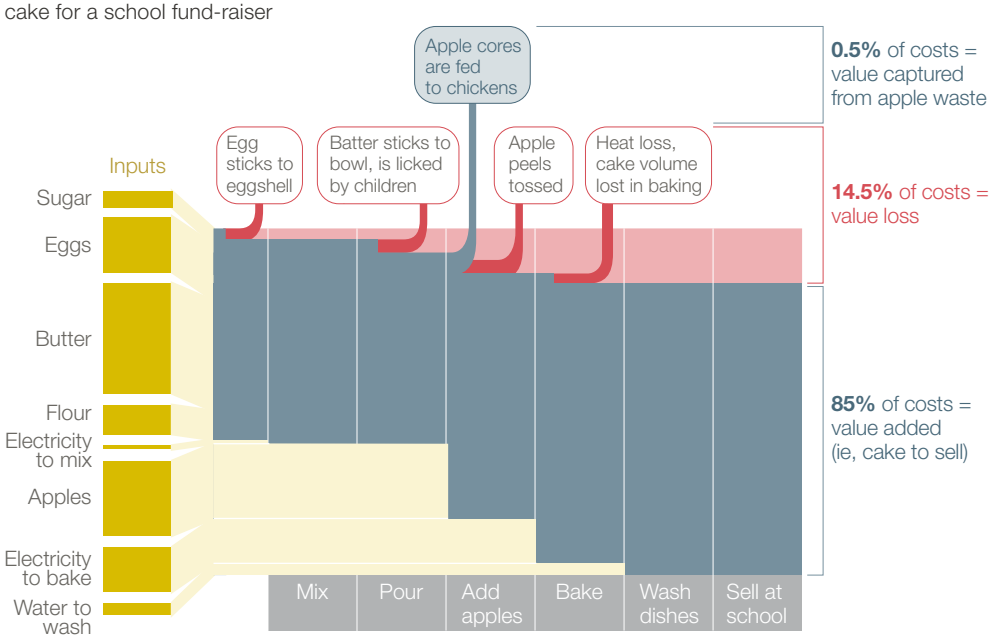
The starting point for most operational-improvement efforts is incremental change: taking an existing process as a baseline and seeing what improvements are possible from that point. For example, an organization might begin with actual consumption and identify ideas to reduce it. As Exhibit 2 suggests, an aggressive approach to resource productivity makes almost the opposite assumption. For any process, the baseline is the theoretical limit: the level of resource efficiency that the process could achieve under perfect conditions, such as a hypothetical state in which it produces zero emissions or if the heat it generates can be recovered.

As the bottom part of the exhibit shows, the difference between the theoretical limit and actual consumption is labeled as what it truly is: a loss. Most people,

Exhibit 1

Value-stream mapping tracks inputs and losses for each step of a process, offering insight into where resource waste might be reduced.

Process illustration: baking an apple cake for a school fund-raiser



and most organizations, are far more motivated to avoid losses than to reduce consumption. Reframing the problem in this way is therefore more likely to produce major improvement opportunities. An iron and steel manufacturer in China, for instance, followed this exercise and increased the power it generated from waste heat by 25 percent—which alone reduced its production costs by more than $1 per ton.

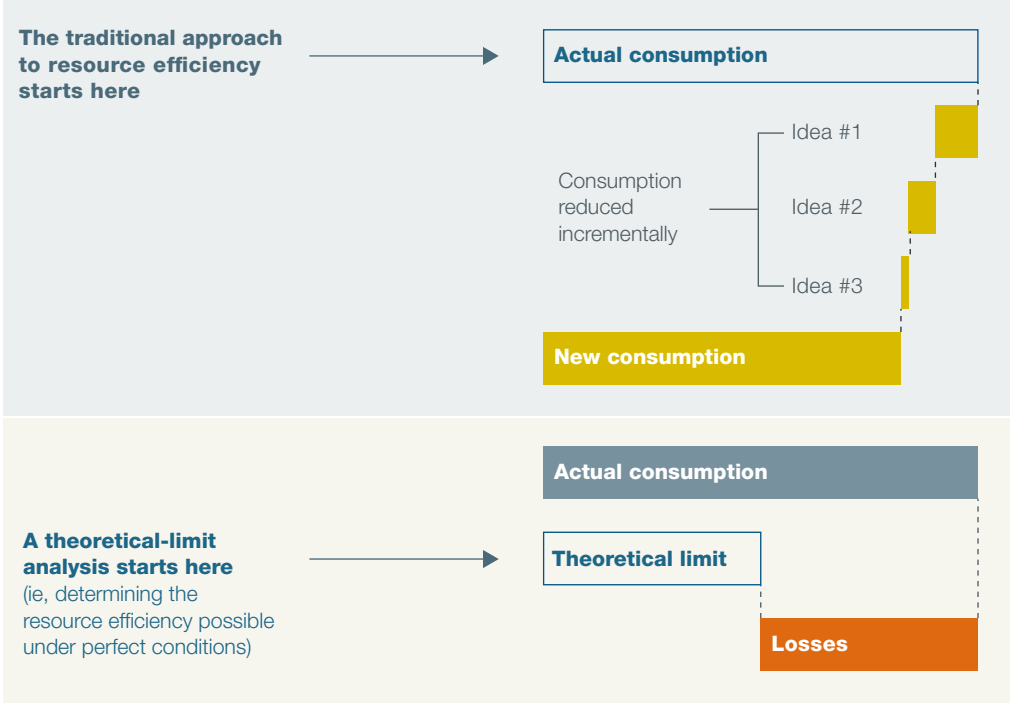
Think profits per hour

To choose among competing resource-productivity initiatives, companies need a common language for evaluating each idea's impact and the trade-offs involved. Ideally, an organization would quantify potential savings by using the one metric companies generally care about most: profit. But until recently, inadequate data and limited analytic tools meant that many manufacturers could measure profitability only by the amount of product they generated—euros per ton, for example.

The problem is that profit per ton ignores an essential resource: time. If the same equipment can produce two different products with two different margins, using it to make the low-margin product

Exhibit 2

Analyzing the theoretical limit exposes unseen losses.



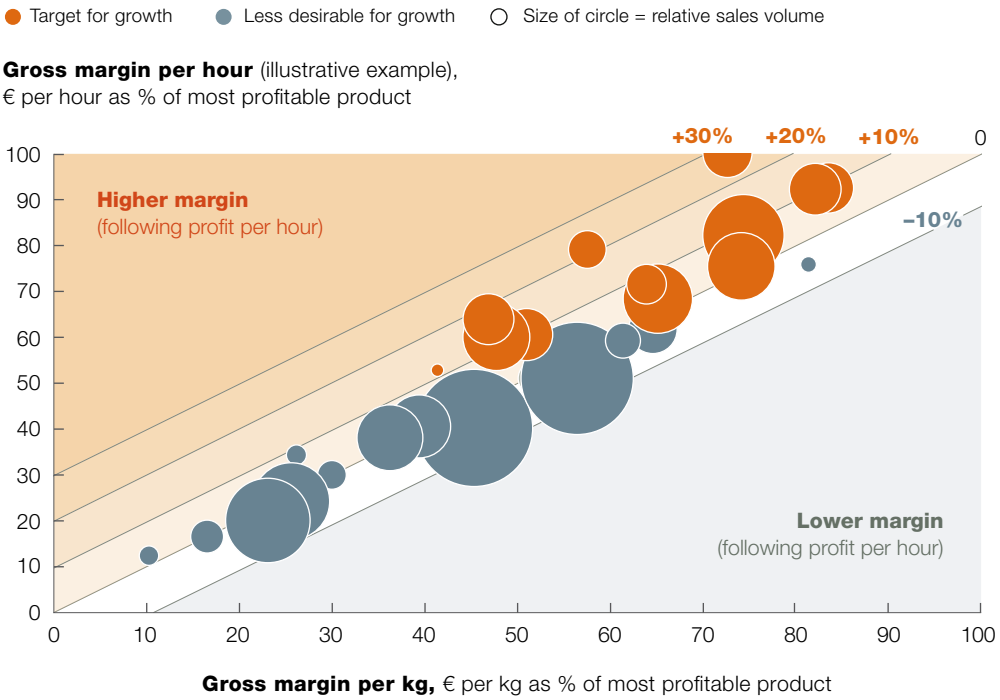
reduces the time it's available for the high-margin one. That loss cannot be recovered.

Now that companies can generate the needed analysis, the results are revealing. Exhibit 3 tracks a typical portfolio of products by profitability as a percentage of a company's highest-margin offering. The x-axis shows each product's margin on a traditional per-kilogram basis, while the y-axis shows the same product's margin measured per hour. Most products end up near the same point on both measures. But two of the highest-volume products, shown at the center of the diagram in blue, are less profitable per hour than per ton, while several lower-volume products, shown in orange, are more profitable by the new metric.

That sort of comparison can help companies make crucial resource-productivity choices. For example, in the chemical industry, increasing a product's yield usually reduces environmental waste but requires longer reaction times and leaves less capacity for other products. If, however, the product's profit per hour increases by running the reaction longer and improving the yield, the decision to do so is an easy one.

Exhibit 3

Thinking about profit per hour can help companies make crucial resource-productivity choices.



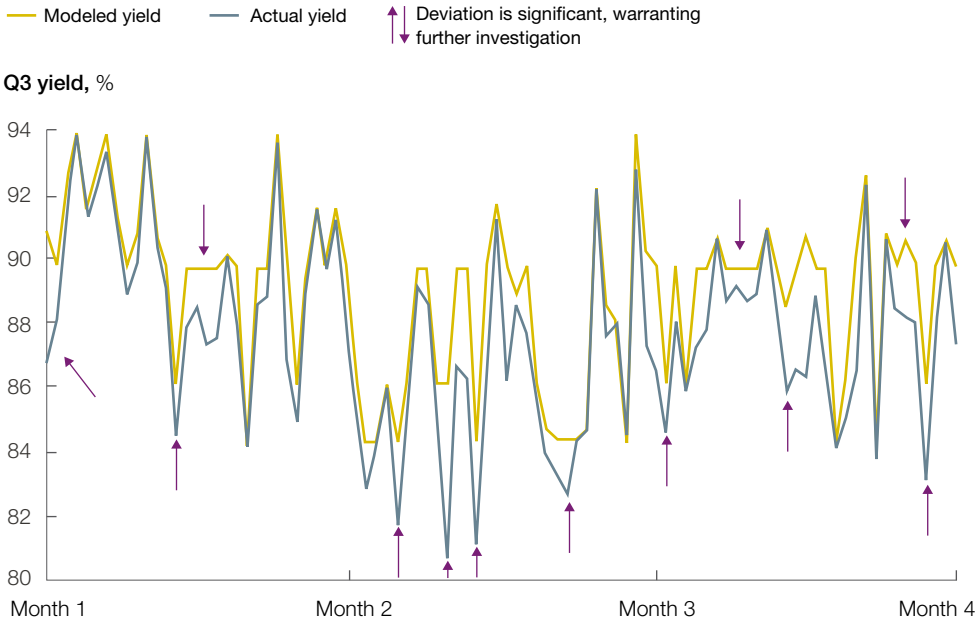
Embrace state-of-the-art analytics

Advanced analytic techniques can multiply the power of profit per hour, helping companies sort through millions of possible interdependencies among variables such as the quality of raw materials, the configuration of equipment, or process changes. Exhibit 4 illustrates how a precious-metals company solved an especially thorny set of questions as it sought to increase yields from its processes. Initially, it found that the optimum yield came from a fairly narrow range of ore grades, but when it examined grades in more detail, it found no discernible patterns.

To understand what was at play, the mining company turned to neural networks to isolate specific days and events when the yield should have been higher. The gray line shows the actual yield, while the green line suggests what the yield should have been. (Arrows indicate points where the deviation was significant and required further investigation.) The analysis showed

Exhibit 4

Neural networks—a form of artificial intelligence—assimilate data, rules, and hypotheses and use algorithms to learn from assumptions.



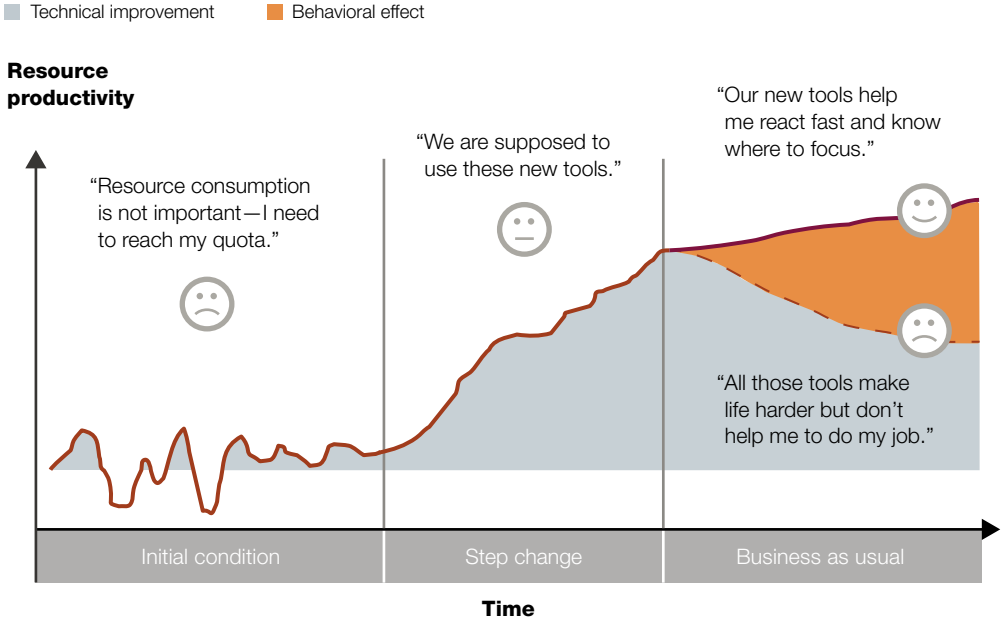
that increasing the concentration of oxygen in the process offsets the yield loss resulting from a decline of ore grades over the previous year. Thanks to the changed process parameter, the company increased yields (and therefore production) by 8 percent in three months.

Go beyond tools

Approaches such as the ones we've described here are only part of the story, of course. Resource productivity also requires a comprehensive change-management effort. Many organizations whose resource projects falter over time rely too much on teaching their employees specific resource-productivity tools and analyses. Success stories, however, change people's underlying mind-sets so that they "think holistically" (Exhibit 5). Equally important, exceptional organizations support the new mind-sets with revised metrics and more frequent performance dialogues as part of a new management infrastructure. At these companies, resource productivity

Exhibit 5

Success entails moving beyond specific resource-productivity tools and analyses to a change in mind-sets.



informs almost every aspect of operations, ensuring that people keep finding new opportunities to create more value from less.

Together, these shifts move organizations away from the traditional take–make–dispose logic: take raw materials out of the ground, assemble them into finished products, and then throw them away. A more sustainable logic is to "think circular," creating new value for companies and society by looping products, components, and materials back into the production process after they have fulfilled their initial use. (For more on circularity, see "Remaking the industrial economy," on mckinsey.com.)

[1] Our new book, *Resource-Productive Operations*, describes these choices.

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Why emerging-market companies acquire abroad

David Cogman, Patrick Jaslowitzer, and Marc Steffen Rapp

Long focused on deals to acquire technology, brands, or know-how, more emerging-market companies have begun using M&A to tap into new markets.

After years of using cross-border deals to acquire strategic and natural resources, multinational companies headquartered in emerging markets are increasingly looking to penetrate new markets—just like multinationals in developed markets do.

Growth in such deals over the 14-year period from 2000 to 2013 reached double digits on an annual basis, and by 2013, deal activity accounted for about 37 percent of the world market for cross-border deals. Moreover, when we analyzed more than 1,000 cross-border acquisitions[1] by emerging-market companies and categorized them by the most common reasons companies pursue acquisitions, we found that the main reason emerging-market companies reach across borders has been to fill capability gaps caused by limited access to strategic resources, such as technology, management capabilities, or other intangible assets in their home markets (Exhibit 1).[2] Over the longer term, only about a third of cross-border M&A deals by emerging-market companies have been made to enter new markets, acquire natural resources, or improve efficiency—deal types that are more common among developed-market buyers.

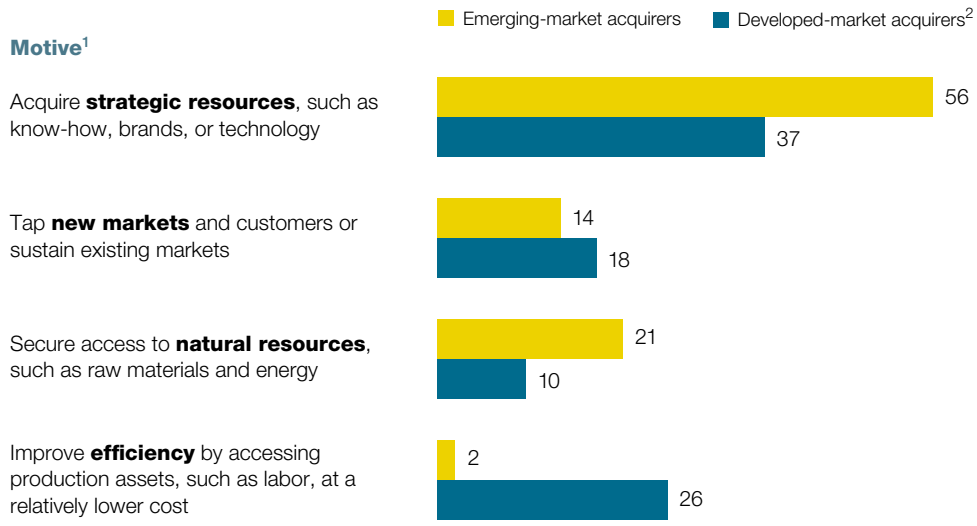
That pattern, however, is changing. As emerging-market companies have developed and matured, they've completed fewer deals in pursuit of strategic resources and more deals to tap into new markets, often located in other emerging countries (Exhibit 2).[3] Companies that followed this rationale include LATAM Airlines Group, which merged its Chilean LAN Airlines with TAM Airlines of Brazil in 2012, and the Philippine food and beverage company San Miguel Corporation, which acquired Australia's National Foods in 2005. In general, market seekers are mostly from nondurable consumer-goods industries or wholesale and retail.

Around every fifth dollar spent for cross-border M&A by emerging-market companies has been in pursuit of natural resources—though the scarcity of certain resources, such as rare earths, has not led to proportionately more deals to secure access to them since 2010. Well-known landmark trans-

Exhibit 1

Cross-border deals by emerging-market companies have mostly been in pursuit of strategic resources.

% of cross-border deal value in 1,095 emerging-market acquisitions, 2000–13

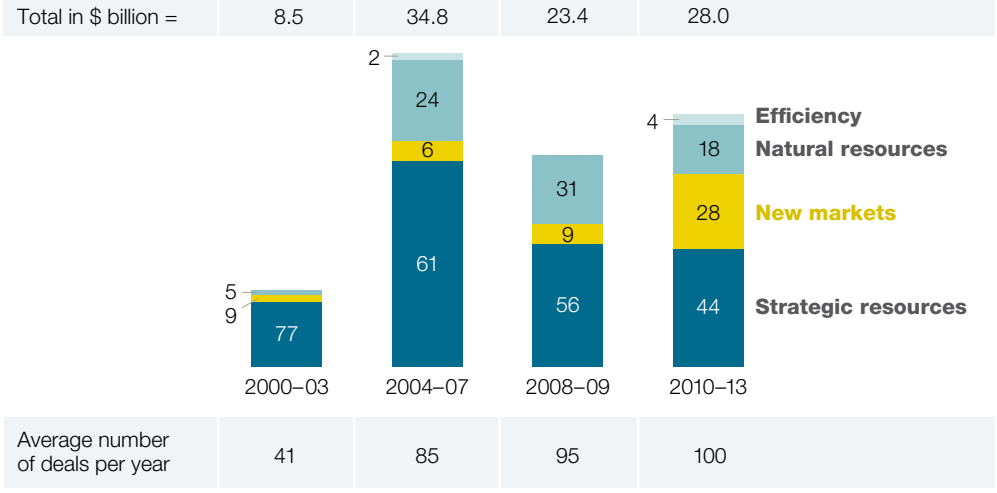


[1] Other strategic motives account for 6% of emerging-market and 10% of developed-market M&A deal value. Figures do not sum to 100%, due to rounding.
[2] Based on 6,957 acquisitions by developed-market acquirers between 2000 and 2013.

Exhibit 2

Since 2010, emerging-market companies have shifted their focus to new markets.

1,095 cross-border acquisitions by emerging-market companies, 2000–13, average deal volume per year, %[1]



[1] Percentages do not sum to 100%, because "other" strategic motives have been excluded.

actions of this type include the acquisition of Canadian mining company Inco by Brazilian metals and mining company Vale in 2006 and the takeover of Udmurtneft, a large Russian oil asset, by Chinese oil and gas company Sinopec that same year. These companies tend to generate most of their revenues in the domestic market and are disproportionately large. Often, natural-resource seekers are state-owned enterprises, such as Sinopec or Russian gas giant Gazprom.

The least common reason for emerging-market companies to acquire abroad is in pursuit of efficiency. Motivated by low labor costs or specific government policies related to import barriers or investment incentives, acquirers move manufacturing capacity to foreign markets by acquiring production-related companies abroad. The small but admittedly growing portion of efficiency-seeking M&A by emerging-market bidders mainly flows into other emerging countries, where production factors are comparatively cheap. Notable examples of such deals are the acquisition of Malaysia's Titan Chemical Corporation by South Korea's Honam Petrochemical in 2010, or Singapore-based Biosensors International Group's takeover of Chinese JW Medical Systems in 2011.

[1] Including deals valued at 1 percent or more of the acquirer's total assets (excluding financial companies) by acquirers from Brazil, Chile, China, Colombia, Egypt, Hong Kong, India, Indonesia, Malaysia, Mexico, Peru, Philippines, Russia, Saudi Arabia, Singapore, South Africa, South Korea, Taiwan, Thailand, and Turkey. Our developed-market data cover acquirers from all high-income Organisation for Economic Co-operation and Development countries.

[2] More specifically, our measures are based on median R&D intensity and intangible assets per industry (for asset-seeking motive), median sales growth per industry (for market-seeking motive), median staff cost per industry (for efficiency-seeking motive), and target-company affiliation with natural-resource industry (for natural resource–seeking motive). We calculate these industry measures for each year in each country of our sample and assign the respective values to all acquiring and target companies. By comparing the variables' standardized differences between both companies involved in a deal, we are eventually able to identify a transaction's dominant strategic motive.

[3] We also analyzed the deal-type distribution per country and found that companies in traditional emerging markets, such as Brazil, China, India, and Russia, focus on seeking assets and natural resources, while buyers from potentially more economically advanced countries, such as Chile, Mexico, and South Korea, strongly engage in market and efficiency seeking.

The authors wish to thank Jan Krause for his contributions to this article.

David Cogman is a principal in McKinsey's Hong Kong office, **Patrick Jaslowitzer** is a consultant in the Munich office, and **Marc Steffen Rapp** is a professor of business administration and head of the Institute of Management Accounting at Philipps University of Marburg.

Short takes

Fighting cycle compression in infrastructure projects

In the following interview excerpts, General Electric vice chairman John G. Rice talks about the expectations—including those for short-term paybacks—that impede large power-generation projects.

I think there has been what you might call a "cycle compression" when it comes to how fast governments want their investments to pay back. When I meet with senior government officials, they want to know what can be done quickly—temporary power, quick investments in clinics and healthcare—so that they can show visible progress. But those kinds of actions do not necessarily address the broader challenges.

There's no question that both social media and the ability of people to communicate and transfer information and to assess their own circumstances are increasing the pressure on governments. Even people who have very little disposable income are connected. Expectations are being built up that problems are going to be solved quickly, and governments pick up on that and feel pressure to respond.

Why public–private partnerships haven't taken off

How do you give governments the confidence that they can make these

Changing the organization from the front lines

In the interview excerpts that follow, DBS Bank's US chief country officer, Tom McCabe, explains how enhancing the role of relationship managers sparked broad cultural change.

The new frontier is helping clients unlock the value that's in their organizations already. We realized that for the relationship managers to assume that role effectively, they would need more than a product focus. They needed to become the client's trusted adviser by providing insights and ideas that are tailored to that client's needs.

When any organization decides to make a significant change, the first question staff will ask is "why?" Our business was doing well, so there wasn't a performance issue or a "burning platform." Instead of leading with the business case for change, we positioned it as a unique opportunity for personal and professional growth. We

decisions and not be attacked? And how can you get private capital to invest in power projects in difficult political environments? For that to happen, third-party investors need to have an assurance on the fuel supply and cost; they also need a bankable off-take agreement.[1]

Public opinion is another factor. Many countries subsidize power, which in effect means that investor returns must be subsidized, too. The private part of the partnership is looking for a risk-adjusted market return, while the public side wants local energy prices. The difference becomes a political issue—sometimes leading to accusations of mismanagement and corruption.

How the private sector can help

It would be interesting to combine the efforts of institutions like the World Bank, a couple of export-credit agencies, and half a dozen companies and say, "OK, we're going to build a model for how to get this stuff done quickly and honestly." Something's got to give because governments alone are not going to fix the electricity problem. And they won't attract a lot of third-party capital without certainty around fuel, costs, and off-take arrangements.

[1]Such an agreement guarantees a market for the project's future production.

This article is adapted from an interview conducted by **Bill Wiseman,** a director in McKinsey's Taipei office.

For more, see "Infrastructure and economic development: An interview with John Rice," August 2015, on mckinsey.com.

found people in our organization who were achievement oriented and woke up in the morning hungry to learn and do more. Harnessing their energy—developing their capabilities and giving them sophisticated data and analytic tools—allowed us to create excitement in the rest of the organization and achieve scale much more quickly.

This group trained the next level of managers, who in turn trained team leaders, and so forth. As clients experienced success in freeing up more capital, momentum started building throughout the organization. The commercial business case for this project was strong, but what really made the change possible was the energy and new thinking that resulted from collective ownership.

This article is adapted from an interview conducted by **Christian Johnson,** a member of McKinsey Publishing in McKinsey's Hong Kong office; **Mads Lauritzen,** a principal in the Bangkok office; and **Sisu Otto,** a specialist in the Hong Kong office.

For more, see "Setting capital free: An interview with Tom McCabe of DBS Bank," March 2015, on mckinsey.com.

Banking

A tale of three Asias

Jay Datesh, Miklos Dietz, and Attila Kincses

China's midsized cities are the biggest growth story in Asian banking. Rural areas in other emerging Asian markets and top-tier cities in developed ones also should grow smartly.

Asia is likely to produce 45 percent of all growth in banking revenues between now and 2020. But McKinsey analysis suggests that global banks should focus their efforts on cities across the continent rather than adopt traditional country-driven strategies—as many do at present (exhibit). In both developed Asia[1] and China, more than 95 percent of all banking growth will happen in urban areas. In the former, the greatest potential lies in the ten largest cities, though GDP growth will be higher in tier-two ones. The reason is that wealth in these developed economies is concentrated in regional financial hubs, such as Tokyo, Hong Kong, and Singapore. By contrast, the majority of China's growth (which will be nearly as great as that of emerging and developed Asia combined) will happen in the country's roughly 150 tier-two cities,[2] which track the growth of GDP and population.

The customers fueling that growth will differ somewhat, too. In developed Asia, more than 70 percent of it will come from retail-banking services for wealthy consumers in regional hubs. Corporate banking will grow mostly through increased deposit volumes; revenues from lending will fall as growth slows and margins decline. In China, corporate lending will drive revenue growth as monetary easing compresses deposit margins. Personal banking for the emerging middle class will be a bright spot.

Emerging Asia's story is more about how banking has and will continue to become increasingly accessible to the rural and urban poor. As larger numbers of people open deposit accounts and make more payments, retail banking will scoop up two-thirds of the roughly 9 percent revenue growth (lower than GDP's expected 12 percent surge). In the top ten cities of emerging Asia, wealth management will fuel expansion. And in these countries, corporate growth will probably come from increased lending, mostly to small and midsize businesses.

[1] Australia, Hong Kong, Japan, Singapore, South Korea, and Taiwan.

[2] With populations from 1.0 million to 7.5 million.

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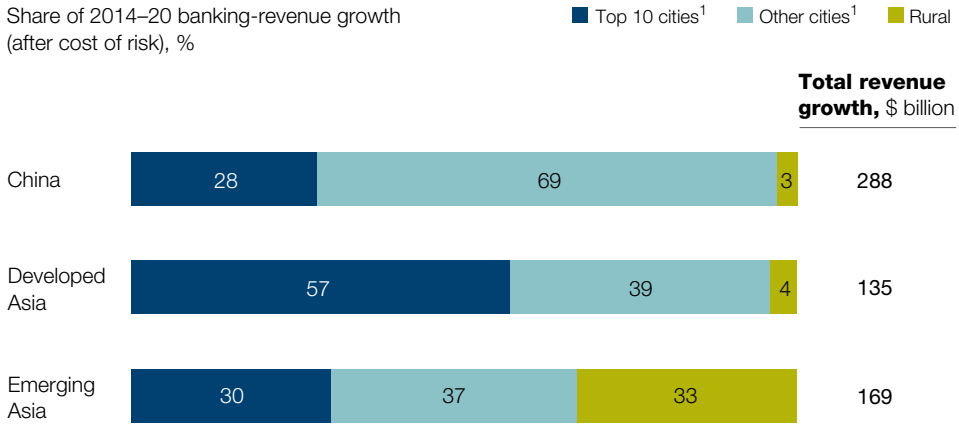
Where banks will find growth in Asia—top cities, other cities, or rural areas—differs significantly across markets.



[1] Top 10 cities are ranked by estimated 2014 total banking revenue after cost of risk. Cities (as opposed to rural areas) are defined as settled areas with populations over 150,000 in developed countries and over 200,000 in emerging markets.

Source: Panorama (a McKinsey Solution); McKinsey Global Institute analysis

Oil and gas

Preparing for a volatile oil-price environment

Sheng Hong, Chris Musso, and Theo Jan Simons

The outlook is highly unstable. Companies must build the capabilities to cope with the unexpected.

The impact of oil-price swings starts with industries, such as chemicals and air travel, for which oil serves as a critical input. But it extends beyond them to diverse areas—for instance, the disposable income and spending of the customers of consumer-goods companies. We analyzed the components of oil-supply growth projected over the next decade and found that the characteristics of additional supply sources may increase the likelihood of price volatility (exhibit).

Some of the most significant new sources of production are intrinsically less steady than traditional ones. Levels of US shale-oil production (by horizontal drilling and fracking) fall rapidly in any given well, so new wells must constantly be developed. Producers tend to hold off investing if oil prices are too low and then rush in together as they rise. The resulting ramp-up in supply can have price-dampening effects. Offshore production is relatively high cost, so future investment is uncertain. Meanwhile, new production in several countries is vulnerable to short-term disruption related to political and social unrest. In fact, if their overall production were interrupted on a large scale, they could be responsible for much more volatility than their contributions to growth would indicate.

With price fluctuations a given, companies will need to develop strategic capabilities to anticipate volatility, as well as greater organizational agility to manage its effects on costs and demand.

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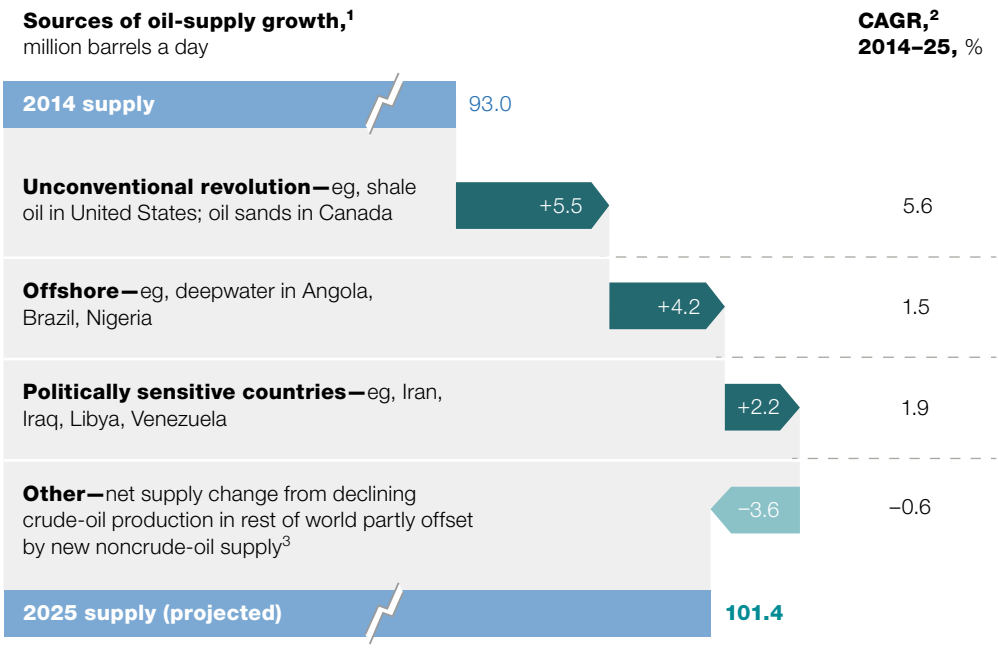
For the full article, see "Oil-price shocks and the chemical industry: Preparing for a volatile environment," May 2015, on mckinsey.com.

Many new sources of oil-supply growth are volatile.



[1] Figures do not sum to total, because of rounding.
[2] Compound annual growth rate, projected.
[3] Including biofuels, coal to liquids, gas to liquids, natural-gas liquids, and refinery gains.

Source: Energy Insights (a McKinsey Solution); Rystad Energy

Illustration by Charles Williams

Raising your Digital Quotient

Tanguy Catlin, Jay Scanlan, and Paul Willmott

Following the leader is a dangerous game. It's better to focus on building an organization and culture that can drive the strategy that's right for you.

With the pace of change in the world accelerating around us, it can be hard to remember that the digital revolution is still in its early days. Massive changes have come about since the packet-switch network and the microprocessor were invented, nearly 50 years ago. A look at the rising rate of discovery in fundamental R&D and in practical engineering leaves little doubt that more upheaval is on the way.

For incumbent companies, the stakes continue to rise. From 1965 to 2012, the "topple rate," at which they lose their leadership positions, increased by almost 40 percent as digital technology ramped up competition, disrupted industries, and forced businesses to clarify their strategies, develop new capabilities, and transform their cultures. Yet the opportunity is also plain. McKinsey research shows that companies have lofty ambitions: they expect digital initiatives to deliver annual growth and cost efficiencies of 5 to 10 percent or more in the next three to five years.

To gain a more precise understanding of the digitization challenge facing business today, McKinsey has been conducting an in-depth diagnostic survey of 150 companies around the world. By evaluating 18 practices related to digital strategy, capabilities, and culture, we have developed a single, simple metric for the digital maturity of a company—what might be called its Digital Quotient, or DQ. This survey reveals a wide range of digital performance in today's big

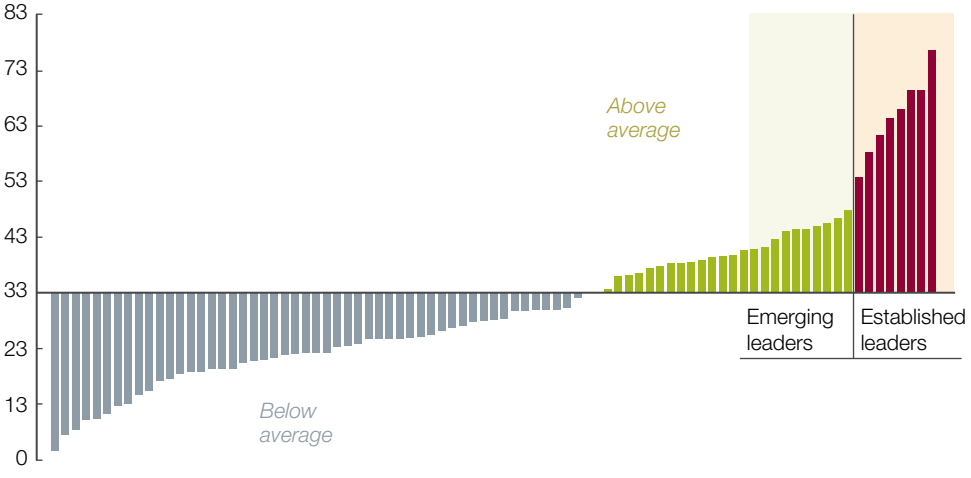
corporations (exhibit) and points to four lessons in which we have increasing confidence:

- First, incumbents must think carefully about the strategy available to them. The number of companies that can operate as pure-play disrupters at global scale—such as Spotify, Square, and Uber—are few in number. Rarer still are the ecosystem shapers that set de facto standards and gain command of the universal control points created by hyperscaling digital platforms. Ninety-five to 99 percent of incumbent companies must choose a different path, not by "doing digital" on the margin of their established businesses but by wholeheartedly committing themselves to a clear strategy.

- Second, success depends on the ability to invest in relevant digital capabilities that are well aligned with strategy—and to do so at scale. The right capabilities help you keep pace with your customers as digitization transforms the way they research and consider products and services, interact, and make purchases on the digital consumer decision journey.

Exhibit

An assessment of the digital maturity of big corporations reveals a wide range of performance.



Source: 2014–15 McKinsey DQ company survey

- Third, while technical capabilities—such as big data analytics, digital content management, and search-engine optimization—are crucial, a strong and adaptive culture can help make up for a lack of them.

- Fourth, companies need to align their organizational structures, talent development, funding mechanisms, and key performance indicators (KPIs) with the digital strategy they've chosen.

Collectively, these lessons represent a high-level road map for the executive teams of established companies seeking to keep pace in the digital age. Much else is required, of course.[1] But in our experience, without the right road map and the management mind-set needed to follow it, there's a real danger of traveling in the wrong direction, traveling too slowly in the right one, or not moving forward at all. We hope this article will help leaders steer organizations effectively as they make the transition to becoming more fully digital enterprises.

1. Getting the strategy right

Executives must arrive at a common vernacular for what "digital" means for them.[2] Then, the starting point for success is developing a clearly defined, coherent digital strategy that's fully integrated with the overall corporate one. Without this deep alignment, any subsequent intervention is bound to fall short. Yet companies struggle to get their digital strategy right. Among the 18 practices in our DQ diagnostic, those related to strategy show the biggest variance between digital leaders and more average-performing companies. One obstacle is the exposure and publicity (and, commonly, the big market valuations) that surround the most visible players in today's digital landscape. These companies include pure-play disrupters, such as Nespresso and Uber, and ecosystem shapers, such as John Deere and Schibsted. Impressive as disrupters and shapers might be, those two strategies are feasible for only a select few.

[1] For a more detailed look at the areas where change must occur, see Driek Desmet, Ewan Duncan, Jay Scanlan, and Marc Singer, "Six building blocks for creating a high-performing digital enterprise," September 2015, on mckinsey.com.

[2] For more, see Karel Dörner and David Edelman, "What 'digital' really means," July 2015, on mckinsey.com.

Companies get their digital strategy right by answering three important questions. First, where will the most interesting digital opportunities and threats open up? Second, how quickly and on what scale is the digital disruption likely to occur? Third, what are the best responses to embrace these opportunities proactively and to reallocate resources away from the biggest threats? The vast majority of companies will address this third question through more targeted strategic responses, including these:

A smaller-scale disruption of your own business model to enter a new space or redefine an existing one. Shenzhen-based Ping An Bank, for instance, founded the digitally centered Orange Bank to target younger consumers of financial services with simple, high-return products and a one-minute account sign-up—all without traditional branch networks or complex product portfolios.

Fast-following to ride the wave and capture some of the value created by an industry's evolution. The UK department store John Lewis deployed thoughtful, targeted "clicks and mortar" levers to make it possible for a highly loyal and attractive customer base to order from its website and get deliveries at stores and company-owned grocery outlets in their local communities.

Aggressively reallocating resources from digitally threatened assets to more digitally interesting ones. Bauer Media Group, in Germany, has systematically reallocated resources away from potentially vulnerable analog media assets to develop a portfolio with a digital advantage. Its overall revenue base has shrunk, but its topline growth is materially higher, and its market capitalization has better equity multiples.

Boosting the effectiveness of existing business models through digital approaches and tools. To help visitors at Disney resorts and theme parks, the Walt Disney Company, for example, developed a suite of digital tools. These include the FastPass+ service, which allows visitors to reserve access to theme-park attractions, and the MagicBand, a tech-enabled wristband that facilitates reservations and customer routing at Disney World. Roughly 50 percent of Disney World's visitors elect to wear it. The more efficient routing helped

the resort's Magic Kingdom to host about 3,000 more guests each day of the 2013–14 holiday season.[3]

Clearly defining the best-fitting digital strategies is important, in part, because successful ones give rise to differentiated management practices: if you get the strategy right, the managerial interventions become clearer and vice versa. Consider the following examples:

- A bold long-term orientation counteracts short-term financial-performance imperatives and frees companies to take calibrated risks and to invest at scale in digital initiatives and the IT architecture.

- Direct integration with the strategy puts digital at the center of the business, fostering natural forms of internal collaboration as well as corporate governance that places digital topics alongside other business requirements. Strategic priorities and investment decisions are now part of the same process.

- A relentless focus on customer needs helps companies innovate constantly where it matters most. While data from early adopters sometimes does mislead businesses that try to serve them, more often than not their behavior soon begins permeating the mass market. That's especially true if multigenerational links can be made through consumer use cases (for instance, direct consumer videoconferencing, texting, and e-chats).

Once companies have arrived at a clearly thought-out strategy, they must commit themselves to it wholeheartedly. The days of tinkering at the edges are gone.

2. Capabilities at scale

For digital success, certain capabilities—especially those that build foundations for other key processes and activities—are more important than others. Foremost among them are the modular IT platforms and agile technology-delivery skills needed to keep

[3] Michelle Baran, "Magic Kingdom gets attendance boost from RFID bracelets," *Travel Weekly*, February 6, 2014, travelweekly.com; and Dan Peltier, "Half of Walt Disney World visitors now enter wearing MyMagic+ wristbands," *Skift*, May 7, 2015, skift.com.

pace with customers in a fast-moving, mobile world. The IT platforms of most companies we surveyed have major gaps, reflecting (and reinforced by) a widespread failure to prioritize digital initiatives within broader IT and capital-expenditure investments.

What further separates high performers in our survey is their ability to engage customers digitally and to improve their cost performance in four areas.

Data-empowered decision making

High-performing digital companies distinguish themselves by keeping pace as their customers undertake the digital consumer decision journey.[4] For example, they anticipate emerging patterns in the behavior of customers and tailor relevant interactions with them by quickly and dynamically integrating structured data, such as demographics and purchase history, with unstructured data, such as social media and voice analytics. These companies skillfully assess the available resources, inside and outside the business, and bring them to bear on issues that matter to their markets.

For example, in 2012, Reckitt Benckiser, a maker of popular cold and flu remedies, used search data from the medical website WebMD (with almost 32 million monthly visitors at that time) to track cold and flu symptoms across the country and anticipate where outbreaks were likely to occur. Then the company released targeted geography- and symptom-specific advertising and promotions (including an offer for free home delivery) in those places. Along with a strong cold and flu season, this initiative helped Reckitt Benckiser, during one four-week period, to increase its US sales of cough and cold products by 22 percent, compared with the previous year.[5]

Connectivity

A closely related skill is connectivity. Digital leaders embrace technologies (such as apps, personalization, and social media) that help companies establish deeper connections between a brand and its customers—and thus give them more rewarding experiences. Such connections can also deeply inform product development.

[4] See Edwin van Bommel, David Edelman, and Kelly Ungerman, "Digitizing the consumer decision journey," June 2014, mckinsey.com.

[5] Emily Steel, "Reckitt targets flu sufferers online," *Financial Times*, November 5, 2012, ft.com; and Jack Neff, "Flu gives Reckitt, Johnson & Johnson a shot in the arm," *Advertising Age*, January 14, 2013, adage.com.

For example, Burberry's Art of the Trench campaign, launched in 2009, encourages customers to visit its online platform and upload photographs of themselves in trench coats. Fellow shoppers and fashion experts then comment on the photos and "like" and share them through email, as well as social-media outlets. Users can also click through to the main Burberry site to shop and buy. These innovations are becoming ever more deeply embedded in the company.[6] Burberry may not have gotten everything right, but, overall, this approach—combined with other innovations—helped the company to double its annual total revenue in six years.

Process automation

Top-performing digital players focus their automation efforts on well-defined processes, which they iterate in a series of test-and-optimize releases. Successful process-automation efforts start by designing the future state for each process, without regard for current constraints—say, shortening turnaround time from days to minutes. Once that future state has been described, relevant constraints (such as legal protocols) can be reintroduced.

Using this approach, a European bank shortened its account-opening process from two or three days to less than ten minutes. At the same time, the bank automated elements of its mortgage-application process by connecting an online calculator to its credit-scoring models, which enabled it to give customers a preliminary offer in less than a minute. This system cut costs while significantly improving customer satisfaction.[7]

Two-speed IT

Today's consumer expectations put a new set of pressures on the IT organization as legacy IT architectures struggle with the rapid testing, failing, learning, adapting, and iterating that digital product innovations require. Our diagnostic shows that leading companies can operate both a specialized, high-speed IT capability designed to deliver rapid results and a legacy capability optimized to support traditional business operations.

[6] Mercedes Bunz, "Burberry checks out crowdsourcing with The Art of the Trench," *Guardian*, November 9, 2009, theguardian.com; and Harriet Walker, "Digging trenchcoats: What makes Burberry our boldest brand?," *Independent*, February 23, 2013, independent.co.uk.

[7] See Shahar Markovitch and Paul Willmott, "Accelerating the digitization of business processes," *McKinsey on Business Technology*, May 2014, mckinsey.com.

This IT architecture and, in certain cases, the IT organization itself essentially function at two different speeds. The customer-facing technology is modular and flexible enough to move quickly—for instance, to develop and deploy new microservices in days or to give customers dynamic, personalized web pages in seconds. The core IT infrastructure, on the other hand, is designed for the stability and resiliency required to manage transaction and support systems. The priority here is high-quality data management and built-in security to keep core business services reliable.

One UK financial institution used this two-speed approach to improve its online retail-banking service. The bank opened a new development office with a start-up culture—an agile work process tested and optimized new products rapidly. To support this capability for the long term, the company simultaneously evolved its service architecture to accelerate the release of new customer-facing features.[8]

3. A fast, agile culture

While strong skills are crucial, companies can to some degree compensate for missing ones by infusing their traditional cultures with velocity, flexibility, an external orientation, and the ability to learn. While there is more than one way to build such a culture, many companies with high scores on the DQ diagnostic have succeeded by adopting test-and-learn approaches drawn from software-development movements such as DevOps, continuous delivery, and agile. Once, these were confined to the periphery of the business environment. Now they bring a cooperative, collaborative disposition to interactions between talented workers at its core. Previously siloed functions, departments, and business units can learn a new spirit of cohesiveness.

These test-and-learn approaches incorporate automation, monitoring, community sharing, and collaboration to unify previously isolated functions and processes into a fast-moving, product-oriented culture. By promoting shared ownership of technology initiatives and

[8] See Henrik Andersson and Philip Tuddenham, "Reinventing IT to support digitization," May 2014; and Oliver Bossert, Jürgen Laartz, and Tor Jakob Ramsøy, "Running your company at two speeds," *McKinsey Quarterly*, December 2014, both available on mckinsey.com.

products, such environments democratize data, minimize complexity, facilitate the rapid reallocation of resources, and enable reusable, modular, and interoperable IT systems.[9] To set this kind of culture in motion, executives can focus their efforts on four key areas.

External orientation

As companies develop their collaborative cultures, they position themselves to participate more meaningfully in broader networks of collaboration, learning, and innovation. The shaping role in these networks, or ecosystems, may be beyond the reach of most incumbent companies. But they can play other value-creating roles by performing specific modules of activity, such as production or logistics, within a more broadly orchestrated ecosystem.

Collaboration beyond the boundaries of companies need not occur only in a broadly orchestrated setting. Companies can also benefit from smaller-scale collaborations with customers, technology providers, and suppliers. In addition, they can mobilize workers they themselves don't employ—the distributed talent in networks of shared interest and purpose. SAP, for instance, mobilized the user community it developed to help launch its NetWeaver software.

All this requires digital leaders to recognize what they're good at themselves and what others might do better and to improve their ability to partner collaboratively with people and institutions. They must also be able to separate the real opportunities, threats, and emerging collaborators and competitors from hype-laden pretenders.

Appetite for risk

Our DQ research finds that digital leaders have a high tolerance for bold initiatives but that executives at laggards say their cultures are risk averse. Although established companies may not be likely to shape or orchestrate broad ecosystems, they must still face up to the implications of disruptive forces in their markets and industries—and the risks that arise in dealing with them. In a world of more data and less certainty, companies have to make decisions and respond to disrupters all the earlier and the more decisively.

[9] For more about DevOps, see Satty Bhens, Ling Lau, and Shahar Markovitch, "Finding the speed to innovate," April 2015, on mckinsey.com. For more about agile cultures, see Paul Willmott, "Want to become agile? Learn from your IT team," July 2015, on mckinsey.com.

Test and learn—at scale!

At the heart of agile cultures is the test-and-learn mind-set and product-development method, which can usefully be applied, or translated, to nearly any project or process that incumbents undertake. Instead of awaiting perfect conditions for a big-bang product launch or deferring market feedback until then, digital leaders learn, track, and react by putting something into the market quickly. Then they gauge interest, collect consumer reactions, and pursue constant improvements. Rigorous data monitoring helps teams quickly refine or jettison new initiatives, so that such companies fail often and succeed early.

Nordstrom's Innovation Lab, for example, launches customer-facing initiatives in a series of one-week experiments. To build an app that helps customers shop for sunglasses, the innovation team set up temporary camp in the retailer's flagship Seattle store. There, it mocked up paper prototypes and had shoppers tap through them as you would a live version. Customers shared feedback on the features they found most helpful and pointed out problematic or unintuitive elements in the prototype. Coders used that information to make real-time adjustments and then released a new live version of the app for customers to test-drive on the spot. After a week of continual tweaking and re-releasing, it was ready for the store's sales associates.[10]

Internal collaboration

Teamwork and collaboration are important in any context, digital or otherwise. Wharton's Adam Grant says the single strongest predictor of a group's effectiveness is the amount of help colleagues extend to each other in their reciprocal working arrangements.[11] But collaborative cultures take on even greater importance as companies look to boost their DQ, since many lack the established digital backbone needed to unify traditionally siloed parts of the organization, from customer service to fulfillment to supply-chain management to financial reporting.

Less than 30 percent of the 150 companies we've surveyed say they have a highly collaborative culture. The good news is that there's

[10] Nordstrom, "Nordstrom Innovation Lab: Sunglass iPad app case study," YouTube video, September 28, 2011, youtube.com.

[11] See Adam Grant, "Givers take all: The hidden dimension of corporate culture," *McKinsey Quarterly*, April 2013, mckinsey.com.

plenty of room for improvement. Some of it comes from technology: by moving into cloud-based virtualized environments, for example, companies can provide appropriate contexts where teams come together and participate in collaborative experimentation, tinkering, and innovation. In this way, they can learn and make decisions quickly by evaluating data from customer experiences.

4. Organization and talent

Beyond strategy, capabilities, and culture, leading digital companies use a wide set of coherent practices in talent, processes, and structure.

Talent connections

High-DQ companies sometimes feel the need for a digital leader on the executive team who combines business and marketing savvy with technological expertise. But while executive leadership is important, the most critical thing is midlevel talent: the "boots on the ground" who can make or break digital initiatives and are ultimately responsible for bringing products, services, and offers to market.

In today's environment, finding that talent isn't easy. To facilitate the search, companies should recognize that, in many instances, digital competency matters more than sector knowledge, at least in the early stages of a digital transformation. Only 35 percent of digital talent in the companies we analyzed had digital experience outside them.

High-DQ companies are also creative about training and nurturing talent. A number of years ago, for example, P&G launched an employee swap with Google to shore up P&G's search engine–optimization skills, while the Internet giant gained a deeper knowledge of marketing.[12] Such opportunities build competency while expanding the methods and possibilities open to companies that take advantage of them.

Companies must also nurture digital talent with the right incentives and clear career paths. Here, some incumbents may have more advantages than they realize, since these young people seem eager to help iconic brands in fashion apparel, luxury cars, newsmagazines,

[12] Ellen Byron, "A new odd couple: Google, P&G swap workers to spur innovation," *Wall Street Journal*, November, 19, 2008, wsj.com.

and other categories to reach digital audiences. When that's done well, companies establish a virtuous cycle: the nurturing of good talent attracts more of it, allowing organizations to build quickly on the initial foundation to secure a stable of digital leaders. That critical mass, in turn, serves to draw in similar candidates in the future.

Real-time monitoring

Leading digital companies track and communicate digital key performance indicators frequently—in some cases in real time. They measure those KPIs against digital priorities and make sure senior management reviews and manages their performance.

When Starbucks rolled out a new point-of-sale system, for example, managers videotaped transactions and interviewed employees to fine-tune the checkout process. That feedback allowed the company to trim ten seconds off any mobile or card-based transaction, allowing employees to process sales more quickly and saving customers 900,000 hours of time in line each year.[13]

Nontraditional structures

While no one answer works for all companies, high-DQ businesses carefully and deliberately build organizational structures that reflect where they are in the digital transformation. Some acknowledge that the core business cannot transform itself fast enough to capture new digital growth. For example, many successful traditional media organizations have carved out their digital businesses from more mature content operations.

Axel Springer used its digital business model as the dominant organizing principle in its recent reorganization—an approach that promotes the emergence of the distinct culture, performance-management system, and governance that growing digital businesses require. In the meantime, Axel Springer's strong legacy businesses can adapt and evolve to master the new digital landscape separately.

Finally, some incumbents—such as L'Oréal and TD Bank Group—have created centers of excellence and appointed chief digital officers. Others, like Burberry, operate governing councils charged with thinking big and ensuring that senior leadership buys into the

[13] Adam Brotman and Curt Garner, "How Starbucks has gone digital," interview by Michael Fitzgerald, *MIT Sloan Management Review*, April 4, 2013, sloanreview.mit.edu.

digital plans. These structures often change over time as companies evolve. What might start out as a newly incubated competency, such as social media, eventually matures and becomes integrated into the broader business.

The journey to digital maturity requires a whole-hearted commitment from a company's leadership and a sustained investment in people, capabilities, technology, and cultural change. To get started, an organization must be honest about its DQ, clear about its long-term strategic opportunity, and open to iterating and refining solutions along the way.

The authors wish to thank McKinsey's Juliette Valains for her contributions to this article.

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An executive's guide to machine learning

Dorian Pyle and Cristina San José

It's no longer the preserve of artificial-intelligence researchers and born-digital companies like Amazon, Google, and Netflix.

Machine learning is based on algorithms that can learn from data without relying on rules-based programming. It came into its own as a scientific discipline in the late 1990s as steady advances in digitization and cheap computing power enabled data scientists to stop building finished models and instead train computers to do so. The unmanageable volume and complexity of the big data that the world is now swimming in have increased the potential of machine learning—and the need for it.

In 2007 Fei-Fei Li, the head of Stanford's Artificial Intelligence Lab, gave up trying to program computers to recognize objects and began labeling the millions of raw images that a child might encounter by age three and feeding them to computers. By being shown thousands and thousands of labeled data sets with instances of, say, a cat, the machine could shape its own rules for deciding whether a particular set of digital pixels was, in fact, a cat.[1] Last November, Li's team unveiled a program that identifies the visual elements of any picture with a high degree of accuracy. IBM's Watson machine relied on a similar self-generated scoring system among hundreds of potential answers to crush the world's best *Jeopardy!* players in 2011.

Dazzling as such feats are, machine learning is nothing like learning in the human sense (yet). But what it already does extraordinarily well—and will get better at—is relentlessly chewing through any amount of data and every combination of variables. Because machine

[1] Fei-Fei Li, "How we're teaching computers to understand pictures," TED, March 2015, ted.com.

learning's emergence as a mainstream management tool is relatively recent, it often raises questions. In this article, we've posed some that we often hear and answered them in a way we hope will be useful for any executive. Now is the time to grapple with these issues, because the competitive significance of business models turbocharged by machine learning is poised to surge. Indeed, management author Ram Charan suggests that "any organization that is not a math house now or is unable to become one soon is already a legacy company."[2]

1. How are traditional industries using machine learning to gather fresh business insights?

Well, let's start with sports. This past spring, contenders for the US National Basketball Association championship relied on the analytics of Second Spectrum, a California machine-learning start-up. By digitizing the past few seasons' games, it has created predictive models that allow a coach to distinguish between, as CEO Rajiv Maheswaran puts it, "a bad shooter who takes good shots and a good shooter who takes bad shots"—and to adjust his decisions accordingly.

You can't get more venerable or traditional than General Electric, the only member of the original Dow Jones Industrial Average still around after 119 years. GE already makes hundreds of millions of dollars by crunching the data it collects from deep-sea oil wells or jet engines to optimize performance, anticipate breakdowns, and streamline maintenance. But Colin Parris, who joined GE Software from IBM late last year as vice president of software research, believes that continued advances in data-processing power, sensors, and predictive algorithms will soon give his company the same sharpness of insight into the individual vagaries of a jet engine that Google has into the online behavior of a 24-year-old netizen from West Hollywood.

2. What about outside North America?

In Europe, more than a dozen banks have replaced older statistical-modeling approaches with machine-learning techniques and, in some cases, experienced 10 percent increases in sales of new products,

[2] Ram Charan, *The Attacker's Advantage: Turning Uncertainty into Breakthrough Opportunities*, New York: PublicAffairs, February 2015.

20 percent savings in capital expenditures, 20 percent increases in cash collections, and 20 percent declines in churn. The banks have achieved these gains by devising new recommendation engines for clients in retailing and in small and medium-sized companies. They have also built microtargeted models that more accurately forecast who will cancel service or default on their loans, and how best to intervene.

Closer to home, as a recent article in *McKinsey Quarterly* notes,[3] our colleagues have been applying hard analytics to the soft stuff of talent management. Last fall, they tested the ability of three algorithms developed by external vendors and one built internally to forecast, solely by examining scanned résumés, which of more than 10,000 potential recruits the firm would have accepted. The predictions strongly correlated with the real-world results. Interestingly, the machines accepted a slightly higher percentage of female candidates, which holds promise for using analytics to unlock a more diverse range of profiles and counter hidden human bias.

As ever more of the analog world gets digitized, our ability to learn from data by developing and testing algorithms will only become more important for what are now seen as traditional businesses. Google chief economist Hal Varian calls this "computer *kaizen*." For "just as mass production changed the way products were assembled and continuous improvement changed how manufacturing was done," he says, "so continuous [and often automatic] experimentation will improve the way we optimize business processes in our organizations."[4]

3. What were the early foundations of machine learning?

Machine learning is based on a number of earlier building blocks, starting with classical statistics. Statistical inference does form an important foundation for the current implementations of artificial intelligence. But it's important to recognize that classical statistical techniques were developed between the 18th and early 20th centuries for much smaller data sets than the ones we now have at our disposal. Machine learning is unconstrained by the preset assumptions of

[3] See Bruce Fecheyr-Lippens, Bill Schaninger, and Karen Tanner, "Power to the new people analytics," *McKinsey Quarterly*, March 2015, mckinsey.com.

[4] Hal R. Varian, "Beyond big data," *Business Economics*, 2014, Volume 49, Number 1, pp. 27–31, palgrave-journals.com.

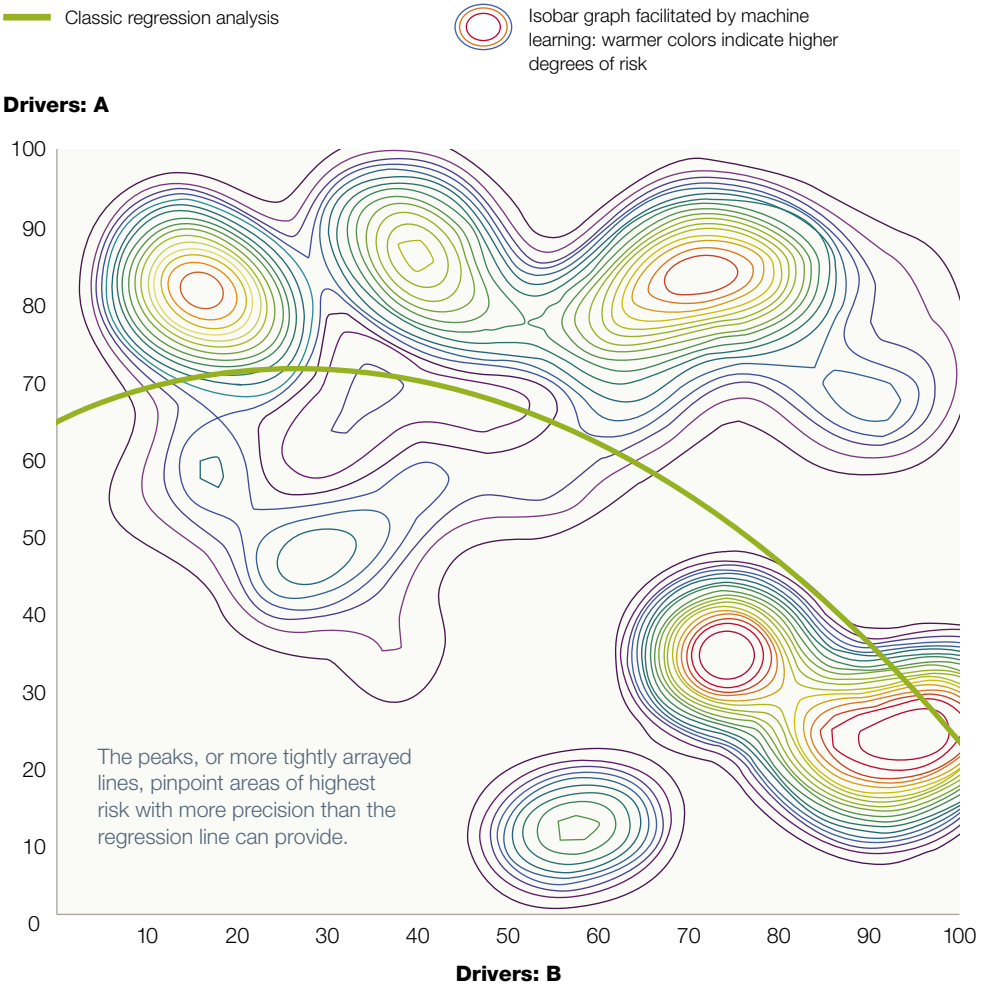
statistics. As a result, it can yield insights that human analysts do not see on their own and make predictions with ever-higher degrees of accuracy (exhibit).

More recently, in the 1930s and 1940s, the pioneers of computing (such as Alan Turing, who had a deep and abiding interest in

Exhibit

The contrast between routine statistical analysis and data generated by machine learning can be quite stark.

Value at risk from customer churn, telecom example



artificial intelligence) began formulating and tinkering with the basic techniques such as neural networks that make today's machine learning possible. But those techniques stayed in the laboratory longer than many technologies did and, for the most part, had to await the development and infrastructure of powerful computers in the late 1970s and early 1980s. That's probably the starting point for the machine-learning adoption curve. New technologies introduced into modern economies—the steam engine, electricity, the electric motor, and computers, for example—seem to take about 80 years to transition from the laboratory to what you might call cultural invisibility. The computer hasn't faded from sight just yet, but it's likely to by 2040. And it probably won't take much longer for machine learning to recede into the background.

4. What does it take to get started?

C-level executives will best exploit machine learning if they see it as a tool to craft and implement a strategic vision. But that means putting strategy first. Without strategy as a starting point, machine learning risks becoming a tool buried inside a company's routine operations: it will provide a useful service, but its long-term value will probably be limited to an endless repetition of "cookie cutter" applications such as models for acquiring, stimulating, and retaining customers.

We find the parallels with M&A instructive. That, after all, is a means to a well-defined end. No sensible business rushes into a flurry of acquisitions or mergers and then just sits back to see what happens. Companies embarking on machine learning should make the same three commitments companies make before embracing M&A. Those commitments are, first, to investigate all feasible alternatives; second, to pursue the strategy wholeheartedly at the C-suite level; and, third, to use (or if necessary acquire) existing expertise and knowledge in the C-suite to guide the application of that strategy.

The people charged with creating the strategic vision may well be (or have been) data scientists. But as they define the problem and the desired outcome of the strategy, they will need guidance from C-level colleagues overseeing other crucial strategic initiatives. More

broadly, companies must have two types of people to unleash the potential of machine learning. “Quants” are schooled in its language and methods. “Translators” can bridge the disciplines of data, machine learning, and decision making by reframing the quants’ complex results as actionable insights that generalist managers can execute.

Access to troves of useful and reliable data is required for effective machine learning, such as Watson’s ability, in tests, to predict oncological outcomes better than physicians or Facebook’s recent success teaching computers to identify specific human faces nearly as accurately as humans do. A true data strategy starts with identifying gaps in the data, determining the time and money required to fill those gaps, and breaking down silos. Too often, departments hoard information and politicize access to it—one reason some companies have created the new role of chief data officer to pull together what’s required. Other elements include putting responsibility for generating data in the hands of frontline managers.

Start small—look for low-hanging fruit and trumpet any early success. This will help recruit grassroots support and reinforce the changes in individual behavior and the employee buy-in that ultimately determine whether an organization can apply machine learning effectively. Finally, evaluate the results in the light of clearly identified criteria for success.

5. What’s the role of top management?

Behavioral change will be critical, and one of top management’s key roles will be to influence and encourage it. Traditional managers, for example, will have to get comfortable with their own variations on A/B testing, the technique digital companies use to see what will and will not appeal to online consumers. Frontline managers, armed with insights from increasingly powerful computers, must learn to make more decisions on their own, with top management setting the overall direction and zeroing in only when exceptions surface. Democratizing the use of analytics—providing the front line with the necessary skills and setting appropriate incentives to encourage data sharing—will require time.

C-level officers should think about applied machine learning in three stages: machine learning 1.0, 2.0, and 3.0—or, as we prefer to say, description, prediction, and prescription. They probably don't need to worry much about the description stage, which most companies have already been through. That was all about collecting data in databases (which had to be invented for the purpose), a development that gave managers new insights into the past. OLAP—online analytical processing—is now pretty routine and well established in most large organizations.

There's a much more urgent need to embrace the prediction stage, which is happening right now. Today's cutting-edge technology already allows businesses not only to look at their historical data but also to predict behavior or outcomes in the future—for example, by helping credit-risk officers at banks to assess which customers are most likely to default or by enabling telcos to anticipate which customers are especially prone to "churn" in the near term.

A frequent concern for the C-suite when it embarks on the prediction stage is the quality of the data. That concern often paralyzes executives. In our experience, though, the last decade's IT investments have equipped most companies with sufficient information to obtain new insights even from incomplete, messy data sets, provided of course that those companies choose the right algorithm. Adding exotic new data sources may be of only marginal benefit compared with what can be mined from existing data warehouses. Confronting that challenge is the task of the "chief data scientist."

Prescription—the third and most advanced stage of machine learning—is the opportunity of the future and must therefore command strong C-suite attention. It is, after all, not enough just to predict *what* customers are going to do; only by understanding *why* they are going to do it can companies encourage or deter that behavior in the future. Technically, today's machine-learning algorithms, aided by human translators, can already do this. For example, an international bank concerned about the scale of defaults in its retail business recently identified a group of customers who had suddenly switched from using credit cards during the day to using them in the middle of the night. That pattern was accompanied by a steep decrease in their savings

rate. After consulting branch managers, the bank further discovered that the people behaving in this way were also coping with some recent stressful event. As a result, all customers tagged by the algorithm as members of that microsegment were automatically given a new limit on their credit cards and offered financial advice.

The prescription stage of machine learning, ushering in a new era of man–machine collaboration, will require the biggest change in the way we work. While the machine identifies patterns, the human translator's responsibility will be to interpret them for different microsegments and to recommend a course of action. Here the C-suite must be directly involved in the crafting and formulation of the objectives that such algorithms attempt to optimize.

6. This sounds awfully like automation replacing humans in the long run. Are we any nearer to knowing whether machines will replace managers?

It's true that change is coming (and data are generated) so quickly that human-in-the-loop involvement in all decision making is rapidly becoming impractical. Looking three to five years out, we expect to see far higher levels of artificial intelligence, as well as the development of distributed autonomous corporations (DACs). These self-motivating, self-contained agents, formed as corporations, will be able to carry out set objectives autonomously, without any direct human supervision. Some DACs will certainly become self-programming.

One current of opinion sees DACs as threatening and inimical to our culture. But by the time they fully evolve, machine learning will have become culturally invisible in the same way technological inventions of the 20th century disappeared into the background. The role of humans will be to direct and guide the algorithms as they attempt to achieve the objectives that they are given. That is one lesson of the automatic-trading algorithms which wreaked such damage during the financial crisis of 2008.

No matter what fresh insights computers unearth, only human managers can decide the essential questions, such as which critical

business problems a company is really trying to solve. Just as human colleagues need regular reviews and assessments, so these "brilliant machines" and their works will also need to be regularly evaluated, refined—and, who knows, perhaps even fired or told to pursue entirely different paths—by executives with experience, judgment, and domain expertise.

The winners will be neither machines alone, nor humans alone, but the two working together effectively.

7. So in the long term there's no need to worry?

It's hard to be sure, but DACs and machine learning should be high on the C-suite agenda. We anticipate a time when the philosophical discussion of what intelligence, artificial or otherwise, might be will end because there will be no such thing as intelligence—just processes. If distributed autonomous corporations act intelligently, perform intelligently, and respond intelligently, we will cease to debate whether high-level intelligence other than the human variety exists. In the meantime, we must all think about what we want these entities to do, the way we want them to behave, and how we are going to work with them.

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Repelling the cyberattackers

Tucker Bailey, James M. Kaplan, and Chris Rezek

Organizations must build digital resilience to protect their most valuable information assets.

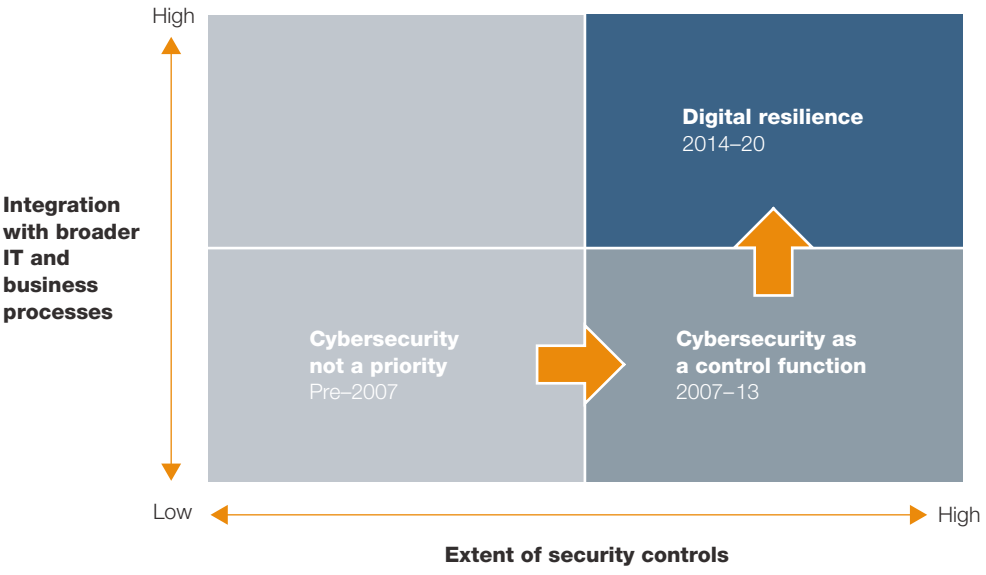
For many businesses, the next wave of innovation and growth will likely involve intelligent analytics, rich mobile experiences, and "one touch" processes that require no further manual intervention. Success will depend on maintaining trust: consumers and business customers alike will accept nothing less than a complete assurance that the companies they engage with protect their highly sensitive data carefully in the hyperconnected information systems powering the digital economy.

When companies think about cybersecurity in such a world, most ask, "How can we protect ourselves and comply with standards or regulations?" instead of "How do we make confident, intelligent investments given the risks we face?" Many also treat cybersecurity primarily as a technology function rather than integrating it into business operations. As a result, they get the wrong answer about how to construct a cybersecurity program. The consequences are painfully clear: nearly 80 percent of technology executives surveyed report that their organizations cannot keep up with the attackers' increasing sophistication.

The solution, we're convinced based on years of research and experience on the front lines, is to move beyond models that make cybersecurity a control function and toward what we call digital resilience: the ability to design customer applications, business processes, technology architectures, and cybersecurity defenses with the protection of critical information assets in mind (Exhibit 1). Digital resilience is the subject of our new book, *Beyond Cybersecurity: Protecting Your Digital Business*, and the focus of this article.

Exhibit 1

Companies need to move beyond cybersecurity as a control function toward a more integrated and resilient approach.



Source: Tucker Bailey et al., *Beyond Cybersecurity: Protecting Your Digital Business*, April 2015

Given the size of the stakes and the solution's cross-functional nature, progress requires senior-level participation and input. Unfortunately, top management often doesn't engage. At roughly two-thirds of the companies we evaluated, the managers in charge of cybersecurity have no regular interaction with the CEO. So the launch—or relaunch—of a digital-resilience program gives the senior-management team an ideal opportunity to set and clarify expectations for how each of its members will help to identify and protect important information assets.

This article describes six critical actions for any organization planning to achieve digital resilience. Reflecting on them will stimulate a dialogue among members of the top team about how they can work together to safeguard their company.

1. Identify all the issues

It's nearly impossible to have an intelligent perspective on how well a cybersecurity function performs without first understanding which information assets are at risk. When companies fail to do so, they can make the wrong downstream choices. One financial institution started its program by assessing regulatory requirements. Two years later, it had made some technical progress but had spent a lot of money and devoted almost all of its efforts to protecting consumers' personal data, to the exclusion of other important information assets.

Companies must assess the risks in an integrated way. An attacker doesn't just have to defeat their processes for identity and access management (I&AM) or for detecting intrusions; it must defeat a *system* of defenses spanning different types of controls. The attacker will have a much harder time if those defenses interlock. Unfortunately, many companies assess each element—intrusion detection, I&AM, data protection, incident response, and the like—separately. They neglect to evaluate how these controls *combine* to protect important information.

Finally, companies must go beyond traditional protections of the perimeter. We often hear executives say that they want to have a security-control assessment. Unfortunately, that starting point frames the exercise around tactical issues, such as the efficacy of the intrusion-detection tool kit or of the antimalware environment. The result, too often, is that any change occurs within an extremely limited security framework. To accomplish something real, companies must typically make substantive business-process changes in the context of broader strategic and operational considerations. Effective cybercapability assessments not only address existing protocols, personnel, and tools but also governance, controls, the security architecture, and delivery systems.

2. Aim high but toward a well-defined target

A cybersecurity plan should be aspirational but attainable—and simple enough to explain so that its leaders can build organizational support. After companies identify the priority business risks,

they can then target three types of mechanisms to step up the security of their information assets: business-process controls (changes to end-user behavior and business processes beyond IT), broader IT controls (changes to the IT architecture as a whole), and cybersecurity controls (the discrete technological changes designed to protect information, such as encryption, I&AM, and security analytics). Many companies focus too much on cybersecurity controls and thus create unnecessarily expensive and intrusive systems. Ideally, they should draw on all three types of controls. Actions should be prioritized by the number and nature of the business risks they address and the extent to which they require the organization to change.

Any plan should synthesize the broad set of improvements, initiatives, and actions into a short list of major strategic themes. Those of one healthcare provider included the following:

- The protection of personal health information as it moves through the entire business system, from patients to doctors to hospitals and, when relevant, to supporting vendors.

- Detecting and responding to cyberevents to minimize harm to the business and the disruption of care for patients.

- Scrutiny of insider activities, both accidental and intentional, at the same level that external activity receives. This final point particularly deserves attention. Many companies focus their resiliency programs on external attackers, not threats from insiders.

The themes the healthcare provider identified, taken together, enabled managers to describe this change program to senior managers, to rally the staff around it, and, ultimately, to track and measure progress.

3. Work out how best to deliver the new cybersecurity system

Once a company has identified its cybersecurity goals, turning aspirations into realities requires an array of operational processes, such as updating access rights for accounts, assessing the vendors'

security capabilities, and reviewing the security architectures of applications. Historically, business and IT managers alike have often viewed such controls as a brake on the organization's ability to get things done. And, frankly, many aspects of cyberprotection do act as constraints. For example, new safeguards to protect vital information assets will require much more granular policies on passwords and access rights. That can strain existing processes, make the business less agile, and frustrate employees and customers.

Bear in mind, however, that no implementation can be expected to proceed without some turbulence. The leading cybersecurity organizations learn by doing. They push themselves aggressively—drilling, iterating, and refining the construction of ready and flexible defenses. This approach may also reveal processes that can be radically enhanced. One insurance company, for example, dramatically upgraded its operations by segmenting requests according to their complexity. Making this change helped the business eliminate rework and allowed it to run its core security processes in parallel, improving both productivity and response times by 30 percent.

Determining the cybersecurity organization's roles and reporting relationships will be critical, as well. Building resilience requires seniority and visibility. In our experience, it's valuable for one executive—often called the chief information security officer—to have sole organizational ownership for all aspects of cybersecurity. Typically, this executive reports to the CIO, but, increasingly, he or she will also have a solid or dotted reporting line to the chief risk officer or to another business executive. This sort of structure shows that cybersecurity is as much a business issue as a technology one and helps cut through complexity when companies must implement changes quickly.

Improving skills and resources may be one of the most demanding and important aspects of a digital-resilience program. Given the tightness of the cybersecurity labor market, it may help companies to focus on their retention efforts. They also ought to draw from nontraditional talent pools, such as young professionals in the military or the intelligence communities, or from strong problem solvers elsewhere in the organization—or competitors.

4. Establish the risk–resource trade-offs

Different companies have different degrees of tolerance for risk, depending on their sectors, cultures, and overall business strategies. There is no simple metric for quantifying an organization's risk profile, including with respect to cyberattacks. Rather than trying to formulate some highly abstract (and therefore largely meaningless) statement of a company's appetite for risk, the executives responsible for cybersecurity should present senior leaders with three or four pragmatic options representing different levels of risk reduction and resource commitments.

For example, a North American bank's cybersecurity team laid out an ambitious program that represented an enormous change for it. The team noted that some of the proposed security measures were essential to achieve a minimum level of responsible practice. Others were standard at the bank's peers and provided additional protection for the bank's most important information assets. A final set of actions deemed more cutting-edge was directed at sophisticated attackers. The team used this framework to develop three security options (with progressive levels of protection and resource commitment) and to describe which types of business risks each would address.

Although the effort was time consuming, it gave senior managers a practicable set of options. It sparked a robust discussion about how much additional capital investment, operating expense, and management attention the company could devote to its cybersecurity program and how much each option would reduce risk. Perhaps predictably, the bank's senior management decided that it had a responsibility to go beyond the bare minimum. However, because the institution lacked the global footprint (and resources) of the largest financial players, its leaders also decided that investing in relatively cutting-edge protections against the most sophisticated attackers did not make business sense. Instead, the bank settled on a middle option: making sure it had appropriate protection for its most important information assets.

5. Develop a plan that aligns business and technology

Once a company has assessed its cybersecurity capabilities, defined its appetite for risk, and agreed on an organizational model, it must develop a plan that aligns the business with the technology. Regulatory requirements, while important, should not be the sole foundation of the new, technology-driven controls. One insurer, for example, started down this path and found that its program didn't create change in its business units. Indeed, most senior executives barely knew what the program did. The insurer was able to right itself only after it took time to rethink its most important assets and business risks and then tailored its cybersecurity protections to meet them specifically. To do so, it had to comb through the portfolio of each business to assess its information assets, identify business-process changes needed to protect critical data, and implement leading-edge technology controls. And the company had to tackle these actions, as much as possible, in order of greatest impact.

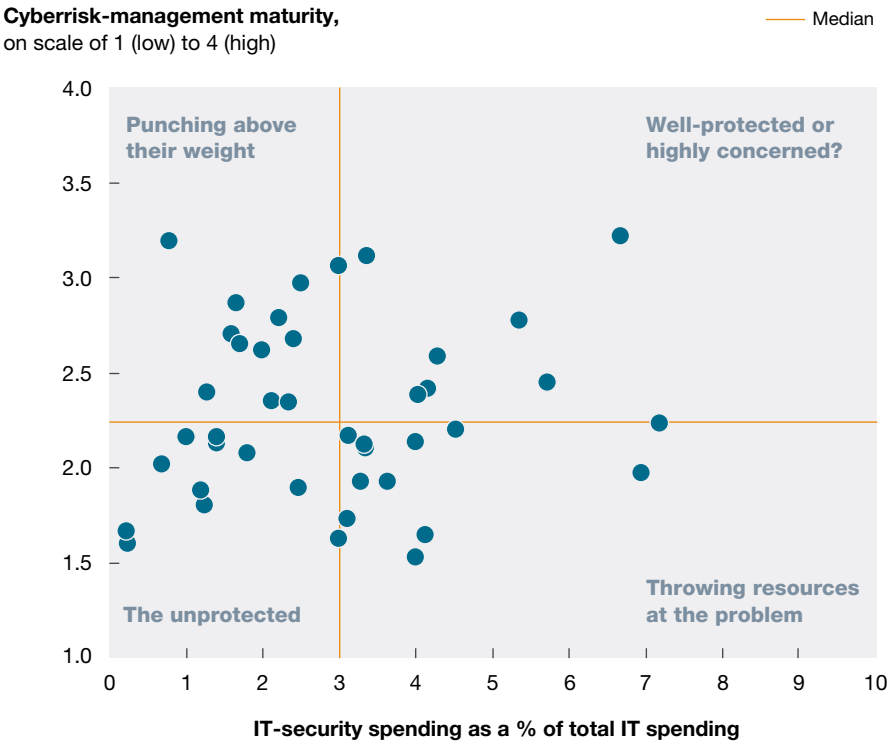
Companies can reduce their vulnerabilities and increase their overall security significantly by implementing many IT improvements, such as the private cloud, desktop virtualization, software-defined networking, and enhanced application development. An integrated cybersecurity plan must take these elements into account. What's more, its leaders must spend lots of time with the leaders of other internal technology programs to understand existing initiatives, see that they have the greatest and best possible impact on security, and ensure that they are in line with the company's broader cybersecurity program.

6. Ensure sustained business engagement

Cybersecurity is a high-stakes topic, so it is a CEO-level one. Attaining digital resilience also requires more than just throwing resources at the problem. Indeed, we've found that additional cybersecurity spending doesn't necessarily bring the management of cyberrisks to maturity (Exhibit 2). Because cybersecurity demands hard decisions that affect many functions across a business, digital resilience requires an actively engaged senior-management team. The company's

Exhibit 2

Big spending cannot buy mature cyberrisk management.



Source: Tucker Bailey et al., *Beyond Cybersecurity: Protecting Your Digital Business*, April 2015

leaders must signal—with their time and attention—the importance they attach to protecting information assets. That engagement must not only be sustained but also reinforced through clear actions and the inclusion of cybersecurity objectives (such as the achievement of major program milestones) in the senior team's evaluations and incentives. Of course, this approach means additional work for the executives involved. But the result is a more nimble and better-prepared organization.

The resiliency levers described in this article represent a fundamental change in how most business organizations interact with IT, how IT addresses security, and how a robust portfolio of interconnected long-term safeguards can emerge and evolve. There are no shortcuts or pat solutions. Indeed, any cybersecurity program for a sizable institution will involve hundreds of individual design and implementation decisions. Senior, cross-functional oversight is essential to avoid a mere patchwork of compromises that will undermine digital resilience. Given the stakes, nothing else will do.

The authors wish to thank Alan Marcus and Derek O'Halloran for their contributions to this article.

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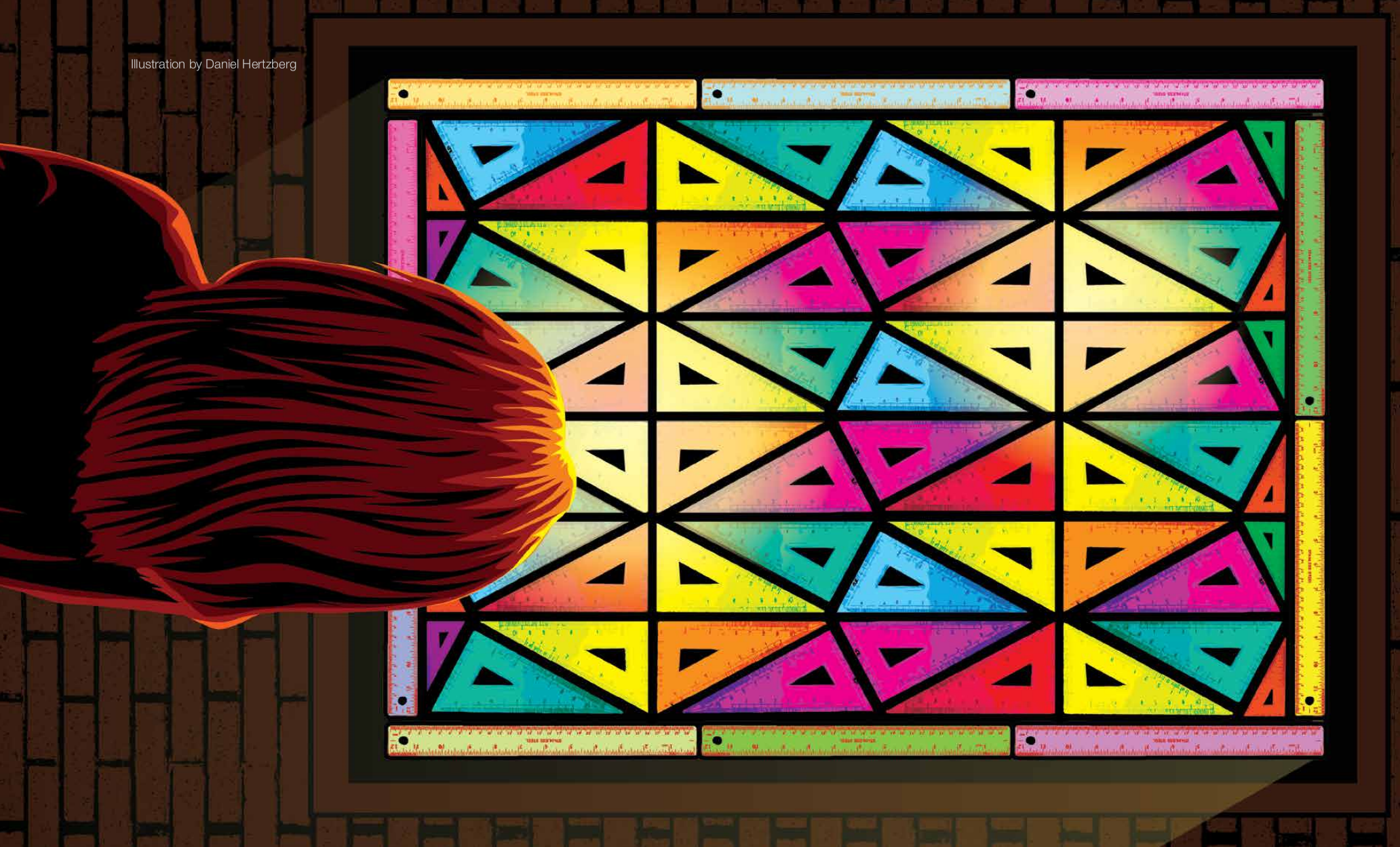
Illustration by Daniel Hertzberg

Innovating with discipline

The premium on innovation continues to rise, but big companies find innovation difficult. What can they do? Four articles give helpful suggestions, including case studies of two that have succeeded.

Disrupting beliefs: A new approach to business-model innovation

Marc de Jong and Menno van Dijk

In a disruptive age, established business models are under attack. Here's how incumbent companies can reframe them.

Let's face it: business models are less durable than they used to be. The basic rules of the game for creating and capturing economic value were once fixed in place for years, even decades, as companies tried to execute the same business models better than their competitors did. But now, business models are subject to rapid displacement, disruption, and, in extreme cases, outright destruction. Consider a few examples:

- Bitcoin bypasses traditional banks and clearinghouses with blockchain technology.
- Coursera and edX, among others, threaten business schools with massive open online courses (MOOCs).[1]
- Tencent outcompetes in Internet services through microtransactions.
- Uber sidesteps the license system that protects taxicab franchises in cities around the world.

The examples are numerous—and familiar. But what's less familiar is *how*, exactly, new entrants achieve their disruptive power. What

[1] Rich Lyons, "Haas dean confidently predicts demise of business schools," interview by Della Bradshaw, *Financial Times*, April 10, 2015, ft.com.

enables them to skirt constraints and exploit unseen possibilities? In short, what's the *process* of business-model innovation?

For incumbents, this kind of innovation is notoriously hard. Some struggle merely to recognize the possibilities. Others shrink from cannibalizing profit streams. Still others tinker and tweak—but rarely change—the rules of the game. Should it be so difficult for established companies to innovate in their business models? What approach would allow incumbents to overturn the conventions of their industries before others do? Our work with companies in telecommunications, maritime shipping, financial services, and hospitality, among other sectors, suggests that established players *can* disrupt traditional ways of doing business by reframing the constraining beliefs that underlie the prevailing modes of value creation.[2] This article shows how.

Reframing beliefs

Every industry is built around long-standing, often implicit, beliefs about how to make money. In retail, for example, it's believed that purchasing power and format determine the bottom line. In telecommunications, customer retention and average revenue per user are seen as fundamental. Success in pharmaceuticals is believed to depend on the time needed to obtain approval from the US Food and Drug Administration. Assets and regulations define returns in oil and gas. In the media industry, hits drive profitability. And so on.

These governing beliefs reflect widely shared notions about customer preferences, the role of technology, regulation, cost drivers, and the basis of competition and differentiation. They are often considered inviolable—until someone comes along to violate them. Almost always, it's an attacker from outside the industry. But while new entrants capture the headlines, industry insiders, who often have a clear sense of what drives profitability, are well positioned to play this game, too.

How can incumbents do so? In a nutshell, the process begins with identifying an industry's foremost belief about value creation and then articulating the notions that support this belief. By turning one

[2] For broad application of reframing as a methodology, see Karim Benammar, *Reframing: The art of thinking differently*, Amsterdam: Uitgeverij Boom, 2012.

A NEW APPROACH TO BUSINESS-MODEL INNOVATION

5 steps to turn your beliefs upside down

of these underlying notions on its head—reframing it—incumbents can look for new forms and mechanisms to create value. When this approach works, it's like toppling a stool by pulling one of the legs.

The fuller process and the questions to ask along the way look like this:

1. Outline the dominant business model in your industry. What are the long-held core beliefs about how to create value? For instance, in financial services, scale is regarded as crucial to profitability.

2. Dissect the most important long-held belief into its supporting notions. How do notions about customer needs and interactions, technology, regulation, business economics, and ways of operating underpin the core belief? For instance, financial-services players assume that customers prefer automated, low-cost interfaces requiring scale. Because the IT underpinning financial services has major scale advantages, most of a provider's cost base is fixed. Furthermore, the appropriate level of risk management is possible only beyond a certain size of business.

3. Turn an underlying belief on its head. Formulate a radical new hypothesis, one that no one wants to believe—at least no one currently in your industry. For instance, what if a financial-services provider's IT could be based almost entirely in the cloud, drastically reducing the minimum economic scale? Examples of companies that have turned an industry belief on its head include the following:

- Target: What if people who shopped in discount stores would pay extra for designer products?
- Apple: What if consumers want to buy electronics in stores, even after Dell educated them to prefer direct buying?
- Palantir: What if advanced analytics could replace part of human intelligence?
- Philips Lighting: What if LED technology puts an end to the lighting industry as a replacement business?
- Amazon Web Services: What if you don't need to own infrastructure yourself?
- TSMC: What if you don't need to develop your own process technology or invest in your own infrastructure?
- Amazon Mechanical Turk, TaskRabbit, and Wikipedia: What if you can get stuff done in chunks by accessing a global workforce in small increments?

4. Sanity-test your reframe. Many reframed beliefs will just be nonsense. Applying a reframe that has already proved itself in another industry greatly enhances your prospects of hitting on something that makes business sense. Business-model innovations, unlike product and service ones, travel well from industry to industry: Airbnb inspires Uber inspires Peerby. So look again at the reframes described in step three above. All of them have broad application across industries.

5. Translate the reframed belief into your industry's new business model. Typically, once companies arrive at a reframe, the new mechanism for creating value suggests itself—a new way to interact with customers, organize your operating model, leverage your resources, or capture income. Of course, companies then need to transition from their existing business model to the new one, and that often requires considerable nerve and sophisticated timing.[3]

Four places to reframe

Executives can begin by systematically examining each core element of their business model, which typically comprises customer relationships, key activities, strategic resources, and the economic model's cost structures and revenue streams. Within each of these elements, various business-model innovations are possible. Having analyzed hundreds of core elements across a wide range of industries and geographies, we have found that a reframe seems to emerge for each one, regardless of industry or location. Moreover, these themes have one common denominator: the digitization of business, which upends customer interactions, business activities, the deployment of resources, and economic models.

Innovating in customer relationships: From loyalty to empowerment

Businesses should strive for customer loyalty, right? Loyal customers tell their friends and contacts how good a company is, thereby lowering acquisition costs. Loyal customers stick around longer,

[3] For more about this transition, see Constantinos Markides and Daniel Oyon, "What to do against disruptive business models (When and how to play two games at once)," *MIT Sloan Management Review*, June 26, 2010, sloanreview.mit.edu.

keeping the competition at bay. Loyal customers provide repeat business, a bigger share of wallet, and more useful feedback about problems and opportunities. No wonder companies in so many industries emphasize locking in customers by winning their loyalty.

But the pursuit of loyalty has become more complicated in the digital world. The cost of acquiring new customers has fallen, even without loyalty programs. Customers—empowered by digital tools and extensive peer-reviewed knowledge about products and services—now often do a better job of choosing among buying options than companies do. Switching costs are low. Most significant, the former passivity of customers has been superseded by a desire to fulfill their own talents and express their own ideas, feelings, and thoughts. As a result, they may interpret efforts to win their loyalty as obstacles to self-actualization.

Instead of fighting that trend, why shouldn't companies embrace the paradox that goes with it: the best way to retain customers is to set them free. The invention company Quirky, for example, lets the ideas and votes of its online community guide the products it designs and produces. MakerLabs, an interactive design–build collective, provides its members with the tools and expertise they need to build what they want.

Established companies can also make the switch from loyalty to empowerment. Consider the pension and insurance industry, long governed by the belief that complex investment decisions are best made by experts (companies or intermediary financial advisers) on behalf of account holders. A multinational insurance and pension provider reframed that belief by proposing the opposite: what if customers preferred to make their own investment decisions, even if they didn't have the credentials of investment professionals? The company now provides customers with web-based investment information and decision-making tools, along with appropriate risk warnings. These enable customers to invest a percentage of their funds directly in businesses of their choice. This effort is in its early days, but customer pick-up and the profitability of products are promising.

Innovating in activities: From efficient to intelligent

One of the most dominant beliefs governing today's big companies is that improving efficiency is the most reliable way to increase profits. Especially if market requirements change only gradually, companies have plenty of time to minimize the production costs of their existing products. Today, of course, constant efficiency improvements are a prerequisite for a healthy bottom line.

They may be necessary, but they're not sufficient. In today's rapidly changing markets, many products become obsolete before they have been "leaned out," so managers get less time to optimize production processes fully. Companies are therefore building flexibility and embedded intelligence directly into the production process to help them adapt quickly to changing needs. Embedded intelligence can, over time, help companies to improve both the performance and the value-in-use of products and services and thus to improve their pricing. In essence, digitization is empowering businesses to go beyond efficiency, to create learning systems that work harder *and* smarter.

Consider how a web-based global hotel-booking platform used quick feedback cycles to reframe the focus of its business model from efficiency to user satisfaction, thereby opening new revenue opportunities. The hotel-booking industry's central belief has been that success depends on two things: negotiating power with hotels and a reliable web interface for customers. The company reframed this dominant belief by asking if customers booking a hotel room might look for more than convenience, speed, and price. It tested this reframe through a series of iterations to its website. Even minor changes—such as the use of photographs, a warmer (or sometimes cooler) tone for the site's text, and the inclusion of testimonials from happy customers—raised the click-through rate. This insight confirmed the reframe: a booking site is more than just a functional service; it can also become an engaging customer experience.

As a result, the company has integrated constant feedback loops and daily experiments into its key activities, creating a true learning system. Now it improves and adjusts its site daily to boost customer engagement and increase revenue. It may well be on its way to becoming the industry's global standard.

Innovating in resources: From ownership to access

One widespread premise in business is that companies compete by owning the assets that matter most to their strategy. Competitive advantage, according to this belief, comes from owning valuable assets and resources, which tend to be scarce and utilized over long time periods, as well as firm and location specific. Thus ownership (rather than, say, leasing) frequently appears to be the best way to ensure exclusive access.

But what if assets are used infrequently or inconsistently? In these cases, digital technology, by increasing transparency and reducing search and transaction costs, is enabling new and better value-creating models of collaborative consumption. As a result, ownership may become an inferior way to access key assets, increasingly replaced by flexible win-win commercial arrangements with partners. On the consumer side, the examples include Peerby, an app that allows neighbors to share tools and other household items that would otherwise sit idle in garages, and Uber, which allows any driver with a qualified vehicle to provide taxi service. House- and room-sharing programs apply the same thinking to underused real estate. In every case, consumers opt to access rather than own these assets.

Big companies are following suit—for example, by reducing sourcing costs through "cradle-to-cradle" approaches that collect and repurpose what they previously considered waste.[4] Instead of buying (and thus owning) the raw materials needed for products, companies access these materials in previously sold products and repurpose them. Similarly, the global sourcing firm Li & Fung limits risk, increases efficiency, and enhances flexibility by using broad networks focused on access to (rather than majority ownership of) suppliers. The software maker Adobe Systems no longer licenses new versions of its products to customers through one-time sales; instead it provides access to them through monthly subscriptions. (For more on this transition, see "How Adobe changed its business model," on page 76.)

The move from ownership to access mirrors a more broadly evolving societal mind-set toward open-source models. For example, in 2014 the electric-vehicle company Tesla made all of its intellectual-

[4] See Hanh Nguyen, Martin Stuchtey, and Markus Zils, "Remaking the industrial economy," *McKinsey Quarterly*, February 2014, mckinsey.com.

property patents freely available in an effort to encourage the manufacture of clean vehicles.

These possibilities penetrate deeply into traditional industries. Consider how a big European maritime port embarked on a large-scale land-management program. The industry belief reframed by the port was that large liquid-bulk-load ships valued private access to storage tanks. The underlying assumption was that shipping companies wanted the ability to deliver their bulk loads anytime and therefore required entry to their tanks at close range.

In response to this perceived need, most maritime ports have developed jetties to which they provide individual shipping companies private access—essentially the equivalent of "ownership." As a result of each company's varying schedules and traffic, many jetties ended up being mostly unused, but others weren't sufficient for peak times. Seeing this problem, the port's management reframed the industry belief by asking if customers cared more about access on demand than exclusivity. The port now intends to help all customers use any jetty to access any fuel tank, by developing a common-carrier pipe connecting them. Just as Peerby in effect shifts a neighborhood's "business model" by increasing the utilization of underused assets, so the maritime port is making more of underutilized jetties and storage tanks by shifting the business model so that shipping companies pay for access to jetties and storage rather than the exclusive use of them. In the future, this model may evolve into a dynamic multi-user slot-booking system that matches the real-time availability of jetties with demand for liquid-bulk-carrier ships.

Innovating in costs: From low cost to no cost

According to historian Peter Watson, humans have been trading goods and services for more than 150,000 years. During that time, we've always believed that to sell more of an offering you had to produce more of it. The underlying notion was that a single unit of a given product or service could be used only by one customer at a time. Any increase in production therefore required a commensurate increase in labor, resources, and equipment. While volume advantages did translate into lower average costs per unit, economies of scale could never get the average cost down to zero.

Digitization is reframing this ancient belief in powerfully disruptive ways. In fact, of all the reframes discussed here, this one has had the most devastating effect, since it can destroy entire industries. What's driving prices to zero is the reframe that multiple customers can simultaneously use digital goods, which can be replicated at zero marginal cost. Massive open online courses, for example, provide a nearly zero-marginal-cost education.

Consider the implications for telecommunications, where the dominant belief has been that value is best captured through economies of scale—the more telephone minutes sold, the lower the unit cost. As a result, the larger the mobile-phone plan, the lower the cost per minute. One telecommunications company is upending this belief by making customers an "all you can eat" offer. It realized that unlimited use of voice and texting units comes at no additional cost to itself, so it can compete against emerging voice-over-IP competitors. As a result, the telco started to offer unlimited texting and voice plans by focusing its economic model on making money from data usage and from its investments in a huge data network and storage capacity. Such plans eliminate confusion among customers and increase their satisfaction. As soon as the network has reached its planned return on investment, incremental data service will also be free.

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Big companies have traditionally struggled to innovate in their business models, even as digital technology has brought business-model innovation to the forefront of the corporate agenda. Yet big companies can be disruptive, too, if they identify and overcome common but limiting orthodoxies about how to do business.

The authors wish to thank Karim Benammar, Berend-Jan Hilberts, and Saskia Rotshuizen for their contributions to this article.

Marc de Jong is a principal in McKinsey's Amsterdam office, and **Menno van Dijk** is the cofounder and managing director of the THNK School of Creative Leadership and a former director in the Amsterdam office.

How Adobe changed its business model

Two senior leaders describe the challenges they faced moving the company's key software tools to the cloud.

More than five years ago, Adobe executives began seeing signs of disruption across the software industry. Flexible web-based application services with monthly subscriber fees were increasingly challenging traditional business models based on packaged software licensed in perpetuity. The logic of shifting the company's line of creative software tools[1] to the cloud was clear enough, but moving into this starkly different terrain risked inflicting financial damage, confusing customers, and provoking internal resistance. In these extracts from a longer interview, Adobe's chief financial officer, Mark Garrett, and its vice president of business operations and strategy, Dan Cohen, tell McKinsey's Kara Sprague about a journey that has so far enticed more than four million

customers to the company's new subscription model and prompted forecasts for more rapid short-term growth.

Reading the tea leaves

Mark Garrett: Even though customers had higher creative demands, our creative products weren't really growing. We were driving revenue growth by raising our average selling price, either directly or through moving people up the product ladder. Demand for our products was stagnating. With recurring-revenue growth of only around 5 percent in fiscal year 2007, our revenue and stock price suffered more than those of most software companies during the downturn of 2008 and 2009. We had virtually no financial buffer.

The perpetual-licensing model was also hampering our efforts to deliver new innovations and capabilities to our customers. Historically, we had delivered product updates only every 18 or 24 months, but our customers' content-creation requirements were changing much faster than that. Additionally, we had a fundamental belief that there were broader market opportunities for us. We already had a strong presence in content creation, and we saw an opportunity to broaden our presence in other areas.

Dan Cohen: We had extremely high customer-satisfaction rates for our products, but when we drilled down into the numbers, we saw that people were saying things like "I'm so happy with what I have, I don't see the need to ever buy another one again." Clearly, we needed to figure out how we could get people to want to buy from us more regularly and how we could innovate better and faster for our customers. The new software companies reaching scale were operating under a cloud model.

Modeling the future

Mark Garrett: We spent many hours talking about risk. A lot of people at Adobe didn't buy into the idea of the cloud strategy at the beginning. We knew that our revenues, earnings, and stock price were almost certain to drop during the transition. And we knew it was going to be a long, hard road. We spent hours knee deep in Excel spreadsheets literally covering the boardroom, with pricing and unit models projecting how quickly perpetual licenses would fall off and how quickly online subscriptions would ramp up. Thanks to these discussions, which took about a year, we realized that we could manage through the transition and that, ultimately, we, our customers, and our shareholders would be much better off.

Dan Cohen: We did a pilot overseas and later offered a subscription model in the US. We offered, side by side, a similar product under a subscription model and our traditional perpetual-licensing model, and we observed the uptake. Our research showed that we were bringing in a lot of new users under the subscription model, and many existing users told us that they would not have upgraded without the subscription offering.

Starting the transition

Dan Cohen: The change happened in phases. After the pilot, we announced our intentions to Wall Street in November 2011—a full day of analyst briefings focused on communicating the cloud strategy, the ramifications, and the financial expectations. The stock dropped by 6 percent the day after we announced our plans, actually less than we had anticipated. We launched Creative Cloud in May 2012, and we also launched Creative Suite 6 under the traditional perpetual-licensing model. So there was a period when we were doing things in parallel.

Mark Garrett: We had prepared Wall Street for a significant drop in revenues and earnings in 2012. We shared some new metrics to help the analysts measure the health of the business as we went through this transition. We also gave them markers—for instance, we said we were going to have four million subscribers in 2015 and build up our annualized recurring revenues. As the switchover progressed, toward the end of 2013, investors became intrigued and started asking about longer-term objectives, which we gave them. The point is, we were transparent.

During the period when we were actively selling both perpetual and subscription products, our finance team did an analysis and found it would cost us twice as much to offer both products side by side. That was not sustainable. Development on the subscription-based product was generating new features and functionality, say, every month or every quarter. It no longer made sense to hold back all those innovations only to bundle them into the packaged product a year later.

Transforming operations

Dan Cohen: We had to dig in and ask, "How do we do this differently?" Moving to the cloud affected how we engineered the product, our operations, and our

"We had to dig in and ask, 'How do we do this differently?' Moving to the cloud affected how we engineered the product, our operations, and our go-to-market and business models."

go-to-market and business models. In the past, we would think about adding new features to the next version of a product, and we would take 18 to 24 months between major launches of new products. Two years is now an eternity. We're in an agile development model. A scrum team delivers service updates that are revised, tested, and released.

Under the cloud model, the value proposition is about delivering high-quality service and not just new features. Uptime, availability, disaster recovery, and security have thus become critical. Our website is no longer just a place to get product and company information. It *is* the product. It's the start of a dynamic customer experience. As a result, there is now closer interaction among the functional groups that contribute to the experience—groups that used to be separate: product management, engineering, marketing, and IT.

Mark Garrett: One of the most challenging aspects of the cloud transition was changing how we brought products to market. We had to educate and compensate the channel and our sales force differently; the latter required different timing for revenue recognition. Additionally, our accounting organization had to change. The team has moved from managing up-front revenue recognition and maybe a few large contracts to billing more than four million individuals every month, in addition to enterprise customers. Previously, we shipped three million units a year. It's a hugely different process requiring many more new metrics. At first, the reaction of some of our employees was that we were crazy. We went through some cultural antibodies—we were a company that had been doing things the same way for almost three decades. We instituted an open dialogue and encouraged debate. Not everyone stayed, but those who did were committed to the cloud model.

Taking advantage of the new model

Mark Garrett: We think the customer is getting a better experience and greater value. Because we are operating in the cloud, we have a better read on customer needs—we know who signed up for Creative Cloud, which apps they downloaded, and which features they are using. We have predictive analytics and our own marketing tools to listen to our customers and to strengthen our relationships with them. Additionally, the company has a more predictable revenue stream. We have a bigger business that can address a larger market opportunity because we can bring millions of users to this platform and develop additional services for them over time.

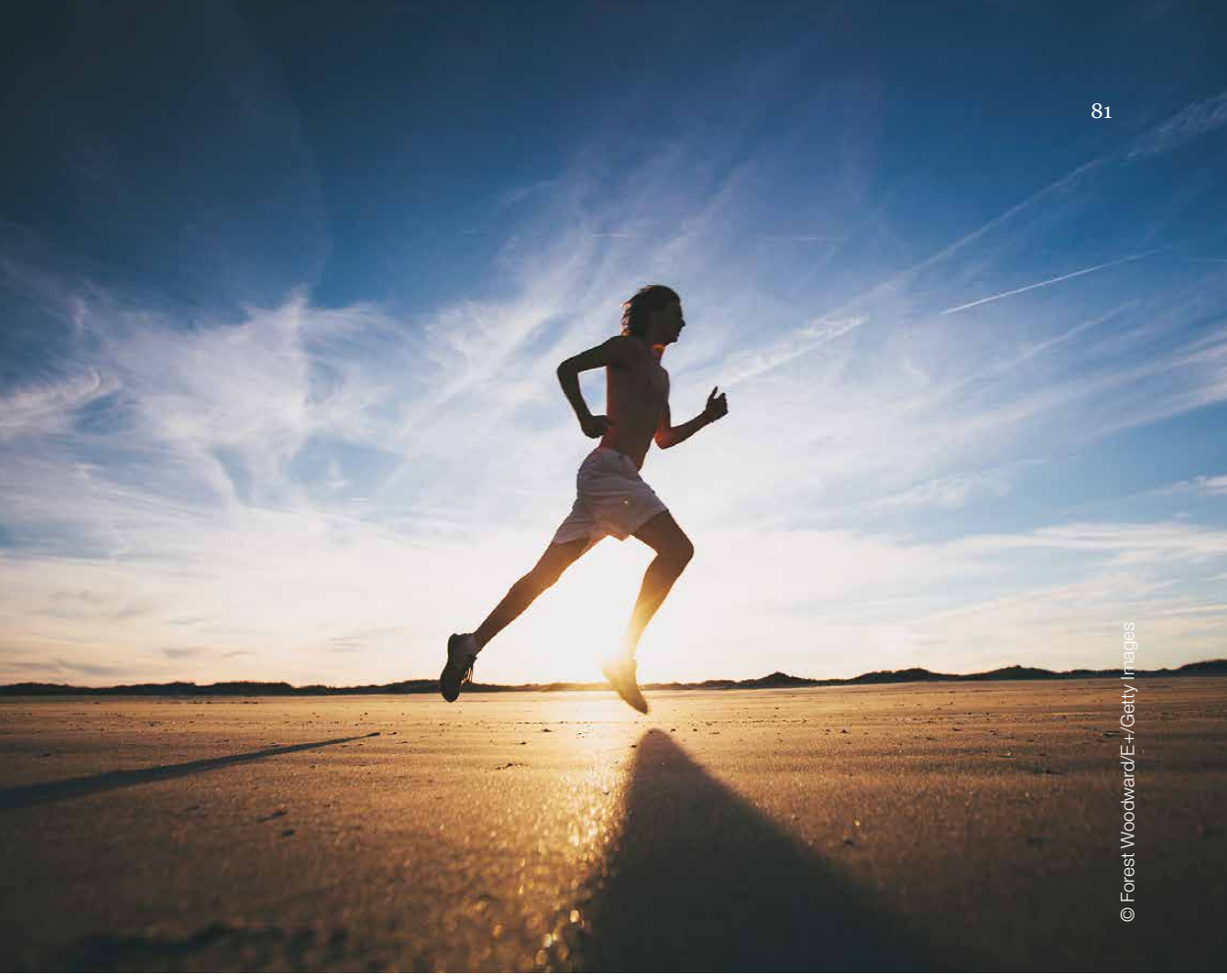
Dan Cohen: When you're considering moving customers to a subscription model, you really have to think through why your new digital offering is better than what customers already have. It's not enough just to give them more frequent updates. You have to take a fresh look at your products and be willing

to burn the boats. Executives in every industry need to read the tea leaves and look at changes happening in their own or adjacent industries. Don't wait until someone is disrupting your business to start moving to the cloud or to make any kind of necessary transformation, because it will be too late. This is a years-long effort, and it can be hard to catch up to others that have gotten the jump on you.

[1] Software for the creative professions in the areas of publishing, web design and development, video and animation production, mobile apps, gaming development, and document creation and collaboration.

This excerpt is adapted from an interview conducted by **Kara Sprague,** a principal in McKinsey's San Francisco office.

For the full interview, see "Reborn in the cloud," July 2015, on mckinsey.com.



How Discovery keeps innovating

CEO Adrian Gore describes how the South African company has been shaking up its industry through business-model innovation and explains what helps to catalyze new ideas.

In 1992, Adrian Gore founded Discovery with an idea for a health-insurance model that would make people healthier. The South African start-up quickly grew into a global player, with a market cap of over $8 billion and a foothold in major markets, including the United Kingdom and China. In the commentary that follows, Gore reflects on the Discovery Group's sources of innovative energy and on the organizational efforts required to maintain that energy as the company grows. (For more on these issues, see "The eight essentials of innovation," April 2015, on mckinsey.com.) One key, says Gore, is that rewards and risk taking go hand in hand at Discovery, which puts its money where its mouth is by making an innovation score part of each manager's performance evaluation and by

conducting an annual competition to identify creative new ideas.

When I started out as a young actuary in a life-insurance company, South Africa was moving from an apartheid state to a proper democracy and facing some serious challenges, particularly in healthcare. There was an undersupply of doctors, an unusual combination of disease burdens, and a new regulatory environment that had zero tolerance for the discrimination of the past, and rightly so. This meant you couldn't rate customers on preexisting conditions. Finally, unlike most countries, where a national system partially covers risk, there was no unified public health-insurance system at that time.

When you put those four things together, sustainably financing healthcare becomes a very complex undertaking. When we formed Discovery, we asked the question, "How do you innovate and build a health-insurance system that can work in this kind of environment?"

Our gut instinct was that if you can make people healthier, you can offer more sustainable insurance. It turns out that three lifestyle choices (smoking, poor nutrition, and poor physical activity) contribute to four conditions (diabetes, cancer, heart disease, and lung disease) that drive over 50 percent of mortality every year. So lifestyle choices are fundamental to any social-insurance system. The behavioral science tells us that people need incentives to make a change. But that wasn't universally known at the time; we were just a start-up acting on a hunch.

When we were starting out, a massive gym chain approached us with the idea to sell our health insurance to their membership base—a classic cross-sales strategy. Our breakthrough came when we flipped this idea around: What if you can use the gyms when you get your insurance from us? But we couldn't figure out how to afford it.

Then we thought, "Well, what if you earn points by doing healthy things? Then those points give you access to cool rewards and a discount on your premium?" That idea was the catalyst for everything, which I think is true of innovation. It's a moment in time. It's not always a revelation in a laboratory. In my experience, it's right there in front of you. Once you get it, you run with it.

The genesis of Vitality

That initial idea was the genesis of our Vitality program, which has evolved into a complete wellness system that tracks everything from physical activity to nutrition over the course of a person's life. For instance, customers earn points by logging their workouts with fitness devices from Nike+, Fitbit, and others. These sync up with Vitality directly, through a computer, or with mobile apps on smartphones. When you go to our partner grocery stores, the healthy food is clearly demarcated on the shelf, and you get a 25 percent discount at the

Innovation is a moment in time. It's not always a revelation in a laboratory. In my experience, it's right there in front of you. Once you get it, you run with it.

register when you swipe your Vitality card. When we first launched the program, we were criticized for wasting healthcare dollars on incentives, but customers went berserk for it.

Today, Vitality is the foundation of our business model, driving every one of our offerings. Take life insurance. It seemed to us that the system was broken. What happens when you fill out an application? They basically cut you in half for a detailed health analysis—blood tests, medicals. From that, they derive a very sophisticated rating that often comes with a rate guaranteed for life. But how does it make any sense to set a rate at a certain point in time, when a change in your behavior could shift the underlying risk throughout your life?

So we decided to offer a new, competitive model. The beauty of it is the shared value it creates for our customers, our company, and society. Our customers are given an incentive to become healthier, lowering their premiums. And we are able to operate with better actuarial dynamics and profitability.

In 2001, we rolled out Discovery Life on this basis, and soon became the number-one provider of life insurance in South Africa. Our competitors have been around for more than a hundred years, but they don't have Vitality. If you understand the scale of the program, you can see it's not a capability that could easily be copied. We log 70,000 gym visits per day; people have bought a hundred million dollars' worth of healthy food in the last few years through our structure. Vitality has provided a competitive advantage that has served us well both inside our home country and beyond it.

The flexibility of Vitality's structure allows us to enter markets where we could never become the main insurer; the barriers to entry are just too high. We can instead partner with established insurers in those markets by scaling our Vitality model as needed. In the United Kingdom, we worked with Prudential initially but recently acquired full ownership of our health- and life-insurance businesses there. In the Asia–Pacific region, we are now rolling out our model across some of AIA's markets. We also

have an equity stake in Ping An Health, working with one of China's largest insurers, Ping An. Just this year, we've established a new partnership with John Hancock Life Insurance in the United States, and we're developing one with Generali in Europe, as well.

The model that keeps on giving

Just as Vitality has allowed us to expand geographically, it has also been an additive model that can accommodate other dimensions. For instance, we found that most motor insurance suffers from the same irrationalities as health-care and life insurance: people under-consume wellness, which in this case means safe driving.

We saw an opportunity to develop a standard vehicle-tracking device that monitors not only the location of a car but also how people are driving—the acceleration, G forces. Rory Byrne, a South African engineer who designed cars for the racing driver Michael Schumacher, has helped us with the telematics to build a Formula One–level analysis of a person's driving behavior. But that requires a complex black-box installation in the car. So, we've been working with a company founded by two MIT professors to build an application that also works directly through your smartphone. It has given us some amazing insights into what we call "driving DNA." We can immediately tell if someone else is driving your car or if you've gotten into an accident, just by the deviation in data, which raises a red flag. The Vitalitydrive program allows us to track our customers, to reward them for good driving with a lower premium and a discount on gas, and to provide real-time emergency assistance.

A cycle for innovation

We're often asked, "Can you keep innovating?" The truth is, I find that the more you innovate, the more you can innovate. Most innovation in companies is event based. A competitor comes up with something, and the company responds. We do the opposite. Our leaders are always on a treadmill to create and launch new ideas. For example, every year we have a rock-star launch where we're presenting something new to thousands of our intermediaries who own sales. Our guys know the date is booked. The concert's happening. You just better write the music.

We have growth metrics for a lot of what we do. Our earnings per share have grown by 25 percent a year, compounded, for the last two decades, with little capital. But my personal view is that the rationales behind innovation and earnings targets are not really great bedfellows. You have to invest in innovation, even if you don't know where it will end up. But with a growth-target mind-set, you're always thinking, "Oh, we can't do this, because it's going to undermine our margins" or whatever. You ought to do both well, but it's challenging to balance those two parts of your brain.

To push ourselves to find the next idea, we have an internal competition every year called Inspiring Excellence, where our top one thousand leaders break into teams of two to four people and work on new concepts. Throughout the year, we hold contests until we've narrowed down to the top five teams, who present at our annual management conference. Even ideas that don't win often prove to be winners later on, when we roll them out. This program provides us with a strong inventory of possibilities, which are continually replenished.

Twice a year, our remuneration committee looks at each business and gives it an innovation score. So the take-home bonus of a thousand people is based on a subjective review of the success of their launches. But even beyond that pool, all our employees are involved in this time-based cycle, working on projects. Across the organization, there's a natural metronome of our innovation.

I genuinely believe that the smartest people work for the organizations they believe are doing good. At Discovery, our people have built innovative businesses that are good not only for the company but also for our customers. I'm dedicated to Discovery's work in building South Africa and communities around the world. I want South Africans to look at Discovery with hope, to feel the future is certain.

Adrian Gore is the founder and CEO of Discovery. This commentary was adapted from an interview conducted by **Jill Hellman.**

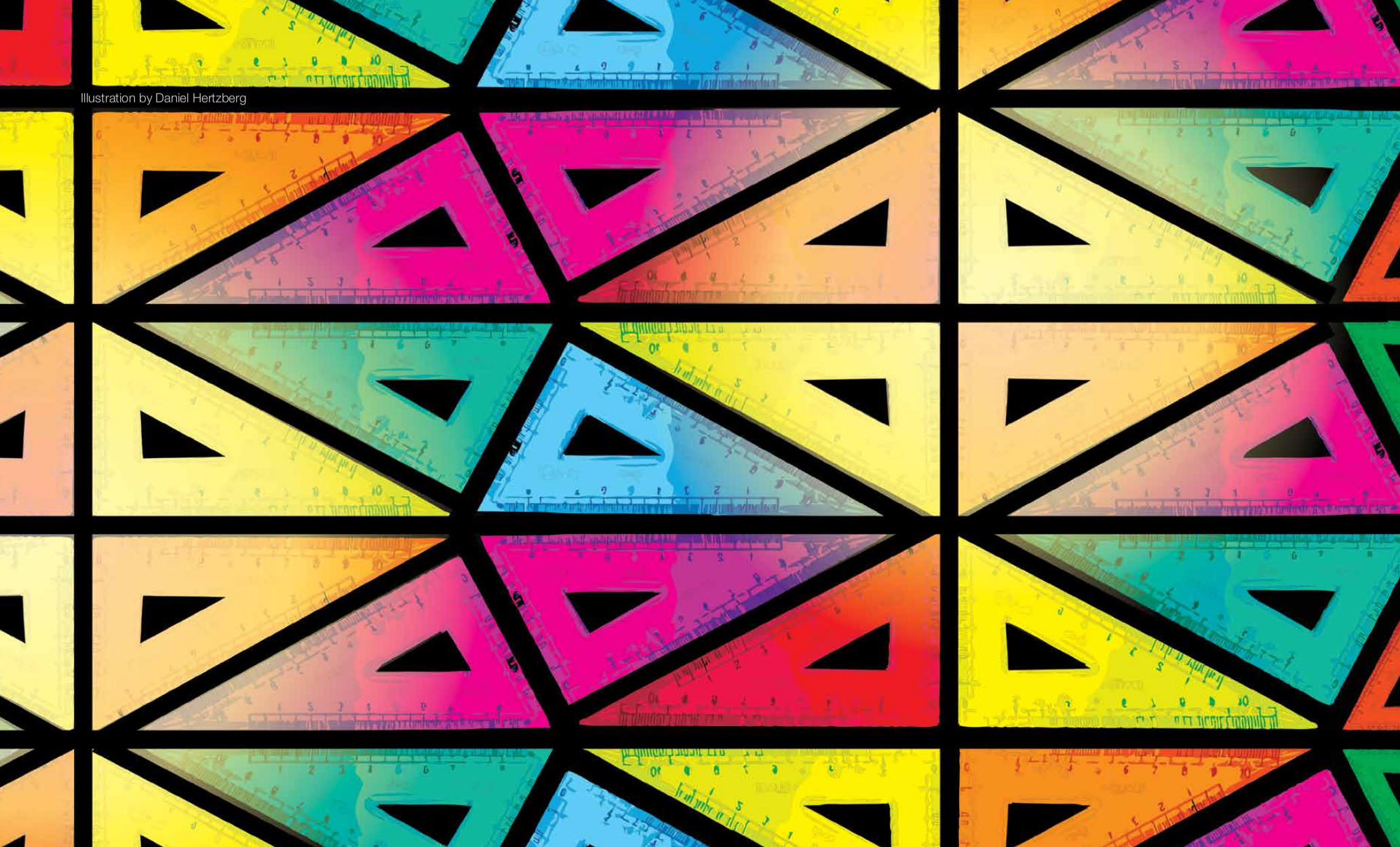


Illustration by Daniel Hertzberg

The simple rules of disciplined innovation

Donald Sull

Constraints aren't the enemy of creativity—they make it more effective.

When it comes to innovation, the single most common piece of advice may be to "think outside the box." Constraints, according to this view, are the enemy of creativity because they sap intrinsic motivation and limit possibilities.

Sophisticated innovators, however, have long recognized that constraints spur and guide innovation. Attempting to innovate without boundaries overwhelms people with options and ignores established practices, such as agile programming, that have been shown to enhance innovation. Without guidelines to structure the interactions, members of a complex organization or ecosystem struggle to coordinate their innovative activities.

How, then, can organizations embrace a more disciplined approach to innovation? One productive approach is to apply a few simple rules to key steps in the innovation process. Simple rules add just enough structure to help organizations avoid the stifling bureaucracy of too many rules and the chaos of none at all. By imposing constraints on themselves, individuals, teams, and organizations can spark creativity and channel it along the desired trajectory. Instead of trying to think outside the wrong box, you can use simple rules to draw the right box and innovate within it.

Simple rules cannot, of course, guarantee successful innovation—no tool can. Innovation creates novel products, processes, or business models that generate economic value. Trying anything new inevitably

entails experimentation and failure. Simple rules, however, add discipline to the process to boost efficiency and increase the odds that the resulting innovations will create value.

Simple rules are most commonly applied to the sustaining kind of innovation, often viewed as less important than major breakthroughs. The current fascination with disruption obscures an important reality. For many established companies, incremental product improvements, advances in existing business models, and moves into adjacent markets remain critical sources of value-creating innovation. The turnaround of Danish toymaker LEGO over the past decade, for example, has depended at least as much on rejuvenating the core business through the injection of discipline into the company's new-product development engine as it has on radical innovation.

Simple rules can also be used to guide a company's major innovations. In the early 2000s, for example, Corning set out to double the number of major new businesses it launched each decade. A team evaluated the company's historical breakthrough products, including the television tube, optical fiber, and substrates for catalytic converters. By identifying the commonalities across these past advances, the team articulated a set of simple rules to evaluate major innovations: they should address new markets with more than $500 million in potential revenue, leverage the company's expertise in materials science, represent a critical component in a complex system, and be protected from competition by patents and proprietary process expertise.

What simple rules are (and aren't)

Simple rules embody a handful of guidelines tailored to the user and task at hand, balancing concrete guidance with the freedom to exercise creativity. To illustrate how simple rules can foster innovation, consider the case of Zumba Fitness.[1] That company's fitness routine was developed when Alberto Perez, a Colombian aerobics instructor, forgot to take his exercise tape to class and used what he had at hand—a tape of salsa music. Today, Zumba is a global business that offers classes at 200,000 locations in 180 countries to over 15 million customers drawn by the ethos "Ditch the workout. Join the party."

[1] Leigh Buchanan, "Zumba Fitness: Company of the year," *Inc.*, December 4, 2012, inc.com.

Zumba's executives actively seek out suggestions for new products and services from its army of over 100,000 licensed instructors. Other companies routinely approach Zumba with possible partnership and licensing agreements. In fact, it is deluged by ideas for new classes (Zumba Gold for baby boomers), music (the first *Zumba Fitness Dance Party* CD went platinum in France), clothing, fitness concerts, and video games, such as Zumba Fitness for Nintendo Wii. Zumba's founders rely on two simple rules that help them quickly identify the most promising innovations from the flood of proposals they receive. First, any new product or service must help the instructors—who not only lead the classes but carry Zumba's brand, and drive sales of products—to attract clients and keep them engaged. Second, the proposal must deliver FEJ (pronounced "fedge"), which stands for "freeing, electrifying joy" and distinguishes Zumba from the "no pain, no gain" philosophy of many fitness classes.

These two principles for screening innovation proposals illustrate the four characteristics of effective simple rules. First, Zumba's rules are few in number, which makes them straightforward to remember, communicate, and use. They also make it easy for the founders to describe the kinds of innovations most likely to be chosen and to explain why specific ones weren't. Capping the number of rules forces a relentless focus on what matters most, as well. Zumba's success depends on the passion of its instructors and the differentiation of its offering from less playful exercise options. The rules encapsulate the essence of the company's strategy.

Second, effective simple rules apply to a well-defined activity or decision (in Zumba's case, selecting new products and services). To promote innovation, many executives embrace broad principles—like "encourage flexibility and innovation" or "be collaborative"—meant to cover every process. To cover multiple activities, rules must be extremely general, and often end up bordering on platitudes. These aspirational statements, while well intentioned, provide little concrete guidance for specific activities. As a result, they are often ignored.

Third, simple rules should be tailored to the unique culture and strategy of the organization using them. Many managers want to transplant rules from successful companies without modification—a big mistake (see sidebar, "Pitfalls to avoid when making rules").

Pitfalls to avoid when making rules

1. **Dictating rules from the top.** Simple rules are most effective when they are created by the people who will use them. Letting the users make the rules helps you draw on their firsthand experience and increases their level of buy-in.

2. **Shooting from the hip.** Some managers view simple rules as a license to lead by gut feeling. But shoot-from-the-hip rules can outweigh recent experience, reflect personal biases, and ignore anomalous data. The best rules, in contrast, draw on a thoughtful analysis of historical experience.

3. **Rolling out the rules before you test them.** A team of users can generate a first cut of rules. These are best viewed as provisional, subject to testing. One approach is to take a sample of past innovation projects and divide it in half at random. Use half of the sample to develop the rules and then test them on the other projects.

4. **Trying to develop general principles.** One Scandinavian technology company developed a set of broad principles meant to cover any activity, anywhere in the organization, that might affect innovation. The resulting rules—such as "recognize and reward practices that encourage innovation" and "reward creativity"—were at a very high level of abstraction. They failed to provide useful guidance to employees, who ignored them. Target a single bottleneck.

5. **Copying someone else's rules.** Many books, articles, and blogs lay out the innovation rules of successful companies, such as Pixar, and imply that other companies will get the same results by following them. But simple rules should be tailored to the specific strategy and culture of a company. Zumba's rules would never work at Under Armour and vice versa.

Finally, simple rules supply guidance while leaving ample scope for discretion and creativity. Zumba's simple rules provide a framework for discussing and identifying which innovations are attractive but are not mathematical formulas where you enter the inputs and the answer pops out. The best simple rules are guidelines, not algorithms.

Simple rules to select innovations

Zumba's rules illustrate a common way that simple rules facilitate innovation—by helping companies select and prioritize the most promising new ideas. McKinsey research shows that the choice of which innovations to pursue is a critical factor influencing a company's ability to innovate successfully (see "The eight essentials of innovation," April 2015, on mckinsey.com).

Although Zumba may seem like a quirky example, even the most serious research labs can use simple rules to select innovations. The Defense Advanced Research Projects Agency (DARPA), for example, is one of the world's most innovative organizations, routinely producing breakthroughs such as brain-controlled prosthetics and climbing gear that allows soldiers with full combat loads to scale vertical walls without using ropes or ladders. DARPA's achievements are even more impressive when you consider that the agency has a technical staff of only 120—about half the size of the Pentagon cafeteria staff. The agency uses two simple rules to evaluate which innovations to back: a project must further the quest for fundamental scientific understanding and have a practical use.

Simple rules can also help ensure that creativity is aligned with strategy, for an innovation process unmoored from strategy often produces intriguing ideas that fail to leverage corporate resources and capabilities. These innovations, viewed as risky distractions, rarely secure the support and resources required for execution. The strategy of the sportswear business Under Armour is to compete on technical innovation, and its simple rules reflect this. Every year, it hosts its Future Show, where thousands of entrepreneurs vie for a chance to pitch their ideas to management. The most recent Future Show, the Connected Fitness Innovation Challenge, was aimed at building "the next generation of game-changing digital experiences through apps and wearable technology." The rules for the competition, reflecting this strategy, require that an innovation should integrate with MapMyFitness (an exercise-tracking company Under Armour acquired in 2013), emphasize inspiration and insight over information, and address a customer need within select areas, such as wellness or team sports.

In addition, simple rules can help ensure that innovations create value, by balancing novelty with the need to keep a lid on costs. The Zátiší Catering Group runs three of the highest rated restaurants in Prague, as well as a high-end cafeteria business serving the Czech operations of multinational clients. In the past, the chef at each cafeteria enjoyed complete autonomy to introduce new dishes, which proliferated so much that the company produced almost 1,000 distinct ones a year. This culinary creativity came at a cost. The chefs often used exotic, out-of-season ingredients. They rarely coordinated meal planning across cafeterias, which prevented the company from capturing economies of scale in purchasing. The relentless drive for novelty meant that the chefs rarely repeated popular meals, even when customers requested them.

The CEO wanted to make sure the chefs weren't generating novelty for its own sake but rather innovating in a way that created value. He assembled a team of chefs and cafeteria managers, who developed simple rules to guide menu selection. One rule was that three of the five dishes offered every day must be proven bestsellers, which built demand for meals. (This was important because customers could always go out for lunch if they didn't like the cafeteria food on offer.) Others were that no fewer than two dishes a day had to be available at all of the company's cafeterias and that 90 percent of the produce must be fresh and sourced locally. Chefs could still experiment with new dishes, but their creativity fell within parameters ensuring that the overall menu was profitable. Within a few months, revenues were up by one-third and profits doubled.

Rules requiring the reuse of existing materials or components are a particularly helpful way to balance efficiency with novelty. LEGO, for example, insists that designers reuse a certain number of existing pieces when developing a new play kit. That rule balances the need for novelty with control over the number of unique pieces (and the associated manufacturing and logistics costs).

Simple rules for how to innovate

Zumba and DARPA use simple rules to select innovations. Other organizations use them to decide how to pursue innovations.

Simple rules can help ensure that innovations create value, by balancing novelty with the need to keep a lid on costs.

Individuals, teams, and organizations can codify their experience and data into simple rules to guide the innovation process in the future.

Consider the case of Tina Fey, who, with eight Emmy Awards, is one of the most successful comedians of her (or any) generation. In an insightful (and very funny) *New Yorker* article, she distilled the lessons she learned from working on *Saturday Night Live* into simple rules she used to produce her next show, *30 Rock*.[2] The rules, largely focusing on managing creative people, include "never tell a crazy person he's crazy," which acknowledges the link between eccentricity and creativity and the need to handle such people carefully. Another rule is "when hiring, mix Harvard nerds with Chicago improvisers and stir." The former experiment with clever ideas; the latter, such as members of Chicago's famed Second City improvisational-comedy group, have a keen sense of what will work in front of an audience. While CEO of Burberry, Angela Ahrendts followed a similar rule to ensure that key teams balanced analytical employees with creative types.

Companies can also codify innovation-process rules based on the experience of others. ONSET Ventures was a pioneer among accelerators designed to help early-stage start-ups.[3] When the founders established the firm (in 1984) they tried to identify which criteria were important to success by gathering information on 300 early-stage investments, both successful and failed, that had been funded

[2] Tina Fey, "Lessons from late night," *New Yorker*, March 14, 2011, newyorker.com.

[3] Michael J. Roberts and Nicole Tempest, "ONSET Ventures," Harvard Business School Case 898-154, March 1998.

by existing Silicon Valley venture capitalists. They found that a handful of variables accounted for over three-quarters of these outcomes and codified the key insights into five simple rules to incubate start-ups.

The best predictor of failure, according to this research, was sticking doggedly to the original business plan. The business models of successful start-ups, in contrast, nearly always underwent at least one major revision (and countless minor tweaks) before they stabilized. This insight led to the first rule: all start-ups must fundamentally change their business model at least once before receiving their next round of funding. Research also taught ONSET's founders that start-ups were more likely to succeed if they waited until after the business model had stabilized before bringing a new CEO on board. That way, the founders and investors could specify the precise skills and expertise the CEO would need to scale the business.

Techstars, a top-ranked accelerator with 18 programs around the world, also uses simple rules to help start-ups get off the ground. The program in Chicago, for example, insists that portfolio companies can have only five key performance metrics at any point. These measures shift over time as companies develop, but the hard cap on five forces a ruthless prioritization at every step in the process.

Help members of a community innovate together

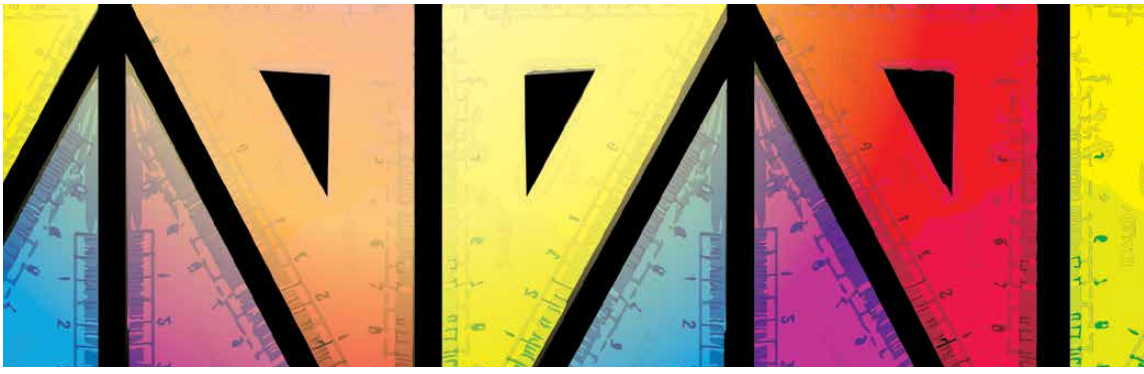
Innovation is rarely the product of lone inventors. More frequently, it emerges from the interactions of members of a community or ecosystem, who extend and build on one another's ideas. Communal innovation entails a deep conflict, however. By freely sharing ideas, members of an ecosystem can collectively create more value through innovation. Yet the open exchange of ideas can make it harder to protect intellectual property and potentially dampens incentives to

innovate. Legal intellectual-property protection, such as patents or copyrights, mitigates this tension in many industries but doesn't work in all settings. Simple rules can protect intellectual property in situations where legal remedies don't apply.

Consider the case of magicians, for whom secrecy is everything.[4] If another magician steals your tricks, he steals your unique selling point, especially if he doesn't credit you. Even more worryingly, if the public learns how tricks are performed, the illusion is ruined for the audience. So it's essential for magicians to ensure that others can't use their proprietary magic and that the public doesn't know how they perform tricks widely shared within the professional community. Magicians cannot rely on the law to protect their intellectual property—they would have to reveal the details of a trick to patent or copyright it.

Instead, magicians rely on simple rules. The rule prohibiting the use of a trick that has not been widely shared, published, or sold to you protects magicians who want to keep their magic proprietary. Another rule—an old trick that hasn't been used for a long time belongs to the person who rediscovers it—revives classic magic for new generations. Finally, and most important, the golden rule of magic is "never expose a secret to a nonmagician." Those who violate these rules are ostracized by the magic community, including

[4] This wonderful example of simple rules among magicians comes from Jacob Loshin, "Secrets revealed: How magicians protect intellectual property without law," Yale Law School working paper, July 2007.



the owners of clubs, who book acts. Simple rules are common in communities (including those of chefs, stand-up comedians, and crowdsourcing) that rely on innovation but do not or cannot use the law to protect their intellectual property.

Sometimes innovation requires working with partners, and simple rules can help here too. Consider the case of Primekss (pronounced "preem-ex"), a European construction-supply company that is trying to disrupt one of the world's most traditional industries—concrete—with a product that not only allows for thinner layers and less cracking but also cuts the carbon footprint by up to 50 percent. (The production of cement, the critical ingredient in concrete, is the third-largest source of greenhouse carbon dioxide.)[5] After Primekss won a construction-industry innovation award, the founder was approached by over 100 contractors, but he estimated that the company could evaluate, train, and support only a few new relationships every year.

To select partners, the company developed a set of simple rules. Instead of putting new partners into head-to-head competition with existing ones, Primekss decided to select them in geographic markets with no current operations. A second rule was that a potential partner should have a Laser Screed machine, a state-of-the-art concrete-spreading system that signaled technical sophistication and commitment to quality. Another rule—partners must sell the concrete within three months of signing a contract with Primekss—ensured that the relationship would be a high priority for partners. In the first year after implementing these principles, Primekss doubled its rate of new partnerships that succeeded and quadrupled its licensing exports.

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Too much constraint can stifle innovation, but too little is just as bad. A blank sheet of paper sounds nice in theory. In practice, pursuing

[5] *Biotechnologies and Biomimetics for Civil Engineering*, edited by Fernando Pacheco Torgal et al., Springer: Cham, Switzerland, 2014.

novelty without guidelines can overwhelm people with options, engender waste, and prevent the coordination required for collective innovation. Simple rules can inject discipline into the process by providing a threshold level of guidance, while leaving ample room for creativity and initiative.

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Illustration by Kotryna Zukauskaite

Getting organizational redesign right

Steven Aronowitz, Aaron De Smet, and Deirdre McGinty

Companies will better integrate their people, processes, and structures by following nine golden rules.

"If at first you don't succeed, try, try, try again." If W. E. Hickson, the British author known for popularizing that familiar proverb in the mid-19th century, were alive today, he might easily be applying it (disparagingly) to the efforts of modern corporations to redesign their organizations.

Recent McKinsey research surveying a large set of global executives suggests that many companies, these days, are in a nearly permanent state of organizational flux. Almost 60 percent of the respondents, for example, told us they had experienced a redesign within the past two years, and an additional 25 percent said they experienced a redesign three or more years ago. A generation or two back, most executives might have experienced some sort of organizational upheaval just a few times over the course of their careers.

One plausible explanation for this new flurry of activity is the accelerating pace of strategic change driven by the disruption of industries. As a result, every time a company switches direction, it alters the organization to deliver the hoped-for results. Rather than small, incremental tweaks of the kind that might have been appropriate in the past, today's organizations often need regular shake-ups of the Big Bang variety.

Frustratingly, it also appears that the frequency of organizational redesign reflects a high level of disappointment with the outcome. According to McKinsey's research, less than a quarter of organizational-redesign efforts succeed. Forty-four percent run out of steam after

getting under way, while a third fail to meet objectives or improve performance after implementation.

The good news is that companies can do better—much better. In this article, we'll describe what we learned when we compared successful and unsuccessful organizational redesigns and explain some rules of the road for executives seeking to improve the odds. Success doesn't just mean avoiding the expense, wasted time, and morale-sapping skepticism that invariably accompany botched attempts; in our experience, a well-executed redesign pays off quickly in the form of better-motivated employees, greater decisiveness, and a stronger bottom line.

Why redesign the organization?

Organizational redesign involves the integration of structure, processes, and people to support the implementation of strategy and therefore goes beyond the traditional tinkering with "lines and boxes." Today, it comprises the processes that people follow, the management of individual performance, the recruitment of talent, and the development of employees' skills. When the organizational redesign of a company matches its strategic intentions, everyone will be primed to execute and deliver them. The company's structure, processes, and people will all support the most important outcomes and channel the organization's efforts into achieving them.

When do executives know that an organization isn't working well and that they need to consider a redesign? Sometimes the answer is obvious: say, after the announcement of a big new regional-growth initiative or following a merger. Other signs may be less visible—for example, a sense that ideas agreed upon at or near the top of the organization aren't being translated quickly into actions or that executives spend too much time in meetings. These signs suggest that employees might be unclear about their day-to-day work priorities or that decisions are not being implemented. A successful organizational redesign should better focus the resources of a company on its strategic priorities and other growth areas, reduce costs, and improve decision making and accountability.

The case of a consumer-packaged-goods (CPG) company that chose to expand outside its US home base illustrates one typical motivation for a redesign. Under the group's previous organizational structure, the ostensibly global brand team responsible for marketing was not only located in the United States but had also been rewarded largely on the performance of US operations; it had no systems for monitoring the performance of products elsewhere. To support a new global strategy and to develop truly international brands and products, the company separated US marketing from its global counterpart and put in place a new structure (including changes to the top team), new processes, new systems, and a new approach to performance management. This intensive redesign helped promote international growth, especially in key emerging markets such as Russia (where sales tripled) and China (where they have nearly doubled).

Avoiding the pitfalls

That CPG company got it right—but many others don't, and the consequences can be profoundly damaging. Leaders who fail to deliver the benefits they promise not only waste precious time but also encourage employees to dismiss or even undermine the redesign effort, because those employees sense that it will run out of steam and be replaced by a new one, with different aims, two to three years down the line.

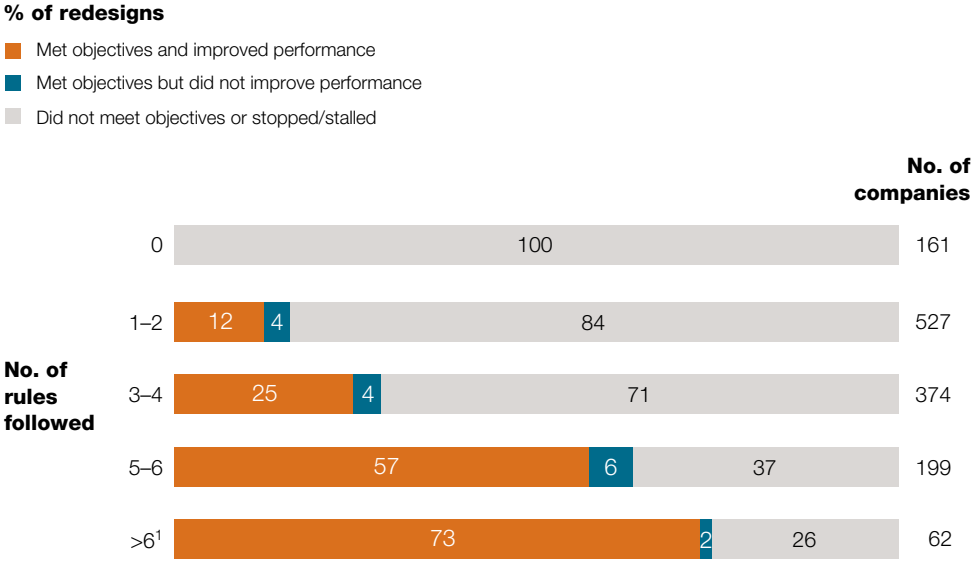
We believe that companies can learn from the way successful redesigners overcome challenges. By combining the results of our research and the insights we've gained from working with multiple companies on these issues, we've identified nine golden rules. They cover everything from early alignment, redesign choices, and reporting structures to performance metrics, the nature of effective leadership, and the management of risks.

Individually, each of the rules is helpful. Our research shows, though, that 73 percent of the executives whose companies followed more than six of them felt that the organizational redesign had succeeded. Executives at these companies were six times more likely to "declare victory" than those at companies that adopted just one or two. Following all nine rules in a structured approach was correlated with an even higher success rate: 86 percent (exhibit).

The rules, it's important to make clear, are not self-evident. We tested more than 20 common approaches and found that upward of half of them weren't correlated with success. We expected, for example, that benchmarking other companies and trying to adopt some of their structural choices might be an important ingredient of successful redesigns—but there is no evidence from the research that it is. Our rules, incidentally, are broadly relevant for different industries, regions, and company sizes. They also hold true for redesigns

Exhibit

Our research identified nine golden rules for successful organizational redesign.



Following all the rules in a structured approach is correlated with even higher success rates.

[1] Figures do not sum to 100%, because of rounding.

Source: 2014 McKinsey survey of organizational redesigns in 1,323 companies

prompted by different types of organizational change, including end-to-end restructurings, postmerger integration, or more focused efforts (such as cost cutting or improvements in governance).

1. Focus first on the longer-term strategic aspirations

Leaders often spend too much time on the current deficiencies of an organization. It's easy, of course, to get fixated on what's wrong today and to be swayed by the vocal (and seemingly urgent) complaints of frustrated teams and their leaders. However, redesigns that merely address the immediate pain points often end up creating a new set of problems. Companies should therefore be clear, at the outset, about what the redesign is intended to achieve and ensure that this aspiration is inextricably linked to strategy. One retail company we know, strongly committed to creating a simple customer experience, stated that its chosen redesign option should provide "market segment–focused managerial roles with clear accountability" for driving growth. The specificity of that strategic test proved much more helpful than simply declaring a wish to "become customer-centric."

2. Take time to survey the scene

Sixty percent of the executives in our survey told us they didn't spend sufficient time assessing the state of the organization ahead of the redesign. Managers can too easily assume that the current state of affairs is clear and that they know how all employees fit into the organizational chart. The truth is that the data managers use are often inaccurate or out of date. A high-profile international bank, for example, publicly announced it was aiming to eliminate thousands of staff positions through an extensive organizational redesign. However, after starting the process, it discovered to its embarrassment that its earlier information was inaccurate. Tens of thousands of positions, already referenced in the press release, had been inaccurately catalogued, and in many cases employees had already left. This new organizational reality radically changed the scope and numbers targeted in the redesign effort.

Knowing the numbers is just part of the story. Leaders must also take time to understand where the lines and boxes are currently drawn, as well as the precise nature of talent and other processes. That helps unearth the root causes of current pain points, thereby

mitigating the risk of having to revisit them through a second redesign a couple of years down the road. By comparing this baseline, or starting point, with the company's strategic aspirations, executives will quickly develop a nuanced understanding of the current organization's weaknesses and of the strengths they should build on.

3. Be structured about selecting the right blueprint

Many companies base their preference for a new structure on untested hypotheses or intuitions. Intuitive decision making can be fine in some situations but involves little pattern recognition, and there is too much at stake to rely on intuition in organizational redesign. Almost four out of five survey respondents who owned up to basing decisions on "gut feel" acknowledged that their chosen blueprint was unsuccessful. In our experience, companies make better choices when they carefully weigh the redesign criteria, challenge biases, and minimize the influence of political agendas.

Interestingly, *Fortune* magazine found that its Most Admired Companies had little in common when it came to aspects of their organizational design, beyond a flexible operating model.[1] This finding is consistent with our experience that off-the-shelf solutions aren't likely to work. The unique mix of strategy, people, and other assets within a company generally requires an individual answer to things like role definition, decision-making governance, and incentives, albeit one based on a primary dimension of function, geography, or customer segment. The key is to get the right set of leaders reviewing options with an open mind in the light of redesign criteria established by the strategic aspiration.

Take a large public pension system we know. Its leaders convinced themselves that a new organization must be set up along product lines. Challenged to reconsider their approach, they ultimately arrived at a functional model—built around health, pensions, and investment—that has served the system well over the past five years and underpinned significant cost savings and the launch of innovative new products.

4. Go beyond lines and boxes

A company's reporting structure is one of the most obvious and controllable aspects of its organization. Many leaders tend to ignore

[1] Mina Kimes, "What admired firms don't have in common," *Fortune*, March 6, 2009, archive.fortune.com.

the other structure, process, and people elements that are part of a complete redesign, thereby rearranging the deck chairs but failing to see that the good ship Titanic may still be sinking.

Companies such as Apple and Pixar are well known for going far beyond lines and boxes, taking into account questions such as where employees gather in communal spaces and how the organizational context shapes behavior. One small but fast-growing enterprise-software player we know made some minor changes to senior roles and reporting as part of a recent organizational redesign. But the biggest impact came from changing the performance-management system so that the CEO could see which parts of the company were embracing change and which were doing business as usual.

Surveyed companies that used a more complete set of levers to design their organizations were three times more likely to be successful in their efforts than those that only used a few. The strongest correlation was between successful redesigners and companies that targeted at least two structural-, two process-, and two people-related redesign elements.

5. Be rigorous about drafting in talent

One of the most common—and commonly ignored—rules of organizational redesign is to focus on roles first, *then* on people. This is easier said than done. The temptation is to work the other way around, selecting the seemingly obvious candidates for key positions before those positions are fully defined.

Competition for talent ratchets up anxiety and risk, creating a domino effect, with groups poaching from one another to fill newly created gaps. This is disruptive and distracting. A talent draft that gives all units access to the same people enables companies to fill each level of the new organizational structure in an orderly and transparent way, so that the most capable talent ends up in the most pivotal roles. This approach promotes both the perception and the reality of fairness.

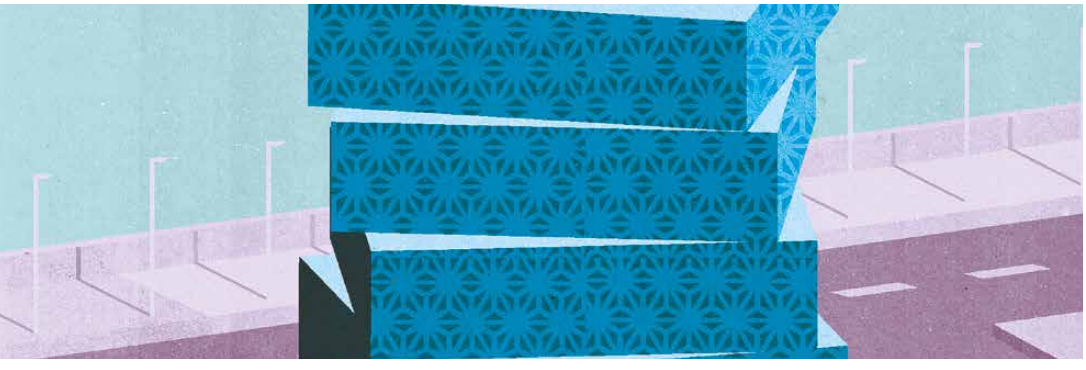
Powerful technology-enabled solutions allow companies to engage hundreds of employees in the redesign effort in real time, while identifying the cost and other implications of possible changes. One web-based tool we've seen in action—full disclosure: it's a McKinsey

application called OrgLab—helps leaders to create and populate new organizational structures while tracking the results by cost, spans, and layers. Such tools expand the number of people involved in placing talent, accelerate the pace, and increase the level of rigor and discipline.

6. Identify the necessary mind-set shifts—and change those mind-sets

Leaders of organizational-redesign efforts too often see themselves as engineers and see people as cogs to be moved around the organizational machine. Organizations, however, are collections of human beings, with beliefs, emotions, hopes, and fears. Ignoring predictable, and sometimes irrational, reactions is certain to undermine an initiative in the long run. The first step is to identify negative mind-sets and seek to change the way people think about how the organization works. Actions at this stage will likely include communicating a compelling reason for change, role modeling the new mind-sets, putting in place mechanisms that reinforce the case for change and maintain momentum, and building new employee skills and capabilities.

One company in the payments industry—beset by changing consumer habits, technology-led business models, and regulatory pressure—understood the importance of shifting mind-sets as part of its recent redesign. The group's sales team traditionally worked well with large retailers and banks. But looking ahead, the company knew it would be important to establish a new set of relationships with high-tech hardware and software players. Simply appointing a new



boss, changing role descriptions, and drawing up a revised process map wasn't enough. The company therefore embarked on a program that consciously sought to shift the thinking of its sales experts from "we create value for our customers" to "we create value with our partners."

7. Establish metrics that measure short- and long-term success

Nobody would drive a car without a functioning speedometer, yet a surprising number of companies roll out an organizational redesign without any new (or at least specially tailored) performance metrics. Some older ones might be relevant, but usually not the whole set. New metrics, typically focusing on how a changed organization is contributing to performance over the short and long term, are best framed at the aspiration-setting stage. Simple, clear key performance indicators (KPIs) are the way forward.

During the redesign effort of one high-tech manufacturer, it set up a war room where it displayed leading indicators such as orders received, orders shipped, supply-chain performance, and customer complaints. This approach helped the company both to measure the short-term impact of the changes and to spot early warning signs of disruption.

One utility business decided that the key metric for its efficiency-driven redesign was the cost of management labor as a proportion of total expenditures on labor. Early on, the company realized that the root cause of its slow decision-making culture and high cost structure had been the combination of excessive management layers and small spans of control. Reviewing the measurement across business units and at the enterprise level became a key agenda item at monthly leadership meetings.

A leading materials manufacturer introduced a new design built around functional groups, such as R&D, manufacturing, and sales, but was rightly anxious to retain a strong focus on products and product P&Ls. To track performance and avoid siloed thinking, the company's KPIs focused on pricing, incremental innovation, and resource allocation.

8. Make sure business leaders communicate

Any organizational redesign will have a deep and personal impact on employees—it's likely, after all, to change whom they report to, whom they work with, how work gets done, and even where they work. Impersonal, mass communication about these issues from the corporate center or a program-management office will be far less reassuring than direct and personal messages from the leaders of the business, cascaded through the organization. An interactive cascade (one that allows two-way communication) gives people an opportunity to ask questions and forces top leaders to explain the rationale for change and to spell out the impact of the new design in their own words, highlighting the things that really matter. This can take time and requires planning at an early stage, as well as effort and preparation to make the messages compelling and convincing. When a top team has been talking about a change for weeks or months, it's all too easy to forget that lower-ranking employees remain in the dark.

One financial-services company encouraged employee buy-in for an organizational redesign by staging a town-hall meeting that was broadcast in real time to all regional offices and featured all its new leaders on a single stage. The virtual gathering gave them an opportunity to demonstrate the extent of their commitment and allowed the CEO to tell her personal story. She shared the moment when she realized that the organization needed a new design and the changes she herself was making to ensure that it was successful. All employees affected by the changes could simultaneously talk to their former managers, their new managers, and the relevant HR representatives.

9. Manage the transitional risks

In the rush to implement a new organizational design, many leaders fall into the trap of going live without a plan to manage the risks. Every organizational redesign carries risks such as interruptions to business continuity, employee defections, a lack of personal engagement, and poor implementation. Companies can mitigate the damage by identifying important risks early on and monitoring them well after the redesign goes live. The CPG company mentioned earlier, for

example, realized that rolling out its reorganization of sales and marketing ahead of the holiday season might unsettle some of those involved. By waiting, it made the transition with no impact on revenues.

Tracking operational, financial, and commercial metrics during a design transition is helpful, as are "pulse checks" on employee reactions in critical parts of the company. Clear leadership accountability for developing and executing risk-mitigation plans is so important that this should be built into regular appraisals of managers.

In our experience the most successful organizations combine stable design elements with dynamic elements that change in response to evolving markets and new strategic directions. Corporate redesigns give organizations a rare opportunity to identify the stable backbone and set up those elements ripe for dynamic change. Successful leaders and successful companies take advantage of such changes to "rebuild the future"—but a landscape littered with failed efforts is a sobering reminder of what's at stake. Following the nine simple rules described in this article will increase the odds of a happy outcome.

The authors wish to thank McKinsey's Wouter Aghina, Lili Duan, Monica Murarka, and Kirsten Weerda for their contributions to this article.

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Peering into energy's crystal ball

McKinsey's predictions were broadly on target in 2007. Here's how things could turn out during the next eight years.

Scott Nyquist is a director in McKinsey's Houston office.

Back in 2007, McKinsey did two pieces of groundbreaking research that still inform how I think about energy—the resource-productivity framework and the greenhouse-gas cost curve.[1] And then, with metaphorical holding of breath, we made forecasts based on that work. My colleague Matt Rogers and I thought it would be interesting to look back at these predictions—which were broadly on target, with a few clunkers—and then consider what might come next.

Win some, lose some

The 2007 research looked at a number of potentially disruptive technologies and assessed their prospects. Here's how we did:

- Solar. Photovoltaic (PV) installations have taken off much faster than we expected. Costs fell steeply, driving adoption. The compression of costs happened throughout the solar-energy system, from sourcing raw materials to manufacturing to installation and service. We expected costs to fall to $2.40 per watt by 2030 but weren't bullish enough; in fact, they are on course to hit $1.60 per watt by 2020.

- Wind. We projected that the global base of 94 gigawatts installed in 2007 would expand to 800 gigawatts by 2030. Again, growth has been faster than expected, with close to 370 gigawatts of installed capacity by 2014. That's a 22 percent increase compared to our prediction for 2014. The key, again, was lower costs. Also, manufacturers improved their maintenance protocols and turbine efficiency. A cautionary note: new onshore wind installations dropped by more than 20 percent in 2013.

- Batteries. In 2007, we published our first greenhouse-gas cost curve, which measured the relative economics of dozens of different ways of curbing emissions (exhibit). At that time, we did not even include electric vehicles; we expected that the big improvements would come from internal-combustion engines. But innovation in consumer devices (smartphones, tablets, and laptops) is changing the game for large-format batteries. In 2007, large-format lithium-ion storage cost about $900 per kilowatt-hour; today, the cost is about $380, and it's on track to drop below $200 in five years.

- Unconventional oil and gas. We did see shale coming, but we were way off in terms of how fast mass-scale production would happen and how low costs would go. As gas prices peaked in 2008, a massive wave of innovation was unleashed. Result: US unconventional-oil production rose from almost nothing in 2007 to 3.7 million barrels a day in 2014.

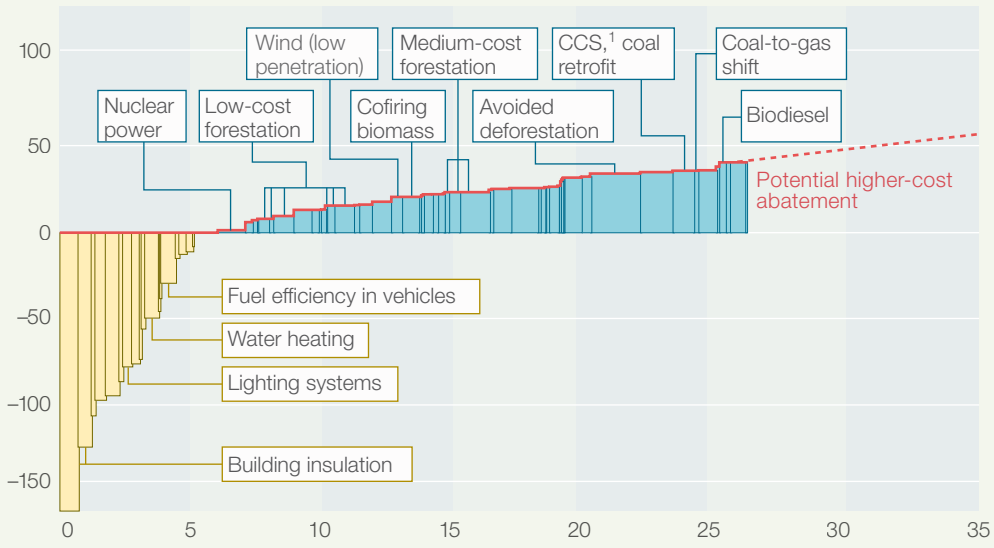
- Energy efficiency. Innovation has come faster than we expected; the forces we thought would hold it back, such as high adoption costs and the slow pace of improvement, proved surmountable. Today we are at a tipping point in consumer behavior; cheap mobile communications, for example, are enabling the connected home. And hardware costs have fallen. For example, LED bulbs now cost about $12 each, down by 80 percent from 2010.

In all these areas, we got the direction right, but not the speed. In other cases, unforeseen events or pressure from competing technologies had the opposite effect on our predictions. Specifically, we saw a bigger future for nuclear, but cost overruns, cheap natural gas, and the 2011 disaster at Fukushima derailed these expectations. Biofuels have also stalled. In 2007, we projected annual consumption of 14 billion gallons by 2030; reality is nowhere near on pace. A lack of innovation and low oil prices have hurt demand for biofuels. Finally, we were too bullish on carbon capture and storage (CCS), a way to make the burning of coal much cleaner. High costs and technical difficulties have slowed adoption. Today, only 13 CCS projects are in operation, and others have been canceled or delayed—4 in 2013 alone. As a whole, then, we were too

Exhibit

The classic 2007 global cost curve estimated the size and cost of feasible approaches to abatement by 2030.

Global cost curve for greenhouse-gas abatement (selected measures labeled)



[1] Carbon capture and storage.
[2] "Business as usual" is emissions growth driven mainly by rising demand for energy and transport around the world and by tropical deforestation.

Source: McKinsey Global Institute analysis

optimistic about most fossil fuels and not optimistic enough about most renewables, natural gas, and efficiency. If all these energy trends continue—and, of course, they might not—what are the implications?

Without venturing too deep into the geopolitical weeds, consider what happens to countries—such as Iran, Saudi Arabia, and Venezuela, whose economies rely heavily on fossil fuels—if demand for their oil peaks or growth slows. Just a decade ago, the idea that the United States is now the largest producer of petroleum and natural-gas hydrocarbons[2] would have seemed ludicrous. Today, the country sends diesel fuel to Europe, gasoline to Latin America, and natural gas to a growing number

of markets. Almost no crude oil now moves across the Atlantic to the United States; almost all of it moves to Asia. These shifts are changing the dynamics of regional markets around the world and shifting the center of trading and pricing to Asia.

Low prices and uncertainty, meanwhile, are making the pressure on oil and gas companies to improve their performance more urgent. Disappointing conventional-exploration results, declining production efficiency, and rising capital intensity have harmed the confidence of investors. Utilities are already struggling to deal with competition from on-site generation—energy from rooftop panels, gas turbines, or other sources that are produced for a specific place—and valuations have tumbled in many markets.

For consumers, the biggest change will probably be on the road. Electric vehicles accounted for under 1 percent of US sales in 2014 and for even less globally—but the pace is picking up. McKinsey's Energy Insights unit projects that in 2030, about 10 percent of all cars in the 34 member countries of the Organisation for Economic Co-operation and Development will be at least partially electric. China has set an ambitious target of five million electric or plug-in hybrid vehicles on its roads by 2020. Autonomous (self-operating) trucks in mining and farming are delivering big savings on labor and carbon-dioxide emissions. Car-sharing services are taking off in Europe and the United States, while Lyft, Uber, and others have upended the taxi business and begun to change patterns of personal vehicle ownership and public-transport choices.

More predictions

All in all, our 2007 research and predictions held up reasonably well. So let's try again. Here's how we see a few important trends:

- Gas will be king. In China and the United States, the future is bright for gas because demand is expanding—for example, in the shift to gas for heavy road transport. Cities in California, Illinois, New York, and elsewhere are equipping their fleets with gas-powered vehicles. In Asia, gas isn't used as much, because resources are monopolized. In Europe, where energy demand is declining, many markets are looking to coal rather than gas.

- Solar will grow fast but remain small compared with conventional sources. Crashing prices in solar may be the key to bringing power to the more than 1.3 billion people who currently do without. A future of distributed generation would allow countries to leapfrog the cost and complexity of building reliable grids. PV is set to capture by far the largest slice of the renewables pie.

- Coal will grow more slowly but will remain huge. The king of fossil fuels is still top of the heap in Asia and will probably remain the fuel of choice. While China is making ambitious moves toward cleaner energy, a true shift away from coal is not imminent. In the United States and Europe, coal is under pressure from regulators and low natural-gas prices. According to the US Energy Information Administration, coal still accounts for 39 percent of US electricity generation today, but that's down from almost 50 percent a decade ago; moreover, no new coal-fired capacity is expected to come on line. And although coal is proving irresistible as much of Europe shifts away from nuclear and continues to experiment with renewables and shale gas, its attraction will fade in time as a result of environmental concerns.

- Value will continue to migrate from generation to services. Distributed generation, dispatchable demand, and the digital grid are redefining the power system. Disruptors are cutting out traditional utilities as new technologies (and financing techniques) let customers opt out of traditional energy supplies.

Finally, a word about outlier technologies—things that aren't particularly popular or feasible at the moment. Nuclear could be a surprise winner. Small modular reactors can provide 24-hour power, without the immense capital expenditure of traditional nuclear reactors. Yes, nuclear is controversial in many countries, but as an emission-free source of constant power, it may be difficult to avoid.

And then there's hydrogen. Admittedly, the hype has been wrong before, but it's interesting that Toyota remains optimistic enough to be working with the Japanese government and

others to build a fueling infrastructure. Toyota is focused on making longer-range hydrogen-fuel-cell vehicles the standard for clean transportation.

So that's our take. If we're wrong—and we're sure to be in some areas—we'll let you know in, say, another eight years.

[1] For McKinsey's 2007 resource-productivity framework, see the full report from the McKinsey Global Institute, *Curbing global energy-demand growth: The energy productivity opportunity*, May 2007. McKinsey has done a number of cost curves, over time and for different countries: For the full 2007 cost curve, see Per-Anders Enkvist, Tomas Nauclér, and Jerker Rosander, "A cost curve for greenhouse gas reduction," *McKinsey Quarterly*, February 2007. All of the above are available on mckinsey.com. For more recent research on resource productivity, see "More from less: Making resources more productive," on page 14 of this issue.

[2] Linda Doman, "US remained world's largest producer of petroleum and natural gas hydrocarbons in 2014," US Energy Information Administration, April 7, 2015, eia.gov.

How to separate **learning myths** from reality

Misconceptions about the brain are embedded in corporate training programs and could be sabotaging their effectiveness. Companies should reevaluate them in light of the latest scientific insights.

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Over the years, you have probably gained some insight into how your brain works. You may have taken a course or read a book that promised to reveal the secret of maximizing your mental capacity—a common sales pitch of leadership coaches these days. In the process, you may have read that after a critical period in childhood there is no hope for significant learning, that half of your brain is inactive at any given time, or that you're capable of learning properly only in your preferred style.

Each of these claims is what we call a "neuromyth," a misconception based on incorrect interpretations of neuroscientific research. Our experience advising companies on their lifelong-learning initiatives suggests that such misunderstandings remain embedded in many corporate training programs. As companies increasingly pour money into developing their employees, they can no longer afford to invest in training programs based on inaccurate and out-of-date assumptions. In recent years, for example, US businesses alone spent more than $164 billion annually on employee learning.[1] The stakes are high and getting higher.

Bridging the gap between popular neuromyths and the scientific insights gathered in the past few decades is a growing challenge. As modern brain-imaging techniques, such as functional magnetic resonance imaging (fMRI), have advanced scientific knowledge, these misleading lay interpretations by business practitioners have advanced as well. Unless such misconceptions are eliminated, they will continue to undermine both personal- and organizational-learning efforts. In this article, we'll address the three most prominent neuromyths in light of the latest research and explore some of the implications for corporate learning.

Myth #1: The critical window of childhood

Most of us have heard about critical learning periods—the first years of life, when the vast majority of the brain's development is thought to occur. After this period, or so the assumption too often goes, the trajectory of human development is deemed to be more or less fixed. That, however, is an exaggeration. Recent neuroscientific research indicates that experience can change both the brain's physical structure and its functional organization—a phenomenon described as neuroplasticity.

Researchers studying the plasticity of the brain are increasingly interested in mindfulness. Practicing simple meditation techniques, such as concentrated breathing, helps build denser gray matter in parts of the brain associated with learning and memory, controlling emotions, and compassion. A team led by Harvard scientists has shown that just eight weeks of mindful meditation can produce structural brain changes significant enough to be picked up by MRI scanners.[2]

Organizations from General Mills in consumer foods to digital bellwethers such as Facebook and Google increasingly give their employees opportunities to benefit from mindfulness and meditation. Most such programs have garnered enthusiastic support from employees, who often see a marked improvement in their mind-sets and job performance. For example, employees at the health insurer Aetna who have participated in the company's free yoga and meditation classes report, on average, a 28 percent decrease in their levels of stress and a productivity increase of 62 minutes a week—an added value of approximately $3,000 per employee a year. CEO Mark Bertolini, who started the program a few years ago, marvels at the level of interest generated across the company; to date, more than a quarter of Aetna's 50,000 employees have taken at least one class.[3] Leaders like Bertolini understand that providing them with the tools to become more focused and mindful can foster a better working environment conducive to development and high performance.

Myth #2: The idle-brain theory

A recent European survey discovered that nearly 50 percent of teachers surveyed in the United Kingdom and the Netherlands

believed that the idle-brain theory has been proved scientifically.[4] This misunderstanding originally stemmed from inaccurate interpretations of activation hot spots in brain-imaging studies. By now, more carefully interpreted functional brain scans have shown that, irrespective of what a person is doing, the entire brain is generally active and that, depending on the task, some areas are more active than others. People can always learn new ideas and new skills, not by tapping into some unused part of the brain, but by forming new or stronger connections between nerve cells.

This insight into the brain's capacity becomes particularly relevant for the environment and context in which learning typically occurs. Everybody knows, all too well, about the habit of quickly checking e-mails or planning for the next meeting in the middle of a training session. The problem is that such multitasking engages large parts of the brain's working memory. Without freeing that up, we cannot successfully memorize and learn new information. In short, multitasking and learning cannot occur effectively at the same time.

Some organizations, recognizing this problem, are working to build immersive learning environments where distractions are eliminated. At McKinsey, we've created a model factory that participants can walk through to see operating conditions in action. But first, everyone is asked to place their phones and other distractive belongings in a locker, so they can fully concentrate on the learning exercise at hand. At many companies, removing the temptation of using mobile devices during learning sessions is becoming commonplace.

Myth #3: Learning styles and the left/right brain hypothesis

Almost everyone has encountered the theory that most people are either dominantly analytical (and left brained) or more creative (and right brained). However, this either/or dichotomy is false. The two hemispheres of the brain are linked and communicate extensively together; they do not work in isolation. The simplistic notion of a false binary has led, in many businesses, to the misconception that each one of us has a strictly preferred learning style and channel. Recent studies have flatly disproved this idea, suggesting instead that engaging all

the senses in a variety of ways (for instance, audiovisual and tactile) can help employees retain new content.

One organization that puts this idea into practice is KFC, which uses multiple forms of learning in customer-service training. Sessions begin with an after-hours board game placing the entire team of a store in the role of the customer. This is followed up by "gamified" learning that fits into roughly 15-minute windows during shifts. These video game–like modules put the employees behind the cash register to handle a number of typical customer experiences, including responding to audio and visual cues of satisfaction. At the end of the online modules, employees physically reconvene at the front of the store to hear feedback, report on what they've learned, and receive live coaching as reinforcement.

Although significant progress has been made, much remains to be done to eradicate neuromyths from the philosophy of corporate training programs. Neuroscience research has confirmed some of the approaches that learning professionals already use, such as on-the-job reinforcement and engagement without distractions. But that research has also contradicted other approaches. Companies should draw on the newly substantiated insights and may need to rethink their training programs accordingly. At the very least, they need to improve their dialogue with, and understanding of, the scientific community.

[1] *2013 State of the Industry,* Association for Talent Development, December 2013, td.org.

[2] Omar Singleton et al., "Change in brainstem gray matter concentration following a mindfulness-based intervention is correlated with improvement in psychological well-being," *Frontiers in Human Neuroscience*, February 18, 2014, frontiersin.org.

[3] David Gelles, "At Aetna, a CEO's management by mantra," *New York Times*, February 27, 2015, nytimes.com.

[4] Paul A. Howard-Jones, "Neuroscience and education: Myths and messages," *Nature Reviews Neuroscience*, 2014, Volume 15, Number 12, nature.com.

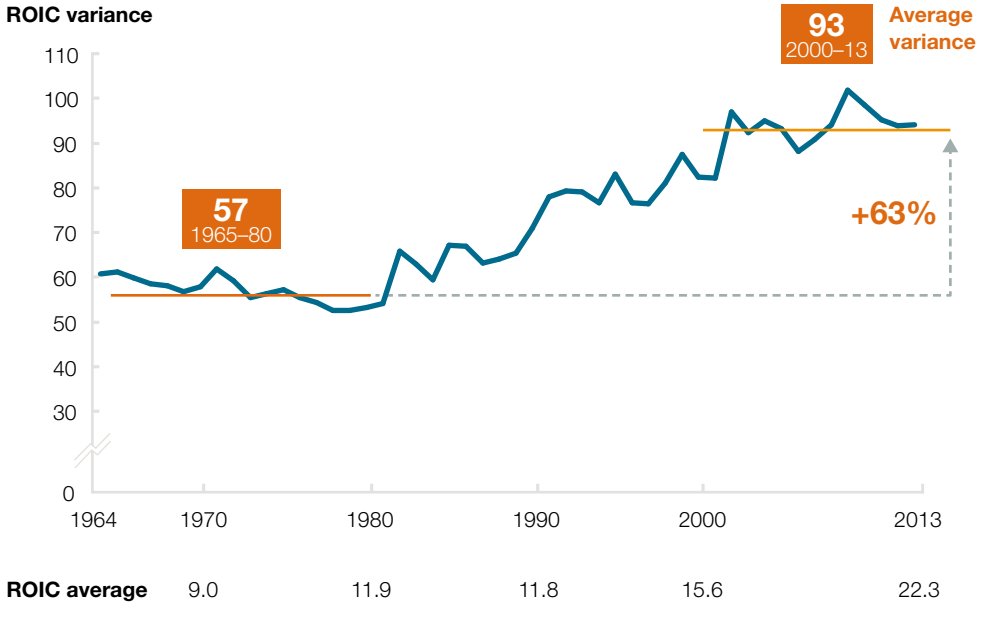
The authors wish to thank McKinsey's Jennifer May, Michael Rennie, and Kristina Wollschlaeger for their support of and contributions to this article.

Extra Point

What's driving volatility. . .

Returns on invested capital (ROIC), driven by upheaval in the corporate sector and macroeconomic instability, have become more volatile in recent years: from 2000 to 2013, volatility rose by more than 60 percent over what it was from 1965 to 1980. The unprecedented scale and quantity of mergers and acquisitions—since 1990, the number of deals increased fivefold, and the value of M&A activity as a share of GDP has grown by 50 percent—contributed to the volatility of returns. In addition, incumbents face more emerging-market competitors moving quickly through the cycle of serving strong local demand, gaining a foothold in nearby export areas, and then using M&A to expand across the value chain and capture far-flung markets. Paradoxically, average ROIC began trending upward in the 1980s and 1990s: rising volatility has not prevented the emergence of winners that earn outsized returns, boosting average performance.

Variance in ROIC for North American firms,[1] 1964–2013, %



[1]ROIC = returns on invested capital; for companies with revenues >$200 million and ROIC up to the 95th percentile in given year. Variance defined as the ratio of standard deviation to mean.

Source: McKinsey Global Institute analysis

For more, see Richard Dobbs, Tim Koller, and Sree Ramaswamy, "The future and how to survive it," in the October 2015 issue of *Harvard Business Review*.

For the full report, see McKinsey Global Institute, *Playing to win: The new global competition for corporate profits*, September 2015, on mckinsey.com.

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