Which are the opportunities and challenges to watch for in a newly digital world? What knowledge do leaders need to equip themselves with when pursuing digital transformation?
Keeping Apace on Digital Transformation

i  Introduction

1  Digital Transformation Opens New Questions — and New Problems to Solve
   By Hal Gregersen

4  Goodbye Structure; Hello Accountability
   By Jeanne Ross

8  The Nine Elements of Digital Transformation
   By George Westerman, Didier Bonnet, and Andrew McAfee

14 Rise of the Strategy Machines
   By Thomas H. Davenport

16 Is Your Company Ready for a Digital Future?
   By Peter Weill and Stephanie L. Woerner

21 Improving Your Digital Intelligence
   By Jacques Bughin, Tanguy Catlin, Bryce Hall, and Nicolas van Zeebroeck

30 Five Myths About Digital Transformation
   By Stephen J. Andriole
INTRODUCTION

Digital strategies must tackle two questions that are shrouded in uncertainty: What can data and digital technologies do to help us solve customer problems? And, what solutions will customers find valuable? This collection of articles from *MIT Sloan Management Review* examines the ways in which organizations should experiment and engage with customers to find the best way forward.

From “Digital Transformation Opens New Questions — and New Problems to Solve”:

- When leaders view technology as merely a source of answers and solutions, they miss opportunities to innovate in bigger, bolder ways.
- John Donahoe, the former CEO of eBay, says that instead of seeing new technologies as a means to develop more efficient answers to known problems, managers should view them as opportunities to revisit the problems themselves. They should ask, “Have we identified and framed the core issue in the right way? Instead of solving for X, should we be solving for Y?”
- Modest questions about how today’s problems could be better solved lead to applications of technology with easily foreseeable gains — and inspire people to ask more ambitious questions.
- One area where this way of thinking is critical is managing and solving cybercrime. Lior Div, who cofounded Cybereason, says his company’s breakthrough came when he recognized that most of the people and companies in his profession were fixating on a flawed challenge: how to keep the bad guys out. In many organizations, the adversary is already inside. Once you recognize this reality, a new and critical question emerges: How do you approach security when your enemy is already through the gates and hiding?

From “Goodbye Structure; Hello Accountability”:

- Companies will be able to operate as true digital organizations only when they learn how to respond quickly to unanticipated opportunities and threats.
- Instead of restructuring to increase agility, some organizations are assigning accountabilities for specific business outcomes to small teams or individual problem owners.
- The challenge of tackling new objectives is then built around individual flexibility, market-based resource allocation, experimental mindsets, and coaching rather than managing.
- To develop accountability at all organizational levels, leaders must learn to empower their people
without creating chaos. In turn, accountability owners must learn how to take responsibility for organizational outcomes. that one lead has a 95% chance of converting into a sale while another has a 60% chance.

**From “The Nine Elements of Digital Transformation”:**

- Companies vary in their degree of digital maturity, and those that are more mature outperform those that are not.
- Interviews with 157 executives in 50 companies found that the best companies — the “Digirati” — combine digital activity with strong leadership to turn technology into transformation.
- Executives of transformational companies in all industries are making the most of digital advances, such as analytics, mobile technologies, social media, and smart embedded devices, while at the same time improving their use of traditional technologies such as ERP.
- Executives are digitally transforming three key areas of their enterprises: customer experience, operational processes, and business models. And each of those three pillars has three different elements that are changing. Those nine elements form a set of building blocks for digital transformation.

**From “Rise of the Strategy Machines”:**

- While humans may be ahead of computers in the ability to create strategy today, we shouldn’t be complacent about our dominance.
- First, humans aren’t perfect strategists. Many M&A deals don’t deliver value, new products routinely fail in the marketplace, and myriad other strategic decisions don’t pan out.
- Second, the narrow intelligence that computers display today is already sufficient to handle specific strategic problems.
- Third, major consulting firms — including Boston Consulting Group, Deloitte, and McKinsey & Co. — are beginning to advocate for automated cognitive capabilities.

**From “Is Your Company Ready for a Digital Future?”:**

- There are four pathways that businesses can take to become top performers in the digital economy. Leadership’s role is to determine which pathway to pursue — and how aggressively to move.
- Becoming future-ready requires changing the enterprise on two dimensions — customer experience and operational efficiency.
- Each of the four pathways to transformation involves significant organizational disruption.
Those pathways can be summarized as follows: (1) standardize first, (2) improve customer experience first, (3) take stair steps (alternate the focus back and forth between improving customer experience and improving operations), and (4) create a new organization.

- The right choice will depend on the company’s circumstances, the environment of the sector in which the company operates, and the direction management wants to go.

**From “Improving Your Digital Intelligence”**

- Analysis of more than 250 companies globally finds that a company’s prospects for success in digital transformation can be diagnosed early in its transformation journey.
- There are 18 management practices that contribute the most to digital leaders’ financial and market success. They include the extent to which a company’s digital strategy is centered on customer needs, the test-and-learn methodologies the company employs, and the priority a company places on digital investments.
- For example, Home Depot has invested heavily in “interconnected” initiatives designed to meet changing customer needs, focusing heavily on integrating the digital and in-store experiences. In 2017, Home Depot shoppers picked up more than 40% of their online purchases in stores.
- This article includes a test that readers can use to rate their own digital intelligence.

**From “Five Myths About Digital Transformation”:**

- Organizations will make significant mistakes in their digital transformations unless those transformations are well planned, exquisitely executed, and enthusiastically sponsored by upper management.
- One myth about digital transformation is that every company should digitally transform. The truth is that digital transformation is a planned shock to what may be a reasonably functioning system and may not be necessary.
- Failing companies are much more motivated to transform themselves than successful companies are. At companies where things are going well — with “going well” defined crassly to mean that the company is making money for employees and shareholders — the chances of transforming anything meaningful are quite low.
- Another myth is that executives are hungry for digital transformation. In reality, the number of executives who really want to transform their companies is relatively small, especially in public companies.
Digital Transformation Opens New Questions — and New Problems to Solve

When leaders view technology as merely a source of answers and solutions, they miss opportunities to innovate in bigger, bolder ways.

BY HAL GREGERSEN

In a recent conversation, John Donahoe, the former CEO of eBay who currently runs ServiceNow, told me about the most important phase in a company’s digital transformation: the part where you start asking better questions. Instead of seeing new technologies as a means to develop more efficient answers to known problems, managers should view them as opportunities — even requirements — to revisit the problems themselves. They should go back to first principles, Donahoe says, and ask, “Have we identified and framed the core issue in the right way? Instead of solving for X, should we be solving for Y?”

Marc Benioff of Salesforce is thinking along similar lines. At the company’s new headquarters in San Francisco, the top floor has been designated an “Ohana” floor. The word, Hawaiian for “family,” is a nod to the island culture that Benioff values so much for its spirit of collaborative work and play. One of the biggest uses of this and the company’s other Ohana spaces is to host clients for Ignite sessions, where they think at a strategic level about what enterprise software should help them achieve. It’s a space where people are prompted to ask big questions that could change how their companies compete.

Given the businesses they are in, Donahoe and Benioff have front-row seats to thousands of companies’ efforts to digitize their operations. As they’ve observed, many management teams begin that journey by asking how they can make back-office functions like help desks and HR information centers more efficient and less expensive through automation. That’s the low-hanging fruit; the business case can be made based on near-term productivity improvement alone. Things get much more interesting, both executives believe, after those systems are in place. New information starts flowing, and more intriguing questions materialize. As managers begin to see patterns in users’ activity, they often find surprises lurking there. They’re inspired to ask, for example: Is there a basis here for us to build a predictive model? If we’re worried about retention risk, could seeing patterns in employee HR queries help guide better employee engagement strategies?

That’s how breakthroughs happen in many digital realms. Modest questions about how today’s problems could be better solved lead to applications of technology with easily foreseeable gains. And experiences with such early applications inspire people to ask more ambitious questions — questions I like to call catalytic, since they knock down mental barriers and channel
energy into new, more productive pathways. The most catalytic questions challenge basic assumptions about how a problem has been framed, opening up space for solutions that are more creative.

Think of the first questions raised by business managers as the foundations of the internet of things were laid. In the beginning, most people thought only in terms of the products they had already created and how they could be made “smarter” — like the deeply unexciting but often-invoked example of the refrigerator that knows when to order milk. Some of these innovations were wonderful improvements, as when sensors were added to jet engines, which allowed them to be monitored remotely for signs of wear rather than routinely taken offline for “just in case” maintenance that might be unnecessary. Soon enough, more catalytic questions began to occur to people: What else could be better understood through remote, networked sensors? If it is now possible to monitor anything inexpensively, what real-time information would be valuable to gather that we don’t see and act on today?

Questions are evolving fast in applications of AI, too. As Tom Davenport and Julia Kirby put it in Only Humans Need Apply, the tendency has been for managers to ask the same old question about productivity-enhancing technology: How can we use machine intelligence to automate work so we can get rid of expensive people? Now it is dawning on managers to ask a new question: How can we use it to augment human strengths — which, in an AI-filled world, will remain the scarce, differentiating strengths that give some companies a competitive advantage. At the Mayo Clinic, Dr. Wyatt Decker, who is in charge of exploring uses of AI across all locations and practice areas, builds on that question: What are the tasks in a research-oriented medical setting that humans find tedious and don’t learn much from by performing repetitively?

And what are the tasks humans would love to accomplish if only they had greater powers of information consumption, pattern recognition, and computation?

And then there is the realm of cybersecurity — very much tangled up in companies’ digital transformation efforts, and the source of one of the best examples I came across in research for my book Questions Are the Answer. I interviewed Lior Div, who co-founded Cybereason in 2012 with two other veterans of Unit 8200, the Israeli military’s elite cybersecurity unit. Based near my office in Cambridge, Massachusetts, the company produces software that can detect and contain complex cyberattacks in real time.

Cybercrime, as Div well knows, is an underworld full of “unknown unknowns,” with its legions of shadowy hackers relentlessly devising new ways of breaching allegedly secure systems. And unfortunately, the numbers are all going in the wrong direction. According to enterprise security company Proofpoint, which tracks cyber threats on a quarterly basis, between fall 2016 and fall 2017 there was a 2,200% rise in phishing — the sending of deceptive messages intended to infect recipients’ devices with malware. Almost two-thirds of these messages were set up to install ransomware, which renders all files on a computer inaccessible unless its owner pays a named price. Another quarter were Trojans designed to steal online banking credentials. Analysis by CyberSecurity Ventures predicts that annual global cybercrime costs will rise to $6 trillion by 2021. Since that will make cybercrime more profitable for its perpetrators than the global trade in all major illegal drugs combined, the report claims, we’re in for “one of the biggest challenges that humanity will face in the next two decades.”

Cybereason’s breakthrough came when Div recognized that most of his profession was fixating on a flawed question. Everyone, he says, was working on the problem of how to keep the bad guys out. But notice the assumption embedded in that question — that the bad guys are outside. “The thing is,” Div tells me, “they’re already in. In most organizations, when we are deploying a solution, we find an adversary active in the environment.” Once you recognize this reality, a new and critical question emerges: How do you approach security when your enemy is already through the gates and hiding? Such reframing opens up a world of different solutions. Rather than immediately ejecting the bad guys, you might pivot to monitoring what they’re doing, finding earmarks of different actors, and piecing together their intent. This strategic approach moves you beyond treating cybercrime as an IT problem and past the hopelessly reactive strategy of building higher walls and slapping on more patches.

“The problem we’re dealing with,” Div says, “is not fundamentally a bits-and-bytes problem; it’s people. There is an adversary behind the scene with an agenda.”

Back in the world of ServiceNow, Donahoe tells me that the genesis of that business was a question that others weren’t yet asking. The company makes software that streamlines and improves the quality of internal services to employees within large enterprises — and is seen as the “central nervous system” of digital transformation. The easy example is the one that the company started with: IT services. On any given day in a big organization, hundreds of people encounter repair issues or identify new needs relating to the hardware and software systems they use in their work, and many of these employees need to contact an IT function for assistance. ServiceNow’s software automates much of that service experience, allowing the problem to be reported and efficiently putting someone on the case — or enabling the employee with the problem to resolve it through a self-service protocol.

What question gave rise to the company? An important reframing of one that companies were already asking as they looked at
external service issues: “What’s a great customer experience?” In an economy where the competition for top talent is fierce, ServiceNow founder Fred Luddy wondered why that same thinking shouldn’t go into addressing people’s frustrations at work. Why shouldn’t people have the same kind of fast and user-friendly access to information in their roles as producers as they have in their lives as consumers? The so-called consumerization of the workplace is by now a well-established trend. But that became possible only after someone changed the central question and asked, “What’s a great employee experience?”

By now, you may be asking a question yourself: What good does it do to recognize the power of catalytic questions if I don’t know how to arrive at them? That is the question that launched my last several years of research, learning from people like Donahoe, Benioff, and Div — and other CEOs of innovative companies, like Rose Marcario of Patagonia, Ed Catmull of Pixar, and the inimitable Oprah Winfrey. The answer I’ve found comes down to this: You can’t summon catalytic questions with the snap of your fingers, but you can establish the conditions in which they will reliably arise.

The tools of digital transformation can help create those conditions for you and your team. If you let them, they can put you in a questioning mode by exposing you to surprising data and possibilities that make you feel less confident you are right, less comfortable, less pressured to transmit information — and more eager to receive.

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Goodbye Structure; Hello Accountability
JEANNE ROSS

Digital technologies offer ubiquitous data, unlimited connectivity, and massive processing power. These capabilities have created a business environment in which decision-makers can more readily acquire data to inform decisions and then shrink bottlenecks between knowing and doing. In this way, digital technologies are accelerating the pace of business.

All this speed is making business agility de rigueur. No matter how big or old they are, companies that hope to avoid a fate like that of the Titanic — sinking because they can’t change course fast enough to avoid calamity — must learn how to respond quickly to unanticipated opportunities and threats.

Well-designed systems and processes can certainly help make a company more agile. But even great systems and processes are responsive to change only if the people who use them recognize what needs to be done and how to do it.

Organizational structures are designed to clarify how a company will meet stated objectives. But they’re not necessarily good at helping people adapt to changing objectives. The result: Leaders will be able to operate as true digital leaders only when they shake their reliance on structure as the primary tool of organizational design and instead start assigning accountabilities in ways that instigate focused responses to opportunities. This is unlikely to come naturally.

What’s Wrong With Structure?
Traditionally, business leaders have structured companies to allocate responsibilities to distinct functions, product lines, geographies, or other business areas. This divide-and-conquer approach to organizational structure creates business silos, which are usually designed as hierarchies. In these structures, leaders assign increasingly specific responsibilities and tasks at lower levels of the hierarchy.
These siloed, hierarchical structures support operational efficiencies, but they are not effective in supporting digital, integrated services to customers. Integration requires coordination of activities across silos. Recognizing this interdependence, decision-makers refer a growing number of decisions up the hierarchy, where senior people can resolve conflicts across all affected business silos. As a result, key decisions are made far away from the operational reality, and then communicated back to where action will be taken.

Digital companies cannot wait for such elongated decision-making processes. But because they also cannot afford to ignore the need to coordinate across silos, leaders are reluctant to empower teams within silos to take independent action.

Restructuring Is Not the Answer

As business leaders recognize the limitations of business silos and hierarchies, they invariably attempt to add new structures, like matrices or networks, to make their structures more agile.

But adding structures is likely to make a company more complex rather than more agile. There are at least four reasons why executives should not rely on structure to provide improved organizational agility:

- **Restructuring is a bad use of management time (and everyone else’s).** Reorganizations are exhausting. Constant introductions of new structures will consume precious management attention that should be focused on meeting new business demands.

  - **Structures trap rather than empower employees.** Roles within formal structures rarely encourage people to do what it takes to solve a problem. Rather, they encourage people to do the job they were told to do. It’s agile employees who solve problems.

- **Formal organizational structures often limit experimentation.** Risk-averse individuals may be reluctant to try new things or note that an experiment is failing, if it bodes poorly for their organizational unit. Commitment to structure as a key design lever can limit learning.

- **Formal structures don’t fully leverage a company’s smarts.** Traditional structures come with annual goals, budgets, and performance metrics. This means that the people at the top need to know what resources are necessary — they need to be the smartest people in the room. But when companies are moving fast, business awareness and creativity are highly distributed.

Most leaders recognize these limitations — they just fear the chaos that could result if they rely less on formal structures. Indeed, structures won’t go away. But what can go away is the reliance on restructuring as a way of introducing important strategic changes.

Lead Change by Assigning Accountabilities

Instead of restructuring, companies can initiate change by assigning accountabilities for specific business outcomes to small teams or individual problem owners.
For example, in our research at MIT’s Center for Information Systems Research (CISR), we’ve seen that at the banking and investment company BNY Mellon, more than 50 service leaders are accountable for creating and maintaining services like opening an account, making a payment, and reconciling a transaction. These service leaders are responsible for cost, reliability, and customer satisfaction (often internal) related to their service, so they coordinate with other parts of the company through collaboration as opposed to working through the hierarchy. This arrangement is allowing BNY Mellon to provide a more integrated face to customers without restructuring the business.

Leading change by assigning accountabilities involves specifying a desired outcome, putting someone in charge, and letting the responsible person decide how to accomplish the objective. Senior leaders need not divvy up necessary tasks; individuals or teams can quickly pivot as they identify what is and isn’t working.

For instance, like many digital companies, the Swedish streaming entertainment company Spotify supports its customer offerings through the efforts of small autonomous teams, known as squads. These squads define their own missions and develop their own goals, as well as hypotheses as to how they will meet their goals, testing and adjusting as they go along. Team membership shifts as the company refocuses priorities or as a team grows beyond an optimal size.

Assigning accountabilities like this differs from structuring in several important ways:

**Individual flexibility.** Companies designed around accountabilities focus on current issues and outcomes. For digital companies, most accountabilities revolve around digital offerings. These are natural because offerings start as minimum viable products that can grow if customers demonstrate enthusiasm. For successful offerings, assignments are likely to become longer term (and could lead to a more formal structure). Other individuals take on accountability for specific process problems that, once resolved, will lead to reassignment. People start to expect (and, in most cases, desire) to move to where they are most needed.

**Less budgeting and more market-based resource allocation.** Accountability owners take responsibility for making their solutions cost-effective. Owners of accountabilities attempt to meet the needs of their internal or external customers at a price those customers are willing to pay. They are inclined to recruit resources as needed rather than simply accrue a reservoir of talent. In some cases, they’ll recruit people to their teams; in others, they will look for collaborators. Thus, an internal market, rather than a budget, will dictate resource levels.

**Experimental mindset.** Because every accountability owner designs experiments to test hypotheses, it’s important to track whether an experiment is meeting with success or failure. Accountability owners accompany their hypotheses with proposed milestones that indicate if an experiment needs scaling up, tweaking, or abandonment. Failure is an option as long as the company has identified how to capture learning.

**Coaching rather than managing.** Because accountability owners are proposing hypotheses, defining metrics to track progress, and assuming responsibility for recruiting and paying for resources, they will usually know more about their roles than their leaders do. Thus, leaders must rethink their roles. To lead empowered teams, leaders
have two important responsibilities: (1) aligning multiple accountabilities and (2) coaching individual accountability owners.

Assigning accountabilities rather than developing structures will be a radical new way of working for people who have climbed the corporate ladder in traditional ways. The demands for agility, however, make it imperative that leaders learn how to help their people adapt quickly to new demands and opportunities.

**Getting Started**

To develop accountability at all organizational levels, leaders must learn to empower their people without creating chaos. In turn, accountability owners must learn how to take responsibility for organizational outcomes.

When former BNY Mellon Global CIO Suresh Kumar revamped the IT unit at BNY Mellon around accountabilities, he noted that he was asking people to act like “mini-CEOs.” He found that some of the people he placed in this role were natural problem-solvers who seized the opportunity. Others regularly asked their bosses what they should do next. Not all could be trained out of old ways of thinking.

To get started, leaders should solicit the names of people who feel they have far more to add to the company than they are contributing in their current roles. This will help identify problem solvers and risk-takers. Leaders can assign them a single issue or digital offering. As they gradually designate new tasks to new accountability owners, leaders themselves will learn how to coordinate and coach.

There will be mistakes, and people throughout the company should know about those mistakes and learn from them. But as the process unfolds, it will accelerate the company’s digital transformation.

**About the Author**

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In-depth research with executives at a wide range of companies shows how managers can use technology to redefine their businesses.

Digital transformation — the use of technology to radically improve performance or reach of enterprises — is a hot topic for companies across the globe. Executives in all industries are using digital advances such as analytics, mobility, social media and smart embedded devices as well as improving their use of traditional technologies such as ERP to change customer relationships, internal processes and value propositions. Other executives, seeing how fast digital technology disrupted media industries in the past decade, know they need to pay attention to changes in their industries now.

Where can you look for digital transformation opportunities? We interviewed 157 executives in 50 companies to find out. These companies are large — typically $1 billion or more in annual sales — and spanned 15 countries. To provide balanced perspectives, approximately half of the interviewees were business leaders such as CEOs, line of business managers, marketing heads or COOs, while the other half were IT and technology leaders.

The companies we interviewed are moving forward with digital transformation at varying paces and experiencing varying levels of success. Some are transforming many parts of their organizations while others are still doing only the basics. Others are encountering organizational issues or other challenges that prevent them from transforming successfully.

But one thing we found was clear. The best companies — those we call Digirati — combine digital activity with strong leadership to turn technology into transformation. This is what we call Digital Maturity. Companies vary in their digital maturity, and those that are more mature outperform those that are not.

Leading digital change requires managers to have a vision of how to transform their company for a digital world. So, where can you look? What digital activities represent good opportunities for your business?

Analysis of the interviews shows clear patterns. Executives are digitally transforming three key areas of their enterprises: customer experience, operational processes and business models. And each of these three pillars has three different elements that are changing.
These nine elements form a set of building blocks for digital transformation.

Currently, no company in our sample has fully transformed all nine elements. Rather, executives are selecting among these building blocks to move forward in the manner that they believe is right for their organizations. In this article, we highlight some of the ways that companies we studied are changing these nine areas.

**Transforming Customer Experience**

The three major building blocks with which companies are digitally transforming customer experience are customer understanding, top-line growth and customer touch points.

**Customer Understanding**

Companies are starting to take advantage of previous investments in systems to gain an in-depth understanding of specific geographies and market segments. Some are exploring social media to understand what makes customers happy — and what leads to customer dissatisfaction.

In addition, companies are learning to promote their brands more effectively through digital media. Companies are also building new online communities to advise and build loyalty with clients in medical, real estate or financial services products. Others are building products that improve branding in lifestyle communities.

Many organizations are building analytics capability to understand customers in more detail. Some insurance companies, for example, are improving their portfolios and cost structures through analytics-based underwriting and pricing. Other companies are conducting analytics-based experiments to drive customer behavior. In one case, a restaurant company is actively conducting experiments in pricing and promotion across a set of franchised stores. The experiment dynamically adjusts product prices in response to demand, weather, inventory levels and proximity to closing time.

**Top-Line Growth**

Companies are using technology to enhance in-person sales conversations. For example, financial services companies are using tablet-based presentations instead of paper-based slide decks to make sales pitches. Insurance firms are introducing mobile tools to help sales people and customers engage in analytics-based planning. A medical device sales force is replacing in-person interactions with digital interactions. When visiting a doctor’s office, a salesperson leaves an iPad with video and other information on new products. The aim is to get the doctor’s attention — without inconveniencing the physician or impacting busy office schedules — in order to obtain a 10-minute conversation when the salesperson returns to retrieve the iPad.

Better understanding helps businesses to transform the sales experience. Companies are integrating customer purchasing data to provide more personalized sales and customer service or even to offer customized product packages. A hospitality company engaged in location-based marketing uses analytics to send personalized mobile coupons to customers as they near a facility; the company can then track uptake in real time. A mortgage company is setting up a CRM strategy to link customers
to local real estate references. This system proposes new offers in real time via the Internet.

Other businesses are using concept stores as flagships for their digital selling innovations. For instance, a mortgage company offers investors an integrated process combining real estate and bank services with external services — and showcases the overall process in a concept megastore.

Some companies try to make life easier for the customer, simplifying their processes through a digital plug-in. One retailer automatically loads a customer's last online shopping list into its e-commerce site. This streamlines the shopping process, allowing customers extra time to look at other products. Customers can then decide whether to use home delivery or a drive-through service with a specific pick-up time.

**Customer Touch Points**

Customer service can be enhanced significantly by digital initiatives. For example, a bank established a Twitter account to answer client complaints quickly, helping customers avoid going physically to a branch. This digital initiative also leveraged an expert community, allowing crowdsourcing with several employees and other customers.

Companies with multiple channels to the customer are experiencing pressure to provide an integrated experience. Multichannel services require envisioning and implementing change across customer experience and internal operational processes. Many retailers now offer home shopping with the option to receive products by mail or in a store. However, one retail executive described customers being angry that customer service representatives in a store could not access online order history.

Several companies in our study are offering self-service via digital tools. These tools allow the customer to save time, while saving the company money. Many companies are now offering customer apps to enhance customer touch points. In one hospitality company, smartphone apps are linked to the customer’s profile, enabling integration across SMS, apps and social media efforts. A media company offers apps with geo-localization and augmented reality to help customers find interesting places to visit and provide special offers via vouchers and e-couponing.

**Transforming Operational Processes**

Although transformed customer experiences are the most visible — and arguably the most exciting — aspects of transformation, companies are also realizing very strong benefits from transforming internal processes through process digitization, worker enablement and performance management.

**Process Digitization**

Automation can enable companies to refocus their people on more strategic tasks. A manufacturer has begun to centralize the HR function, allowing economies of scale through self-service while freeing HR people to “focus on enlarging manager skills, rather than counting days off.” A specialty materials company has automated many R&D processes. Automation allows researchers to focus on innovation and creativity rather than repetitive efforts. It
also creates streams of data that can be useful in later data mining efforts.

One paint manufacturer has created fully automated plants that significantly reduce labor requirements, improve product quality and enhance environmental, health and safety performance. An apparel company has moved to digital design processes when collaborating with manufacturing partners. Going digital eliminates most need to ship physical prototypes back and forth, reducing the product development lifecycle by 30%.

Worker Enablement

Individual-level work has, in essence, been virtualized — separating the work process from the location of the work. A financial services business rearranged its headquarters so that nobody had an assigned desk, even the CEO. Employees now work from home one or two days per week and, when they are in the office, sit near people with whom they are temporarily collaborating. Meanwhile, the company’s collaboration and networking tools allow employees to talk with anyone in the organization from wherever they are sitting. This is setting the stage for further changes related to globalization.

The tools that virtualize individual work, while implemented for cost reasons, have become powerful enablers for knowledge sharing. Salespeople and frontline employees, for example, are beginning to benefit from collaborative tools in which they can identify experts and get questions answered in real time. They are also increasingly gaining access to a single, global view of the company’s interactions with a customer.

Performance Management

Transactional systems give executives deeper insights into products, regions and customers, allowing decisions to be made on real data and not on assumptions. This is happening in both internal processes and customer-facing processes. The level of detail is also increasing, allowing managers to compare status across sites or reallocate product manufacturing capacity in ways they could not do before.

Beyond being better informed, digital transformation is actually changing the process of strategic decision-making. Top executives in a medical device manufacturer used the company’s existing collaboration tools to extend strategic planning sessions from 12 people to more than 300 of the business’s top managers. This enabled better input into the process and better uptake of the vision after decisions were made.

Transforming Business Models

Companies are not only changing how their functions work, but also redefining how functions interact and even evolving the boundaries and activities of the firm.

The three building blocks of this transformation are digital modifications to the business, the creation of new digital businesses, and digital globalization.

Digitally Modified Businesses

One media executive said: “We’ve realized that if we don’t transform the way we do business, we’re going to die. It’s not about changing the way we do technology but changing the way we do business.” The company is
finding ways to augment physical with digital offerings and to use digital to share content across organizational silos.

A grocery company is staying true to its traditional business but using digital to transform a new growth business. As one executive reported, “After two years, our e-commerce platform is bringing us 20% of our new clients and our traditional clients are consuming 13% more on average.”

Other businesses are building digital or service wrappers around traditional products. A national post office is creating a free digital mailbox attached to each physical mail address that companies can use as a substitute for a person’s physical mailbox. A business credit company is developing a digital business for some credit products that requires less involvement than their traditional high-touch offerings.

New Digital Businesses
Companies are also introducing digital products that complement traditional products. For example, a sports apparel manufacturer started selling GPS and other digital devices that can track and report on a customer’s workout. Other companies are changing business models by reshaping their boundaries through digital. A mortgage company is moving from being a link in the value chain to being a global assembler of investment products. An airport authority is aiming to become the owner of a traveler’s end-to-end process by providing an integrated multichannel experience, including information on airplane traffic and reservations, duty-free shopping promotions and other benefits.

Digital Globalization
Companies are increasingly transforming from multinational to truly global operations. Digital technology coupled with integrated information is allowing businesses to gain global synergies while remaining locally responsive. These companies benefit from global shared services for finance, HR and even core capabilities like manufacturing and design. Global shared services promote efficiency and reduce risk. They even promote global flexibility. One manufacturer can shift production around the globe with only a few days’ notice in response to interruptions or excess demand.

The Take-Away
Digital transformation requires strong leadership to drive change. But it also requires a vision for what parts of the company you want to transform. Companies in all industries and regions are experimenting with — and benefiting from — digital transformation. Whether it is in the way individuals work and collaborate, the way business processes are executed within and across organizational boundaries, or in the way a company understands and serves customers, digital technology provides a wealth of opportunity.

Focus is important; no company we studied is transforming all nine areas at once. But the best-managed firms are constantly identifying new ways to redefine the way they work in the new digital era.
About the Authors

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Rise of the Strategy Machines
THOMAS H. DAVENPORT

While humans may be ahead of computers in the ability to create strategy today, we shouldn’t be complacent about our dominance.

Editor’s Note: This article is one of a special series of 14 commissioned essays MIT Sloan Management Review is publishing to celebrate the launch of our new Frontiers initiative. Each essay gives the author’s response to this question:

“Within the next five years, how will technology change the practice of management in a way we have not yet witnessed?”

As a society, we are becoming increasingly comfortable with the idea that machines can make decisions and take actions on their own. We already have semi-autonomous vehicles, high-performing manufacturing robots, and automated decision making in insurance underwriting and bank credit. We have machines that can beat humans at virtually any game that can be programmed. Intelligent systems can recommend cancer cures and diabetes treatments. “Robotic process automation” can perform a wide variety of digital tasks.

What we don’t have yet, however, are machines for producing strategy. We still believe that humans are uniquely capable of making “big swing” strategic decisions. For example, we wouldn’t ask a computer to put together a new “mobility strategy” for a car company based on such trends as a decreased interest in driving among teens, the rise of ride-on-demand services like Uber and Lyft, and the likelihood of self-driving cars at some point in the future. We assume that the defined capabilities of algorithms are no match for the uncertainties, high-level issues, and problems that strategy often serves up.

We may be ahead of smart machines in our ability to strategize right now, but we shouldn’t be complacent about our human dominance. First, it’s not as if we humans are really that great at setting strategy. Many M&A deals don’t deliver value, new products routinely fail in the marketplace, companies expand unsuccessfully into new regions and countries, and myriad other strategic decisions don’t pan out.

Second, although it’s unlikely that a single system will be able to handle all strategic decisions, the narrow intelligence that computers display today is already sufficient to handle specific strategic problems. IBM Corp., for example, has begun to use an algorithm rather than just human judgment to evaluate potential acquisition targets. Netflix Inc. uses predictive analytics to help decide what TV programs to produce. Algorithms have long been used to identify specific sites for retail stores, and could probably be used to identify regions for expansion as well. Key strategic tasks are already being performed by smart machines, and they’ll take on more over time.
A third piece of evidence that strategy is becoming more autonomous is that major consulting firms are beginning to advocate for the idea. For example, Martin Reeves and Daichi Ueda, both of the Boston Consulting Group, recently published a short article on the Harvard Business Review website called “Designing the Machines That Will Design Strategy,” in which they discuss the possibility of automating some aspects of strategy. McKinsey & Co. has invested heavily in a series of software capabilities it calls “McKinsey Solutions,” many of which depend on analytics and the semi-automated generation of insights. Deloitte has developed a set of internal and client offerings involving semi-automated sensing of an organization’s external environment. In short, there is clear movement within the strategy consulting industry toward a greater degree of interest in automated cognitive capabilities.

Assuming that this movement toward autonomous strategy is beginning to take place, what are the implications for human strategists? As Reeves and Ueda point out in their article, cognitive capabilities will need to be combined with human intelligence in what they call an “integrated strategy machine.” Just as contemporary autonomous vehicles can take the wheel under certain conditions, we’ll see situations in which strategic decision making can be automated. Other situations, however, will require that a human strategist take the wheel and change direction.

Big-picture thinking is one capability at which humans are still better than computers — and will continue to be for some time. Machines are not very good at piecing together a big picture in the first place, or at noticing when the landscape has changed in some fundamental way. Good human strategists do this every day.

In a world of smart, strategic machines, humans need to excel at big-picture thinking in order to decide, for example, when automation is appropriate for a decision; what roles machines and people will play, respectively; and when an automated strategy approach their organization has implemented no longer makes sense.

Executives who see the big picture are able to answer the critical questions that will guide their organizations’ future: how their companies make money, what their customers really want, how the economy is changing, and what competitors are up to that is relevant to their company.

These kinds of issues and trends can’t be captured in data alone. It’s certainly a good and necessary thing for strategists to begin embedding their thinking into cognitive technologies, but they also have to keep their eyes on the broader world. There is a level of sense-making that only a human strategist is capable of — at least for now. It’s a skill that will be more prized than ever as we enter an era of truly strategic human-machine partnerships.

About the Author

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In preparing for the future, many large, established enterprises are embarking on a digital business transformation journey — often without any sense of where they are going. In this article, we will present four viable pathways for transformation and examine their pros and cons. However, the goal isn’t digital transformation but rather business transformation — using digital capabilities to transform a traditional enterprise into a top performer in the digital economy. We call such top-performing enterprises “future-ready.”

In 2015 and 2017, we surveyed several hundred enterprises, examining both the capabilities needed for transformation and the impacts on performance. We also had conversations with more than 50 executives to learn about their experiences with digital business transformation. Respondents represented a wide variety of industries, with manufacturing, financial services, and IT software and services being the biggest groups. Based on our analysis, future-ready enterprises performed much better than their industry peers. But we also found that, even within a single industry, enterprises can take different paths to becoming future-ready. This article looks at four banks that have taken different pathways: Danske Bank, mBank, BBVA, and ING.

**Becoming Future-Ready**

Becoming future-ready requires changing the enterprise on two dimensions — customer experience and operational efficiency. (See “How Companies Compare on Digital Business Transformation,” p. 22.)

**Future-Ready**

Future-ready enterprises are able to innovate to engage and satisfy customers while at the same time reducing costs. Their goal is to meet customers’ needs rather than push products, and customers can expect to have a good experience no matter which service delivery channel they choose. On the operations side, the company’s capabilities are modular and agile; data is a strategic asset that is shared and accessible to all those in the company who need it. The enterprise is ready to compete in the digital economy and able to work with a wide variety of partners through both...
Is Your Company Ready for a Digital Future? (Continued from page 21)

digital services and exposed application programming interfaces (APIs). By these criteria, 23% of the businesses we surveyed were future-ready, shown in the upper-right quadrant of the exhibit. Their performance averaged 16 percentage points better than their industry average, meaning that if the average net profit margin for a company in a given industry was 8%, future-ready enterprises earned 24%.

Silos and Complexity Of the companies we surveyed, 51% were in the bottom-left quadrant, with an extensive catalog of products and services developed over many years. Their products and services are supported by a complex set of business processes, systems, and data. The result is a fragmented, labor-intensive, and frustrating customer experience, often made worse by product silos within the company.

Frequently, the ability of such organizations to provide an engaging customer experience depends heavily on heroics by employees. For example, we watched one bank teller work with an elderly customer who wanted to change her address on six different bank products. The number of keystrokes required to make the necessary changes was dizzying. During a 20-minute encounter, the teller chatted amiably with the customer about the local sports team. An amazing effort, to be sure — but not scalable. It shouldn’t be surprising that, in our survey, the profit margins of enterprises from this group were weak; they averaged 5 percentage points below their industry average.

Industrialized Companies characterized by digital industrialization, shown in the bottom-right quadrant, apply the best practices of automation to their operations. They use the features that make them strong as an enterprise and turn them into modular and standardized digitized services. For example, companies in this group picked the best way of handling each key task (processing an insurance claim, on-boarding a customer, or assessing risk) and deployed it across the enterprise. They configured their services into plug-and-play modules to meet particular customer requirements quickly and inexpensively. The consolidated data created from the customer interactions and operations can become a competitive asset that anyone involved in the enterprise can access. Over time, many of these processes and decisions can be automated. Of the companies we studied, 11% were in the industrialized group; their net profit margins averaged 4.6 percentage points higher than their industry average.

Integrated Experience Enterprises offering what we call an “integrated experience,” shown in the upper-left quadrant, provide a better-than-industry-average customer experience despite having complex operations. Some of the companies emulated the industry-leading model epitomized by United Services Automobile Association (USAA), the San Antonio, Texas-based financial services group. USAA is organized around addressing a customer’s life events (for example, buying a house, having a baby, or preparing for retirement) rather than on pushing products. We have seen companies that want to offer an integrated experience develop attractive websites and mobile apps and hire more relationship managers to improve the customer experience. Many attempt to improve the customer experience by investing in analytics. However, we have found that these enterprises typically are unable to simplify or automate the underlying and complex business processes, technology, and data landscape. As a result, they see their costs of serving customers increase. About 15% of enterprises we studied offered an integrated experience; their net profit margins averaged 3.6 percentage points below their industry average.

**HOW COMPANIES COMPARE ON DIGITAL BUSINESS TRANSFORMATION**

In 2015 and 2017, we surveyed several hundred enterprises, examining both the capabilities needed for transformation and the impacts on performance. Based on our analysis, companies in the future-ready quadrant performed much better than their industry peers. Becoming future-ready requires changing the enterprise on two dimensions — customer experience and operational efficiency. We found that enterprises can take one of four different paths to go from the lower-left quadrant (Silos and Complexity) to the upper-right (Future-ready).
Four Pathways to Transformation

We identified four different pathways that companies took to become future-ready. Each pathway begins in the bottom-left quadrant (Silos and Complexity), and each involves significant organizational disruption.

**PATHWAY 1: Standardize first.** Pathway 1 moves enterprises from the Silos and Complexity quadrant to the Industrialized quadrant. This pathway relies on building a platform mindset with API-enabled business services that can be accessed across the enterprise and also externally. It enables an organization to eliminate many of its legacy processes and systems. But, as anyone who’s been through an enterprise resource planning, customer relationship management, or core banking project will attest, replacing core processes in an enterprise is an expensive, multiyear undertaking. It also requires putting many other projects on hold. Cloud computing, APIs, microservices, and better solution architectures make this industrialization process quicker, less risky, and less disruptive. However, embarking on Pathway 1 takes time. Among other things, it requires changing the decision rights to emphasize integrated services for customers, rather than focusing on products.

Danske Bank A/S, headquartered in Copenhagen, Denmark, and operating in 16 countries, has been pursuing Pathway 1. The vision it presented on its website in 2012 was: “One platform — exceptional brands.” Danske Bank’s approach brought some early benefits, allowing it to acquire five banks in six years and to reduce operating expenses. In the past few years, Danske Bank has also revamped its financial products into a set of banking services that can be combined to create products in real time across distribution channels in most markets. In the core banking services, 90% of its applications are shared and standardized. At the same time, it simplified its management structure, slimming down its product owner organizations. Whereas there used to be many executives responsible for credit cards, for example, today there’s just one.

Danske Bank’s “one platform” approach has also delivered longer-term benefits in terms of its relationships with customers and its reputation among peers. In the five years between November 2012 and November 2017, its share price rose approximately 150%. Although the bank cut its number of retail branches by half between 2012 and 2015, it has seen tremendous increases in e-banking. About 2.2 million of its 3.2 million customers use Danske Bank’s e-banking platform for such things as paying bills, accessing accounts, and managing their retirement savings. Moreover, the bank’s payment app, called MobilePay, is so popular that it has been embraced by other Scandinavian banks.

**PATHWAY 2: Improve customer experience first.** Pathway 2 involves moving from the Silos and Complexity to the Integrated Experience quadrant. Companies choose this strategy when their most pressing strategic goal is to improve the customer experience across the whole enterprise, tackling the problem across multiple organizational silos. Typically, they attempt to do several things at once: develop new attractive offers, build mobile apps and websites, improve call centers, and empower relationship managers — all with the goal of measurably increasing customer satisfaction.

One company following this approach is mBank S.A., headquartered in Warsaw, Poland. The bank’s leadership realized back in 2000 that the typical banking customer experience in Poland was far from positive. This led mBank to initiate a series of changes, including opening call centers, offering online services, and adding many new banking products. As it introduced new products and features, it also expanded into new markets in two neighboring countries, the Czech Republic and Slovakia.

Eventually, mBank’s leadership concluded that the company’s old service platform had reached its limit. Struggling to deliver the desired flexibility and customer experience — and predicting that the problems would only worsen — the bank set out to develop a new banking platform. Created over 14 months, the new platform offers customers a wide range of features, including 30-second loan approvals, mobile payments, video chat, integration with Facebook, peer-to-peer transfers, and cardless ATM withdrawals. The new platform is designed to increase efficiency and reduce time to market. When customers perform transactions or make changes on their mBank mobile app, the information is available immediately to customer representatives and distribution channels.

To grow, mBank has created business channels that tap into its digitized platform, allowing it to offer services to an expanded set of customers via partnerships with other companies. It is thus able to expand the business into new markets or offer its services through noncompeting banks in other countries.

The advantages of Pathway 2 include focusing on the customer first and improving the customer experience, which results in higher customer satisfaction scores and sometimes increased sales. The biggest disadvantage is that the improvements in the
customer experience typically add more complexity to already complex systems and processes, increasing the cost to serve a customer. Employees may still need to perform heroics to deliver what was promised.

**PATHWAY 3: Take stair steps.** Enterprises on Pathway 3 move toward becoming future-ready by alternating their focus from improving customer experience to improving operations and then back again, shifting the focus back and forth as needed. For example, the first move might be a project to implement an omnichannel experience. After that, companies might improve operations, perhaps by replacing a few legacy processes or creating an API layer. Then, they might attempt to put together a more attractive set of customer offerings by making smarter use of internal data.

With this approach, the difference between success and failure is having a road map that informs everyone’s efforts versus taking a haphazard approach. The best way to tell the difference is to ask a manager how a specific project fits into the overall plan. The advantage is that the steps, which consist of tightly coordinated sets of projects, are smaller, reducing risk. The disadvantage is that explaining the intermittent changes in direction can be difficult and can even confuse employees. In some enterprises, we have seen organizational whiplash from changes in direction, with a reduction in employee effectiveness and an increase in burnout.

An example of Pathway 3 can be found in Banco Bilbao Vizcaya Argentaria Sociedad Anónima (BBVA), based in Bilbao, Spain. Responding to challenges he saw in the banking industry, BBVA executive chairman Francisco González announced plans in 2015 to build “the best digital bank of the 21st century.”7 In its effort to reshape the customer experience, BBVA introduced a mobile app in 2014 that offers simple new-customer on-boarding in less than five minutes. It serves as a digital wallet and allows customers to set up appointments and conduct instant messaging conversations with managers. The app also allows easy, automated purchases from a self-service suite of products, including consumer loans and investment funds. The changes have been well-received by bank customers; in early 2017, customers interacted with the bank on average 150 times per year via their mobile devices, compared to four branch visits in the same year.

To improve efficiency, BBVA has worked hard to remove legacy business processes that had been constructed over time from many different systems and versions of data, replacing them with scalable, reusable global digital platforms. Today, BBVA offers customers a digital experience via a reliable core banking platform, enabling new developments that combine the bank’s open APIs and other capabilities. A big advantage of this approach is that other enterprises, including retailers, telcos, and even startups, are able to tie into the bank’s services, thereby enhancing their own products.

**PATHWAY 4: Create a new organization.** Rather than fight an uphill battle to transform their existing organization, leaders who choose to pursue Pathway 4 start new enterprises that begin life as future-ready. In the automobile industry, for example, German carmaker Audi AG recently created a wholly owned subsidiary to develop experimental mobility services apart from car ownership. In banking, ING Groep N.V., the multinational banking and financial services company based in Amsterdam, has pursued a similar approach with ING Direct.

ING launched ING Direct in Canada in 1997 before expanding into Australia, Italy, Spain, the United Kingdom, the United States, and other countries. By 2006, it had 13 million customers in nine countries. Although ING Direct did have some ATMs, it had no branches. Customers interacted with the bank by phone, mail, or online. After beginning as a monoline bank offering high-interest deposit products, it gradually added multiple new products, including loans and mortgages.

ING Direct’s country-based businesses operated autonomously but shared a common set of standardized business solutions and technical platform components. Module reuse kept operational costs low, allowing the businesses to offer higher savings rates and lower-cost loans.8

It took several years for ING Direct to establish its brand, culture, products, platforms, and partnerships. In our research, we have seen that the big challenge for enterprises taking Pathway 4 is figuring out how to bring the parent company and the transformed enterprise together.

Everything about them — their business models, their cultures, even the customers they cater to — tends to be different. Like every parent of a Pathway 4 enterprise, ING had to figure out how to deal with a successful spin-off. Complicating matters was the fact that there was no single ING Direct; each country operated a little differently. In the face of difficulties following the 2008 financial crisis, ING sold some of its operations, including ING Direct in the United States, Canada, and the United Kingdom,9 while continuing to hold on to its businesses in other countries, including Australia and Spain. The company says that it plans to standardize on a single digital banking platform by 2021.

In some enterprises, we have seen organizational whiplash from changes in direction, with a reduction in employee effectiveness and an increase in burnout.
with data and support functions shared across countries and product lines.\textsuperscript{10}

The advantage of Pathway 4 is that it allows an enterprise to build its customer base, people, culture, processes, and systems from scratch to be future-ready. It doesn’t need to deal with legacy systems or silos or culture. The challenge is that once the new entity is successful, how do you — or do you — integrate it with the mother ship?

**Choosing a Pathway**

Leadership’s role is to determine which pathway the enterprise (or, depending on the circumstances, the business unit) should take and how aggressively to move. Start by determining where the company is today — based on metrics such as net promoter score and net margin — compared to the rest of the industry.

Another important step is selecting the right executive to lead the transformation.\textsuperscript{11} The right choice will depend on the company’s circumstances, the industry environment, and the direction management wants to go.

- **Pathway 1** makes sense if the customer experience the company provides is around industry average and the threat of digital disruption is not high. CIOs are a good choice to lead Pathway 1.
- **Pathway 2** makes sense if the customer experience the company provides is significantly worse than average and you can’t wait to improve, or if there are worrisome new competitors. An executive passionate about customer experience who is technologically literate is a good choice to lead Pathway 2.
- **Pathway 3** makes sense if the customer experience the company provides is a problem, but you can identify a few limited initiatives that will make a big difference. Start with those and then focus on operations — and repeat in small steps. A chief digital officer is a good choice to lead Pathway 3.
- **Pathway 4** — building a new enterprise — makes sense when you can’t see a way to change the culture or the customer experience and operations fast enough to survive. The CEO or COO are good choices to lead Pathway 4.

Once the company — that is, the board, the CEO, and the senior management team — settles on a pathway, the difficult work begins. The digital era is a great opportunity for leaders to reinvent the enterprise. The most successful enterprises will need to become future-ready and ambidextrous — constantly innovating to improve customer experience while also working to reduce costs. Those that don’t become future-ready will likely suffer a death by a thousand cuts, with startups, players from other industries, and agile competitors slicing bits out of their businesses.

We conclude on a cautionary but realistic note. We recently ran a workshop on digital business transformation with the CEO and the executive team of an international financial services firm. We asked attendees to plot their company’s journey over the previous three years using the pathway framework. After the other executives had presented, we invited the CEO to share his version. He drew a series of movements, beginning in the Silos and Complexity quadrant, moving up, then to the right, then down and back, charting a convoluted path that continued for several more squiggles. When the CEO finished, he stepped back and said, “You know, it’s not as if we planned to do it that way. But using the objective metrics against our industry, this is the path we followed.”

He concluded by expressing his view that leaders need to pick a pathway and then stick to it. Ultimately, we think this is good advice. After all, transformation is difficult. All of a company’s stakeholders — including the board, employees, partners, and customers — need to know where the enterprise is going and how it plans to get there.

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Improving Your Digital Intelligence

JACQUES BUGHIN, TANGUY CATLIN, BRYCE HALL, AND NICOLAS VAN ZEEBROECK

Fundamentally transforming your business to become fully digital isn’t easy, but focusing on increasing your digital intelligence in specific areas significantly increases the chances your digital transformation will succeed.

However, some established companies have fully embraced digital as core to their overall corporate strategies and successfully transformed to reestablish profitable growth. Among the companies that are responding through digital initiatives, the fundamental question is whether they have the right intelligence to succeed in their digital transformation.

We have found that a company’s prospects for success can be diagnosed early in its transformation journey. A shared understanding of a company’s current digital intelligence, its desired future state, and critical gaps to overcome is a necessary precondition for success. Without this, the transformation will predictably hit major roadblocks. Having an objective, empirical, detailed assessment of digital capabilities is essential, enabling managers to speak a shared language across business units, functions, and geographies and to ensure alignment on priorities.

This article discusses tried-and-true approaches companies are taking to improve their digital intelligence and, in doing so, successfully execute digital transformations. Our findings are based both on insights and on recurring themes from our analyses of more than 250 companies globally, across industries, as well as on
statistical results confirming the link between those companies’ revenue trajectory and their digital intelligence.

Further, we invite you to conduct your own initial assessment of your company’s digital intelligence (see “Test Your Digital Intelligence”), and then provide a guided tour of best practices and specific steps others have taken on their successful digital transformation journeys.

**Measuring Digital Intelligence: The Concept Explained**

Over two years, we interviewed more than 100 thought leaders across leading digital companies worldwide — including digital natives such as Google Inc., Amazon.com Inc., and eBay Inc., as well as legacy companies that have become digital leaders such as Burberry Group plc and Capital One Financial Corp. — to identify the characteristics that distinguish these organizations. The research suggests that a company’s digital intelligence is informed by four dimensions: strategy, culture, organization, and capabilities. Within these dimensions, our research identified a set of 18 management practices that contribute the most to digital leaders’ financial and market success:

- The strategy dimension assesses management practices that include to what extent a company’s digital strategy is centered on customer needs, how closely linked it is to the company’s overall corporate strategy, how well it anticipates digital disruption, and whether it sets a bold, long-term vision.

- The culture section diagnoses management practices that increase a company’s ability to change, including speed and agility, risk aversion, test-and-learn methodologies, internal collaboration, and the ability to form external partnerships to develop market-leading solutions.

- The organization dimension evaluates the clarity of digital roles and responsibilities, presence of digital talent and leadership skills, governance and key performance indicators, and prioritization of digital investments.

- The capabilities section assesses integrated customer experience across touch points, data-driven decision-making, IT architecture, automation, content creation, and personalization.

Combined, these four dimensions and 18 management practices encompass what we call a company’s Digital Quotient (DQ). This DQ digital intelligence assessment creates a composite score based on a 100-point scale and tabulates individual scores for each dimension and management practice. Specifically, respondents across the company answer questions within each management practice on a 1 to 5 scale, based on clear definitions of what 1 (lagging), 3 (baseline or average), and 5 (best practice) look like. Values from each question add up to a score for each management practice. Values from each management practice add up into scores for each dimension, which then comprise the overall score. (See “Overall Average Digital Intelligence Results by Management Practice.”)
In aggregate, the assessment lets corporate leaders know where they stand relative to their industry peers and leading companies across sectors—and informs what they need to do to improve their own digital and financial performance. Based on our subsequent analyses from running this assessment with 250 companies globally, focusing on increasing digital intelligence pays off. Collecting revenue and profit data of these companies from external financial sources, we found that this digital intelligence score is statistically significant and positively correlated with subsequent financial indicators collected from audited sources, such as revenue, earnings before interest and taxes (EBIT), and company growth, controlling for factors such as industry mix, company size, or location. This correlation is also clearly visible for each sector where we have enough data to run solid regression, including manufacturing, business services, and high tech. Controlling for factors such as industry, company size, and location reinforces the economic significance of digital intelligence on revenue and margin growth.

**Test 1. Does digital intelligence predict a company’s revenue and margin growth?** A major impact of digital disruption is indeed the destruction of the original growth path of a company. Increasing digital intelligence scores should lead to recovering a new growth path in revenues and profit. Collecting the revenue and profit data of these companies from external financial sources, we found that digital intelligence scores are statistically significant and positively correlated with subsequent revenue, as well as earnings before interest and taxes (EBIT) margin, and growth of companies, controlling for factors such as industry mix, company size, or location. (See “About the Research.”)

**About the Research**

An important test of the validity of the digital intelligence assessment is whether the score predicts the financial performance of companies. We performed three tests in our research on the predictability of digital intelligence scores.
companies, with scores above 50. Further, these digital attackers were all above average for each of the 18 markers of digital intelligence.

What Score Will Increase Your Chance of Success?

Having determined that the digital intelligence score is strongly predictive, the practical question is: What minimum threshold is needed to maximize the chance of success?

Among our sample of companies, we found a wide distribution of overall scores. The scores tend to vary by sector, with consumer-facing industries including travel and hospitality, retail, and telecommunications among the most digitally mature, and pharmaceuticals, transportation, and logistics among the least-mature sectors. (See “Digital Intelligence Varies Significantly by Sector.”) Quite powerfully, among the sectors with the highest scores, we see intense competition and disruption (witness the current tectonic shifts in the retail sector) and are also starting to see many cases of successful digital transformation.

Digital Intelligence Varies Significantly by Sector

One example, The Home Depot Inc., has invested heavily in “interconnected” initiatives designed to meet changing customer needs, focusing heavily on integrating digital and in-store experience, including equipping associates with digital tools and developing user-friendly web and mobile interfaces. Today, more than 40% of online purchases are picked up in stores. These digital innovations have contributed to Home Depot’s significant growth in revenue and net income, even though the company has not opened a new big-box store in the United States over the past three years. Another example, Hasbro Inc., has had similar success with its mission to transform into a digital toy manufacturer and entertainment company with a stronger customer focus. For Hasbro, this involved initiatives such as leveraging ad technologies to integrate online and in-store advertising with key partners and developing social media campaigns including YouTube series, Facebook campaigns, and a Snapchat branded game. Collectively, these have contributed to incremental sales of $1 billion since 2013.

While the average company scores only 34 out of 100, we found that companies fall in three “clusters.” (See “Company Clusters Based on Digital Intelligence.”) The first cluster comprises the bottom 20% of companies, or those unable to achieve a score above 25; companies in this cluster typically have low scores on each of the four dimensions; low performance in one dimension is strongly predictive of low performance in other dimensions as well. The second cluster includes 60% of companies, whose score falls between 25 and 40. Among this cluster, performance across dimensions varies but is typically average across each of the four dimensions. Finally, the top 20% includes leading companies whose score is above 40. Across all three clusters, and even even
among digital leaders, companies tend to score lowest on capabilities.

Company Clusters Based on Digital Intelligence

<table>
<thead>
<tr>
<th>Cluster</th>
<th>DQ score per dimension</th>
<th>Range of Overall DQ scores</th>
</tr>
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<tbody>
<tr>
<td>Laggards</td>
<td>24 26 21 17</td>
<td>&lt; 25</td>
</tr>
<tr>
<td>Average</td>
<td>36 33 32 25</td>
<td>25-40</td>
</tr>
<tr>
<td>Digital Leaders</td>
<td>52 45 47 38</td>
<td>&gt; 40</td>
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One striking finding from our regression analysis is that being in the top 20% is highly correlated with higher revenue and margin growth. That is, companies in this cluster are not only able to fight the pressure of digital disruption, they are also able to reinvent themselves and achieve a higher growth profile. Being in the middle cluster does not put companies in a position to achieve positive growth. Companies in this cluster are able to avoid the worst effect of digital disruption, but they do not capture the financial opportunities from digitization. Companies in the lowest cluster are not able to cope with digital disruption — their net growth profile is negative.

We thus conclude that having a score below 25 indicates the greatest risk of shrinking profit and revenue. Companies with a score above 40, however, are reinventing their businesses profitably — having a score of 40 is a minimum threshold for positive odds of a successful digital transformation.

Getting Started: How to Rate Your Own Digital Intelligence

How do you know where you stand currently? The digital intelligence score is relatively easy and quick to measure, both as an initial assessment and as an ongoing measure. It is typically collected through an online survey of managers across the company, across business units, functions, and geographies, as needed to provide insights across these areas.

Whether you are beginning your digital journey or are looking to assess your progress, we have created an eight-question “pulse check” as an initial indicator of a company's digital intelligence. This sample assessment includes two of the most important management practices for each dimension: strategy, culture, organization, and capabilities.

At the end, you’ll see your individual scores compared to digital leaders and global averages and receive an estimated overall digital intelligence score. This assessment will give you a sense of where your company falls along the spectrum of digital intelligence, and where your company has strengths and critical gaps. Then, we'll focus on how to use these results to drive transformational change.

Test Your Digital Intelligence

Take a few minutes to test your digital intelligence.

Take the Test
Best Practices to Improve Digital Intelligence Quickly

Now that you know roughly where you stand, how do you engage in improving your digital intelligence where it matters most? Based on our experience working with digital natives and legacy companies at various stages of their digital journey, several recurring best practices have emerged.

First, for lagging companies with gaps across the board, don’t try to focus on everything at once; strategy matters most. Although our analyses imply that a company must be above average on all dimensions, not all digital leaders are great at all 18 management practices. Start by focusing on your overall digital strategy — one that anticipates disruption in your industry, meets your customers’ needs, and is closely linked to your overall corporate strategy. This typically involves a series of immersive sessions with key stakeholders across the organization to identify potential areas of digital disruption to the current business model, clearly articulate customer needs, evaluate the competitive landscape and market trends, assess current core competencies, and then develop and prioritize potential options to create value for customers.

To be clear, this is hard work. And there is no work-around. Companies that try to skip this step tend to find themselves adrift, struggling to execute on misaligned digital initiatives and dangerously vulnerable to digital attackers. In our experience, all successful digital transformations begin with a clearly articulated digital strategy, laser-focused on customer needs, and so fully integrated into their overall corporate strategy as to be one and the same.

We find interesting, sometimes surprising examples of this across industries. For one, John Deere, what a previous generation may have thought of as a “tractor company,” shifted its business model to provide sticky “farm management platforms,” including integrated onboard data systems and infrastructure to manage irrigation, fertilizer inputs, and ultimately increase farm yield. Another example, General Electric, an industrial manufacturing powerhouse previously associated with everything from light bulbs to dishwashers, has morphed into a “digital industrial company.” GE of today provides data management systems to improve the performance and fundamentally change the value proposition of their products, including wind turbines, aircraft engines, power plants, MRI systems, and locomotives.

Second, evolve your culture to accelerate the rate of change, push hard on legacy cultures that hold others back, and create an environment that makes it easier to attract top digital talent. Establish iterative and agile test-and-learn processes and methodologies. The digital landscape is evolving too quickly for the traditional approach and timelines. Companies that can take a digital initiative from idea to implementation quickly (in six to 10 weeks) will continue to adapt and lead — and have success attracting digital talent. Those that can’t will continue to find themselves vulnerable.

Even companies starting further along the intelligence curve, such as Capital One or Telefónica S.A., have invested in transforming their culture. Both of these companies have formed innovation labs to create new products in 24-hour sprints. Teams from different functions and business units collaborate using agile design thinking and test-and-learn methodologies more commonly associated with startups. These changes pay
“user journeys,” from searching for travel options, to confirmations, changes, and updates and services during their actual journey, to opportunities to provide adjacent services and increase loyalty during every interaction. For example, Air New Zealand Ltd., once a company posting large losses, has consistently reported high profit margins after it transformed itself using digital technology for better onboarding experience and improved yield management of its routes. The question for airline executives is not whether these increased customer expectations are transforming their industry, but whether their companies will lead now or be forced to play catch-up later.

Incorporating these four best practices together, companies can develop an integrated digital road map including specific, essential initiatives needed to deliver on their digital strategy. Depending on the digital strategy and scope of the transformation, the road map can include specific initiatives focused on new product development, mobile strategy, and underlying capabilities (for example, IT architecture, and data and analytics) that need to be in place. Successful digital transformation road maps also include initiatives to foster a digital culture, establishing agile test-and-learn methodologies in teams focused on redefining user journeys or developing new digital features for customers.

We have found that companies have the most success by establishing smaller teams initially, and then scaling the changes across the company over time. Lloyds Bank used this approach, starting with smaller teams to identify use cases and redefining them one at a time. Today, the company has trained 12,000 digital champions company-wide.
Another global financial institution decided to deploy a small cross-functional team empowered with greater decision-making authority in one of its core product lines. Within a matter of weeks, the team developed and launched an app that radically simplified the process of opening a new account. That innovation was quickly deemed best practice, and the team was asked to partner with colleagues in larger domestic markets to replicate and roll out similar apps.

The same scaling approach is useful for talent. Successful leaders create opportunities for digital talent to move across the organization, transferring skills and experience to others. That allows the business to grow digital talent organically and multiply the number of complementary digital initiatives it can support.

Although fundamentally transforming your business to become fully digital isn’t easy, this approach allows you to break down the challenge into the most important components. Focusing these initiatives on increasing your digital intelligence in specific areas significantly increases the chances your digital transformation will succeed.
About the Authors


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ii. By recombining the four components in orthogonal factors, the first factor already explains close to the totality of the variance in DQ components, with a test of single factor being passed at 0.00%. The loading factors of each DQ are 0.87 for strategy, 0.83 for organization, 0.74 for capabilities (all are statistically not different). Only culture weight is lower than others, at 0.53.
[OPINION]

Five Myths About Digital Transformation

If you want to lead your organization’s technology transition, the first step is grasping the realities of digital transformations — rather than getting seduced by the hype.

BY STEPHEN J. ANDRIOLE

Many boards of directors and senior management teams aspire to the efficiencies, innovation, and competitiveness that digital transformation might deliver. But in my experience, the path to transformation — like most major corporate initiatives — is a risky one.

I have spent much of my career overseeing and participating in digital transformations in both government and private sector settings. Specifically, I have served as the director of the Cybernetics Technology Office of the U.S. Defense Advanced Research Projects Agency (DARPA); as CTO and senior VP of Safeguard Sciences Inc.; and as CTO and senior vice president for technology strategy at Cigna Corp. And I have observed that in the vast majority of cases, organizations will make significant mistakes — unless the transformation is well-planned, exquisitely executed, and enthusiastically sponsored by upper management.

Villanova University — where I now teach and direct research about digital transformation and emerging technologies — collects data about technology adoption and digital transformation trends. I’m constantly hearing about the “amazing,” “fabulous,” “terrific,” and “incredible” projects under way with the potential to “revolutionize” companies and “disrupt” whole industries. But when I probe survey respondents for key details about their initiatives, I often find that there is still confusion about the process.

To replace this confusion with some clarity, I have distilled my observations and experiences into five myths about digital transformation — each of which has a corresponding reality. If you understand these myths, you’ll be less likely to fall prey to the hype about digital transformation and be more aware of how arduous the process really is.

MYTH #1: Every company should digitally transform.
REALITY: Not every company, process, or business model requires digital transformation.

Digital transformation is not a software upgrade or a supply chain improvement project. It’s a planned digital shock to what may be a reasonably functioning system. For example, to launch a digital transformation of business processes, it’s necessary to purposefully model those processes with tools that enable creative, empirical simulations. Think, for example, of the software programs that enable business process modeling and business simulations.

So, as a first step to digitally transforming your processes, you need to honestly assess if your company can create digital models that simulate the nuances inherent in its procedures. Simply put, the question is this: Can my company model its existing processes?

Remember, too, that the impact of any initiative is ultimately defined by market share, revenue, and profit. That means that some companies — even if they can model...
their nuanced processes — may still not be able to make a convincing business case for digitally transforming them. (In other words, just because it’s possible doesn’t mean it’s going to be profitable.) What’s more, you should keep in mind that your existing business rules, processes, models, and systems may be working just fine, so efforts to digitally transform them may not make sense, given the costs and time required of the effort.

Of course, over time, the efficiency of your rules, processes, models, and systems may diminish; when that happens, your company’s need for digital transformation could grow. But you don’t have to effect digital transformation just for transformation’s sake; you should be able to make the business case, and you should be able to say, with certainty, that the transformation will successfully streamline some key processes.

**MYTH #2: Digital transformation leverages emerging or disruptive technologies.**

**REALITY:** Most short-term transformational impact comes from “conventional” operational and strategic technology — not from emerging or so-called “disruptive” technology.

Most transformational leverage comes from tried-and-true operational technology (for example, networking and databases) and strategic technology (such as enterprise resource planning or customer relationship management software). It rarely, in my experience, comes from emerging technology (such as augmented reality) or disruptive technology (such as machine learning).

Why is that? Many business processes and models are outdated. For example, consider the manner in which Uber Technologies Inc. and Airbnb Inc. have, by degrees, supplanted taxis and hotels respectively. While emerging
Five Myths About Digital Transformation
(Continued from page 21)

technologies have abetted Uber and Airbnb’s rises to prominence, their most significant gains have come from leveraging the mainstream networking technologies already in consumers’ hands: mobile phones, apps, and websites optimized for quick transactions and location tracking. It’s often easier to achieve impact with technologies already in widespread use than it is with emerging technologies.

As obvious as that point may seem, many leaders ignore it. They think they have to be positioned to pounce on the next wave of emerging technology, when that next wave is often difficult to predict and is, by definition, not yet conventional enough to produce a major impact.

MYTH #3: Profitable companies are the most likely to launch successful digital transformation projects.

REALITY: If things are going well — defined crassly as employee and shareholder wealth creation — then the chances of transforming anything meaningful are quite low.

Failing companies are much more motivated to transform themselves, simply because they need to change something — if not everything — quickly. Successful companies, especially if they’re public companies, are understandably cautious about change. Think about it: How many successful companies — without market duress — have truly transformed their business models? Change is expensive, time-consuming, inexact, and painful. It also makes the leaders who suggest it easy targets for in-house politics, especially when the change initiatives move slowly or stumble.

And despite what the best-selling business authors, pundits, and huge-fee-collecting lunchtime speakers will tell you, the truth is, most human beings are resistant to digital change when it happens in the organization where they’ve grown comfortable. That means that transformation efforts are often constrained. Yes, resistance to change can disappear quickly when a company begins to fail. But until that day arrives, it’s difficult to tell everyone to fix what’s perceived as unbroken.

Where is there the least resistance to digital transformation efforts? At companies hemorrhaging customers and cash, and at startups with investor cash to burn. That’s because digital transformations work well when you have money to spend and a high capacity — and rationale — for taking risks. By contrast, established companies are “established” for a reason: They’ve reached consistent levels of profitable revenue generation, driven by well-understood processes that make up an ongoing business model. They are therefore typically unwilling to upend those processes as long as they continue winning in the marketplace.

MYTH #4: We need to disrupt our industry before someone else does.

REALITY: Disruptive transformation seldom begins with market leaders whose business models have defined their industry categories for years.

While market leaders pay lip service to their role as innovators and disruptors, they are usually unlikely champions of change — until their profits begin to fall and their shareholders scream for transformation.

Historically, industry disruptors have often been startups making bold bets on old industries. Examples include Airbnb (hospitality), Uber and Lyft (transportation), Amazon (books, retail), and Netflix (entertainment).

Does this mean there’s no possibility for industry leaders to disrupt themselves? No. But let history serve as a helpful reminder: Disruption seldom comes from established companies with consistent, profitable revenue streams.

MYTH #5: Executives are hungry for digital transformation.

REALITY: The number of executives who really want to transform their companies is relatively small, especially in public companies.

Digital transformation requires strong support from upper management. And while the concept of digital transformation can be sold up the management chain, simply selling the concept isn’t enough. Transformations require overt, continuous support from the senior management team to succeed.

And it’s this sort of support — public, persistent, enduring, and unwavering — that’s more difficult to secure than one might assume. Many executives are suspicious of risky change efforts that might affect their status in the company. Many executives are also challenged by the sheer complexity of digital transformation projects, especially when they learn how long they take. Moreover, as we’ve already discussed, executives are reluctant to tweak existing business models that are consistently generating wealth for themselves and their shareholders.

In short, there’s a wide gap between what executives say about digital transformation and what they do. It would be nice to think that executives are primarily motivated by what’s best for the long-term health of the company, but their motives are often more complex.

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