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Issue 26 | January 2020



## Progress fueled by the past

Connected business and society | Technology and ethics  
Leadership | Human performance in a digital world

**Deloitte.**  
Insights

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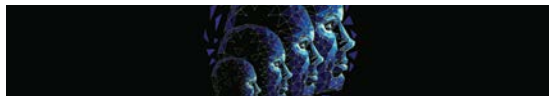
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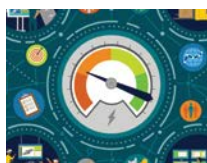
## Connected business and society



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Business's journey to balance profit and purpose is accelerating. A sharper focus on strategy and broader adoption of transformational technologies that benefit both business and society will help organizations get there faster.



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*by Paul Wellener, Steve Shepley, Ben Dollar, Stephen Laaper, Heather Ashton Manolian, and David Beckoff*

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To be effective in an increasingly technological workplace, workers must know not just *how* to use digital tools, but *when* and *why* to use them. Critical to this ability is digital agency: the judgment and confidence required to navigate and be effective in unfamiliar digital environments.

# LEADER

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## Progress fueled by the past

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**PUNIT RENJEN**

*Deloitte Global CEO*

**T**HIS COMING YEAR, as you steer your organization through the intricacies of the Fourth Industrial Revolution, I hope you'll also join us in celebrating 175 years of what began as a one-man operation in the waning years of the First Industrial Revolution.

I doubt there was much fanfare when William Welch Deloitte hung a shingle outside his London office in 1845. After all, there were 204 other accounting firms listed in the city's directory that year. The 27-year-old Deloitte, who'd dropped out of school a dozen years earlier to work as an assistant in bankruptcy court, was an undistinguished face in a sea of competitors. But he was industrious and talented, which caught the eye of Great Western Railway's board of directors, who appointed Deloitte as its first-ever independent auditor just four years later.

As we barrel into the digital age, there's value in recalling pivotal events that occurred since the age of steam engines. The occasional, quick glance into the rearview mirror reminds us that challenges similar to those we encounter in business today have been met—and often conquered—before. Our job as leaders, to paraphrase Goethe, is to make a better future by developing elements from the past.

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Sprinkled throughout this issue of *Deloitte Review* are a number of viewpoints that Deloitte has expressed in prior years: reminders that circumstances evolve, but fundamental issues persist. The accountability sought by the board that invited William Deloitte's external review in 1849 remains at the core of ethical debates around the use of technology. Concerns about privacy that exploded with the growth of data collection during the age of Aquarius are equally troubling in the age of analytics. Decades-old fears that automation will make humans obsolete continue to be stoked by leaps in artificial intelligence. Trepidation about diversity in the workplace has been replaced by anxiety that we don't have enough.

These ancient, ongoing struggles do not signal failure on our part. Quite the opposite, they reflect how far and how quickly business has advanced, and more importantly, how attached business leaders remain to the basic values that bind society. As much as ever, integrity matters. Responsibility matters. Fairness, security, well-being, and relationships all still matter. The fact that we remain focused on these ideals in the face of radical transformation speaks well of our instincts.

Progress is fueled by the past, and every leap forward is bound by principles that create a stable foundation for us all. In the 175 years since William Welch Deloitte's modest foray into professional services, the world has learned many lessons and achieved many amazing things. May the future be as full of potential.

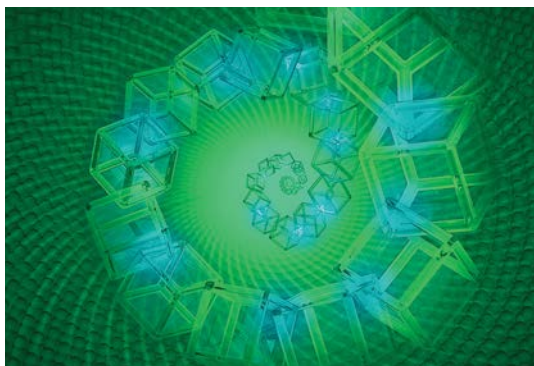
A handwritten signature in black ink, appearing to be 'William Welch Deloitte', written in a cursive style.

# on the

## PREDICTING TMT'S FUTURE

Only five ecosystems—smartphones, computers, TVs, enterprise data centers and software, and the IoT—account for most of the TMT industry's revenue. Explore what this and two other major themes mean in our 2020 TMT Predictions.

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Many paths lead to blockchain adoption, and no two are alike. In this industry-by-industry look at our blockchain survey, we examine how each industry is finding its own way to create value through blockchain.

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## IS GENDER EQUITY WITHIN REACH IN FINANCIAL SERVICES?

The percentage of women in finance leadership roles is growing, but there's still a ways to go to reach gender equity. In this podcast, Amanda Pullinger, CEO of 100 Women in Finance, joins Deloitte's Stacy Sandler and Alison Rogish to discuss how the industry can improve.

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# CONNECTED BUSINESS AND SOCIETY

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# Industry 4.0: At the intersection of readiness and responsibility

**Deloitte Global's annual survey on business's  
preparedness for a connected era**

BY PUNIT RENJEN

ILLUSTRATION BY ANDREW BANNECKER

Some have long argued that corporations should strive for profits above all else, that making money for shareholders is a company's sole reason for being.<sup>1</sup> But as the transformation to Industry 4.0 continues, more business leaders are starting to see a bigger picture and a larger responsibility.

Building on the last generation's *corporate social responsibility* movement, a new form of capitalism seems to be emerging, one that considers a broader group of stakeholders and measures societal impact alongside financial performance. In August 2019, the CEOs of nearly 200 multinational corporations signed a statement issued by the Business Roundtable, publicly pledging to lead their companies for the benefit of customers, employees, suppliers, and communities in addition to shareholders.<sup>2</sup>

In working to keep up with the pace of technological change, business leaders are also beginning to appreciate the need to nurture a culture of lifelong learning, equipping their workforces with the skills necessary to succeed in the future. And thanks in part to pressure from customers and employees, executives are expressing deep concern about climate change and resource scarcity, topics that were on few C-suite agendas just a couple of years ago.

In Deloitte Global's third annual survey of more than 2,000 C-suite executives across 19 countries, we examined the intersection of readiness and responsibility to see how leaders are balancing this transition to Industry 4.0—capitalizing on advanced technologies to help propel their businesses forward while acting in a more socially responsible way, particularly in the area of environmental stewardship.

As companies face these new realities, leaders are seeking the right approach to four key areas critical to Industry 4.0: strategy, societal impact, talent, and technology. We found that some companies,

particularly those with a comprehensive Industry 4.0 strategy, are performing well while others lag behind. This year's report highlights some major trends and insights:

- **When strategy leads, success follows.** Short-termism and the struggle to develop effective, holistic strategies that take advantage of Industry 4.0 technologies—identified in last year's report—continue, to the detriment of many organizations' operations. Two-thirds of CxOs said that their companies either have no formal strategies or are taking ad hoc approaches. Conversely, only 10 percent of CxOs said they have longer-range strategies to leverage new technologies that reach across their organizations.

That's unfortunate, because the survey data suggests businesses with comprehensive Industry 4.0 strategies are far more successful across the board. They're innovating and growing faster, successfully integrating Industry 4.0 technologies, and doing a better job of attracting and training the people they'll need in the future. Their leadership is also more confident about leading in the Industry 4.0 era.

- **Recognition of business's social responsibility.** There's ample evidence that most businesses are beginning to try to find balance between profit and purpose, thanks largely to increased pressure from customers, employees, and other stakeholders. In fact, nearly four in 10 survey respondents said they focus on societal issues because it's a priority for external stakeholders.

Almost 70 percent of those who have integrated Industry 4.0 into their strategies said they have made a great deal of progress against their goal of making a profit while positively contributing to society, versus 10 percent who do not have strategies.

It's telling that nearly *all* business leaders we surveyed fear that the effects of climate change could negatively affect their organizations, and half cite tackling climate change as their generation's top priority. Business leaders accept a responsibility to act, and many are rolling out programs addressing resource scarcity and environmental sustainability. More than 90 percent of respondents say their companies have sustainability initiatives in place or on the drawing board.

- **Commitment to training and development.** Organizations continue to struggle to ensure that their workforces possess the skills needed to succeed in an Industry 4.0 environment. Only one-fifth of executives completely agreed that their organizations are currently ready, and just 10 percent said they are making a great deal of progress identifying, attracting, and retaining the right talent.

Interestingly, though, the responsibility for developing skills seems to have shifted. A growing number of leaders accept responsibility for developing their workforces, with fewer executives than last year putting the onus on the individual worker. More than 80 percent of respondents said they either have created or are creating a corporate culture of lifelong learning, with another 17 percent planning to do so.

Part of the challenge: Executives still don't fully understand the skills necessary to succeed in the ever-changing Industry 4.0 world. Six in 10 reported investing significantly to understand what skills will be needed to succeed.

*looking back*

## Deloitte on digital technology and logistics

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“A continuing stream of new technology has changed logistical management in one generation. But perhaps most significant is that computer and data communication technology has enabled businesses to manage the massive volume of statistics required by logistical operations. Yet one has to wonder why, with all of these technological advances, we still cannot manage to operate our businesses as a single entity rather than as a group of fragmented fiefdoms.”

**Harrison H. Appleby**

Partner, Touche Ross



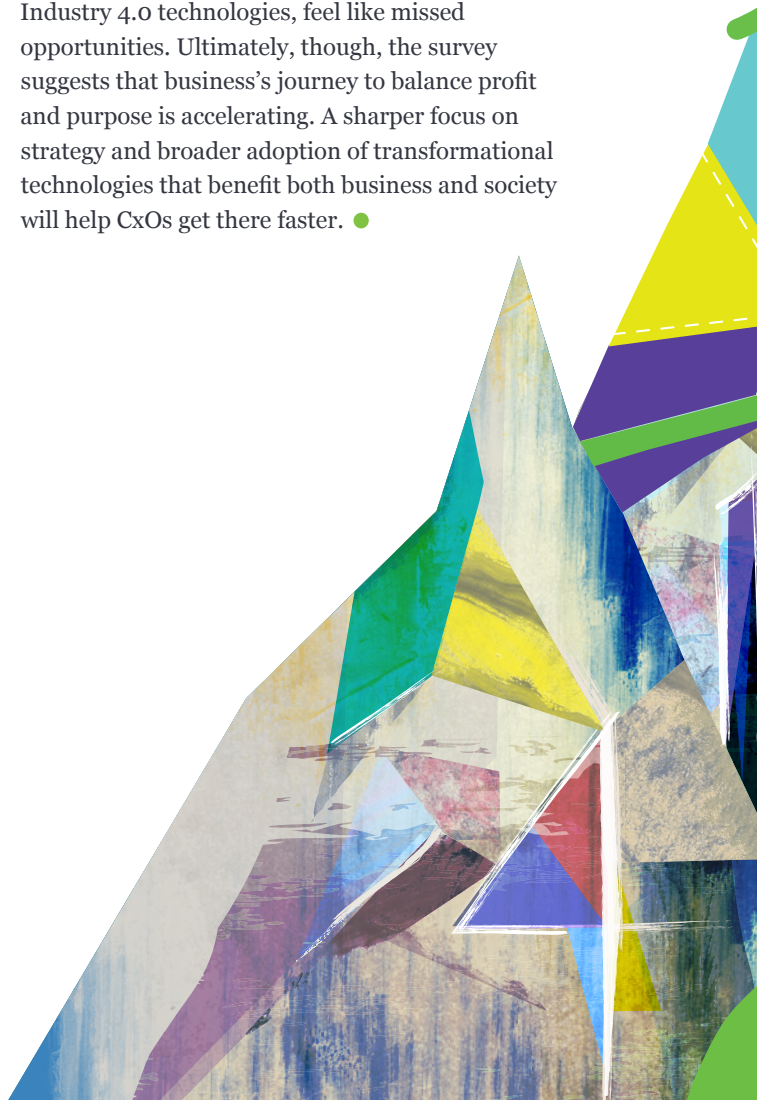
- **A retreat from disruption.** While Industry 4.0 technologies have the potential to disrupt and transform many different areas of business for the better, executives do not appear to be leveraging them as broadly across their organizations as they could.

Only 17 percent of CXOs say making effective Industry 4.0 technology investments is a priority for their organization, ranking lowest among 12 investment priorities. And while leaders seem to understand the merits of taking a connected, integrated approach to implementing Industry 4.0 technologies, only 5 percent indicate significant progress in this area.

Given organizations' increased focus on positive societal impact, it might follow that executives would explore how Industry 4.0 technologies might help propel these initiatives forward. However, executives have yet to recognize or embrace the potential of Industry 4.0 technologies to advance societal and environmental initiatives: Only one in five leaders say they are prioritizing investing in advanced technologies that have a positive societal impact.

Since executives aren't fully using technology to disrupt and transform their own organizations, it's perhaps not surprising that they also aren't using it to disrupt competitors. When presented with 10 possible outcomes that executives aim to achieve with their future Industry 4.0 investments, only 3 percent mentioned disrupting competitors as a top-five outcome.

This year's survey shines a light on how traditional business objectives, transformational technologies, evolving skills, and growing obligations to the greater good are intersecting. Some responses, such as those showing an embrace of employee development and societal concerns, indicate progress. Others, like the persistence of short-termism and the reluctance to fully embrace Industry 4.0 technologies, feel like missed opportunities. Ultimately, though, the survey suggests that business's journey to balance profit and purpose is accelerating. A sharper focus on strategy and broader adoption of transformational technologies that benefit both business and society will help CxOs get there faster. ●





**PUNIT RENJEN** is the CEO of Deloitte Global. He is based in Portland, Oregon.



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**Reinventing to win in Industry 4.0**

Implementing change in a shifting market landscape with constant disruption is a challenge for any leader. In this series we help guide leaders through digital transformation in an Industry 4.0 age.

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# 2019 Deloitte and MAPI Smart Factory Study

## **Capturing value through the digital journey**

BY PAUL WELLENER, STEVE SHEPLEY, BEN DOLLAR, STEPHEN LAAPER,  
HEATHER ASHTON MANOLIAN, AND DAVID BECKOFF

*ILLUSTRATION BY LUCIE RICE AND KEVIN WEIER*

Factories are not new to absorbing technologies. Since at least 1913, when Henry Ford's assembly line first started rolling,<sup>1</sup> factories have ingested the latest technologies to manufacture products faster, better, and more cost-efficiently.

However, manufacturing productivity appears to be stuck now, despite notable advances in factory equipment, new software, and manufacturing processes. Labor productivity continues to perplex most manufacturers, posting annual growth of around 0.7 percent between 2007 and 2018, in a stark contrast to the 3.6 percent average annual growth rate seen between 1987 and 2006.<sup>2</sup> Simply put, economic output is moving in lockstep with the number of hours people work, rather than rising as it did for much of the last seven decades.<sup>3</sup>

This brings us to one of the promises of the Fourth Industrial Revolution—to accelerate operational improvements by connecting machines, people, data, and value chains. This can be achieved by building a digital fabric across the traditional factory (enter the smart factory) and, eventually, the entire factory network.

What if the smart factory could ignite stalled labor productivity and unlock the key to productivity for manufacturers? And, considering that the manufactured goods value chain plus manufacturing for other industries' supply chains account for about one-third of GDP and

employment in the United States, what if smart factory initiatives could spark economywide gains in productivity?<sup>4</sup>

In April 2019, Deloitte and the Manufacturer's Alliance for Productivity and Innovation (MAPI) launched a joint study to determine the value of smart factory initiatives to make the business case for investment. The aim was to identify the top use cases of smart factory technology, common adoption patterns, gains manufacturers are already seeing, and how they measure value from smart factory initiatives. Qualitative and quantitative analyses revealed five major findings:

- Every manufacturer—whether already “running smart” or yet to invest in smart factory technologies—can harvest business value from smart factory initiatives.
- Smart factory initiatives typically accelerate business value creation. Companies report on average 10–12 percent gains in areas such as manufacturing output, factory utilization, and labor productivity after they invested in smart factory initiatives.

- There is a direct and established connection—primarily through investment and use cases—between smart factory initiatives and the business value realized. What’s more, any manufacturer can use this connection.
- While there are risks, primarily operational and financial, they are generally outweighed by the smart factory’s value contribution. Also, most risks can be mitigated through rational stakeholder selection, an efficient change management strategy, measurable proof-of-concepts, and incremental investments.
- An identified cohort—we call it Trailblazers—is outperforming with smart factory initiatives.

## RESEARCH METHODOLOGY

Deloitte and MAPI jointly launched a study in April 2019 with the intent to quantify the impact of smart factories on US manufacturing productivity. The study included an online survey of more than 600 executives at manufacturing companies with headquarters in the United States and a global factory footprint, interviews with more than a dozen executives from manufacturing companies, and focus group discussions with finance and operations leaders at manufacturing companies. Additionally, the study team analyzed secondary data and used economic projections from Deloitte’s global economic team. Here is how we calculated the impact of smart factory adoption on labor productivity growth through 2030.

We made the following key assumptions:

- Baseline manufacturing productivity growth will remain at historical levels (2007–2018 BLS data) of 0.7 percent from 2019 to 2030 based on smart factory adoption rates discovered through the survey.
- All US manufacturers, spanning discrete and process sectors will likely have adopted some smart factory initiative(s) by the end of the forecast period (2030).
- Accelerated smart factory adoption will occur from 2025 as most manufacturers will likely be leveraging advanced technologies. As such, we classified the adoption of smart factories into two phases—phase 1 (2019–2024) that will likely experience relatively slower adoption and phase 2 (2025–2030) that will likely experience accelerated adoption.

Based on the level of smart factory adoption reported by the respondents, we classified the sample into two segments:

- Group A: traditional manufacturers (no ongoing smart factory initiatives; 49 percent of the sample).
- Group B: manufacturers adopting smart factories (some form of ongoing smart factory initiatives; 51 percent of the sample).

Only three percent of the sample indicated full-scale smart factory adoption.

To forecast the manufacturing labor productivity growth rate during 2019–2030, we used Oxford’s Global Economic Model, data from the BLS, and responses from the 2019 Deloitte and MAPI Smart Factory Survey (figure 1).

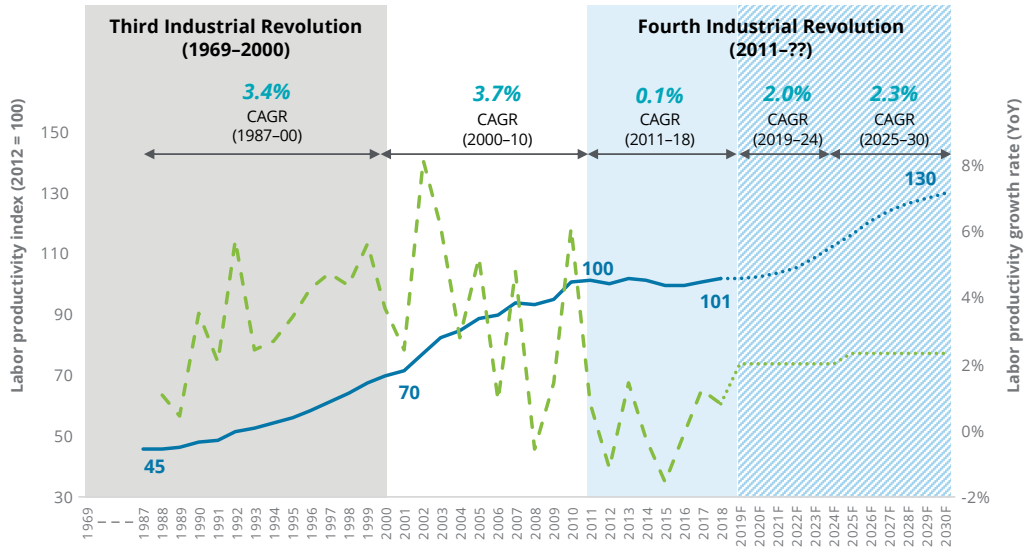
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FIGURE 1

## Smart factory initiatives that are part of Fourth Industrial Revolution could ignite labor productivity growth

Manufacturing labor productivity, forecast, 1987–2030 (2012 index = 100)

— Labor productivity index (2012 = 100)    - - - Labor productivity year-on-year growth rate



Sources: Data from Bureau of Labor Statistics; Deloitte and MAPI Smart Factory Survey; and Deloitte analysis.

- BLS data indicates that during 2015–2018, the overall US manufacturing labor productivity increased by 2 percent, or 0.66 percent per year.
- Manufacturers in Group B observed average annual productivity gains of 3.3 percent during 2015–2018.
- We assume that productivity index for manufacturers in Group A likely declined 2.3 percent per year to equal the overall manufacturing labor productivity annual rate of 0.66 percent during 2015–2018.
- Group B expects additional labor productivity growth of approximately 0.68 percent during the next three years (over 2019–2022). Group B will likely experience a net productivity growth of 1.38 percent over 2019–2030, the sum of 0.70 percent due to US baseline manufacturing labor productivity gains and 0.68 percent due to smart factory–driven labor productivity gains.
- Manufacturers in Group A are likely to observe annual labor productivity growth of 4 percent as they first adopt smart factory initiatives starting in 2019. This rate will taper to 1.38 percent after five years, leveling to the rate Group B is experiencing.
- This translates to a compound annual growth rate for labor productivity of 2.0 percent from 2019 to 2024 and 2.3 percent from 2025 to 2030.

## The smart factory: Initiatives that accelerate value, led by accurate investment decisions

In its most mature form, a smart factory is the “sum of the parts”—it is a flexible system that can self-optimize performance across a broader network of factories, suppliers, and partners; self-adapt to and learn from new conditions in near-to-real time; and autonomously run the production processes.<sup>5</sup> That being said, smart factory transformation is not a “Big Bang,” but rather a concerted effort over a number of years to identify, invest in, implement, and refine specific use cases for applying advanced technology to existing processes and workstreams (see sidebar, “Categories of use cases for advanced technology”). As such, realizing the smart factory vision is a tall order. But our research results reveal it can be a goal worth pursuing—smart factories can deliver *measurable* business results,

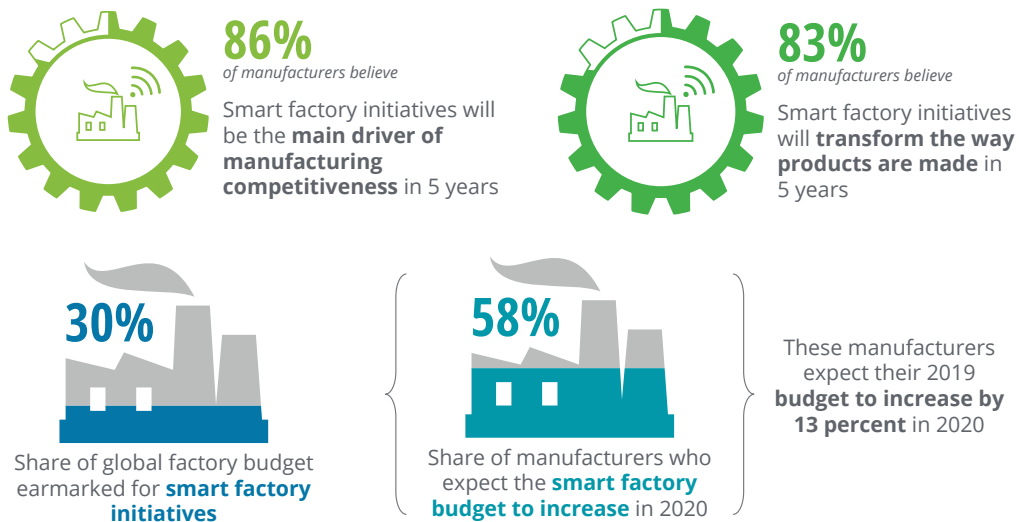
with the potential to transform the role of manufacturing in the global economy. More than 85 percent of respondents, for example, believe that smart factory initiatives will be the main driver of manufacturing competitiveness in the next five years (figure 2).

### Smart factory transformation is not a “Big Bang,” but rather a concerted effort over a number of years to identify, invest in, implement, and refine specific use cases.

Transformational change does not happen all at once, though. To start with, smart factory initiatives generally need targeted investments.

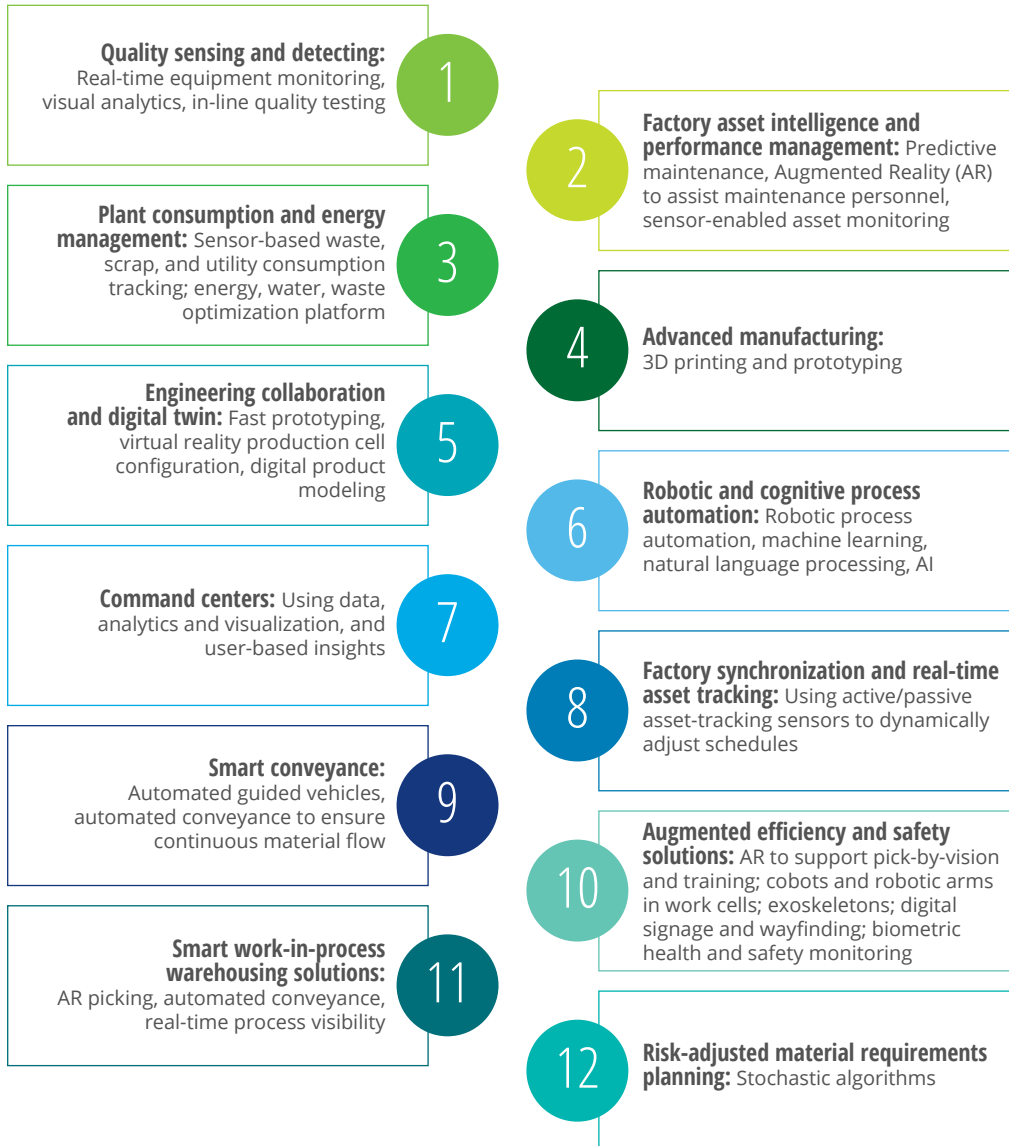
FIGURE 2

### Manufacturers recognize that smart factory initiatives are important



Source: Deloitte analysis of the 2019 Deloitte and MAPI Smart Factory Study data.

## CATEGORIES OF USE CASES FOR ADVANCED TECHNOLOGY IN EXISTING PROCESSES AND WORKSTREAMS





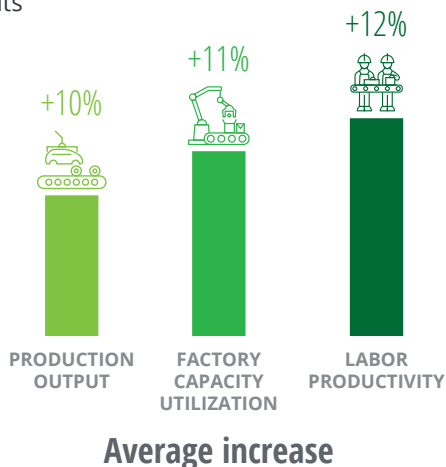
While manufacturers typically have an appetite for investing in smart factory initiatives, what they should work on is linking such investments with the business value they can deliver. Once investments are committed, companies can see positive results. Since 2015, many companies that have implemented smart factory initiatives have seen an increase in their key performance indicators (figure 3), validating that early adopters often see early payoffs.

Additionally, the last metric—employee productivity—can make a significant impact on manufacturing’s contribution to economic output. Given manufacturing’s direct and indirect contribution (via its own value chain and other industries’ supply chains) accounts for about one-third of GDP and employment in the United States, productivity gains through smart factory initiatives could spark economywide gains.<sup>6</sup>

FIGURE 3

### Smart factory initiatives triggered double-digit growth in key performance indicators between 2015 and 2018

Over the past three years, companies running smart factory initiatives have seen encouraging results



Source: Deloitte analysis of the 2019 Deloitte and MAPI Smart Factory Study data.

## *looking back* Deloitte on factory automation 1955

“In the factory ... the ingenuity of our engineers has resulted in the alleviation of some of the load on the worker through the design of industrial machines and methods to meet the pressures of our expanding manufacturing empire. A relatively high level of factory automation has been realized.”

**Virgil F. Blank**  
Principal, Haskins & Sells



Overall, the primary goals that most manufacturers expect to achieve from initiatives related to the smart factory are both financial and operational (figure 4). Therefore, it may not be very surprising that most smart factory initiatives are targeted first at existing facilities rather than on building new factories. Brownfield developments come with their unique set of challenges that require executives to make technology investments based on the existing infrastructure. Careful

calculations are needed to mitigate risks while retrofitting for the promise of smart factories. Therefore, the decision-makers' attitude toward

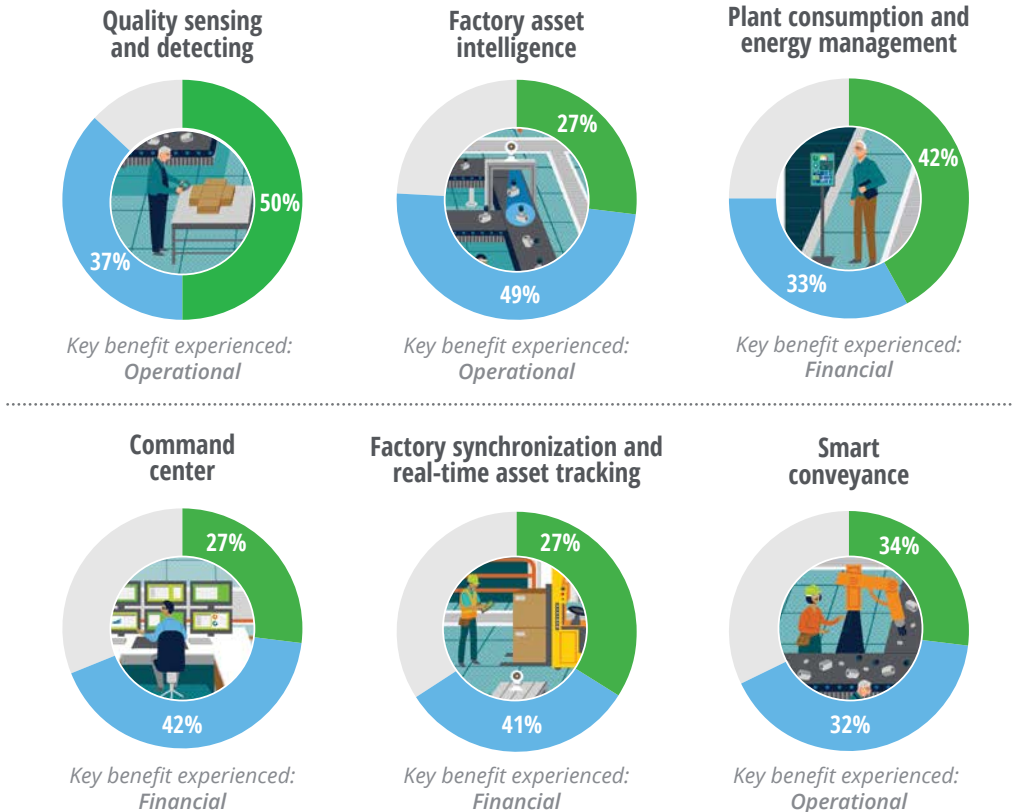
**Overall, the primary goals that most manufacturers expect to achieve from initiatives related to smart factory are both financial and operational.**

FIGURE 4

**Use cases of advanced technology in existing processes and workstreams, and their benefits**

Manufacturers report operational and financial benefits after adopting the following use cases

■ In use ■ Piloting



Source: Deloitte analysis of the 2019 Deloitte and MAPI Smart Factory Study data.

factory digital transformation can play an important role in the success of any initiative.

## It's all in the mindset: Three types of smart factory initiative takers

One of the key findings of the 2019 Deloitte and MAPI Smart Factory Study is that there are *three distinct cohorts of adopters of smart factory initiatives*. We call them **Trailblazers**, **Explorers**, and **Followers** (figure 5). Each cohort represents a different approach toward smart factory adoption, and based on survey responses, we could determine the mindset of each cohort and how their decisions influenced their smart factory maturity.



FIGURE 5

### A deep dive into the traits of Trailblazers, Explorers, and Followers

The 2019 Deloitte MAPI Smart Factory Study identifies three distinct cohorts of adopters—Trailblazers, Explorers, and Followers—each representing a different mindset toward smart factory adoption, and determines how their mindset and decisions influence their maturity in smart factory initiatives.

COHORTS WE IDENTIFIED			
	TRAILBLAZERS	EXPLORERS	FOLLOWERS
Proportion	18%	55%	27%
Maturity level	<i>Moving toward complete transformation of at least one factory</i>	<i>Currently implementing initiatives related to smart factory</i>	<i>On the smart factory journey</i>
Budget share	65%	19%	13%
Use case in action	More than 10	More than 9	More than 5
Benefits observed*	20%	10%	8%

*Parameters we identified: Approach toward smart factory initiatives; share of smart factory budget; number of ongoing use cases; benefits seen over the last 3 years.*

*\* Average reported changes: Change in production output, factory capacity utilization, and employee productivity from smart factory initiatives in the last 3 years.*

Continued ›

FIGURE 5 continues

## THREE COHORTS—TRAILBLAZERS, EXPLORERS, AND FOLLOWERS— EACH REPRESENTING A DIFFERENT MINDSET TOWARD SMART FACTORY ADOPTION

### TRAILBLAZERS: Pioneering the adoption of smart factory initiatives

When it comes to factory-related innovation, Trailblazers are “the first to innovate.” They have identified the potential value that smart factory can deliver and have stepped up to invest in that potential.



#### INVESTMENTS

On average, Trailblazers dedicate a whopping 65 percent of their global factory budget to smart factory initiatives.



#### USE CASES

Trailblazers invest in multiple initiatives; on average, they have more than 10 use cases at a given time.



#### ADOPTION LEVEL

Trailblazers are transforming at least one facility into a smart factory. They are 3X as likely to be transforming the entire factory footprint than others.



#### BENEFITS OBSERVED

Between 2015 and 2018, Trailblazers’ smart factory initiatives led to twice the benefits than others.

**Ecosystem:** Trailblazers connect up and down their value chains, from inside (engineering) out to suppliers and customers, indicating they understand the importance of a connected ecosystem to succeed in their smart factory initiatives.



### EXPLORERS: Navigating new territories and charting a course

Like Trailblazers, Explorers are well underway with their smart factory initiatives, but they have adopted a “moderated approach” toward investment and use cases. In terms of adoption, most Explorers seem to “be a leader, but not the first.” While they are cautious and take small smart factory initiatives, they have begun to see some benefits.



#### INVESTMENTS

On average, Explorers dedicate 19 percent of their global factory budget to smart factory initiatives. What’s more, 64 percent of Explorers report average potential increase of 12 percent in the coming year.



#### USE CASES

Explorers’ lower budget allocation yields fewer than 10 use cases, but these investments are still spread across all 12 categories.



#### ADOPTION LEVEL

Explorers exhibit a lower adoption level, with the majority currently implementing initiatives at the single asset or production line.



#### BENEFITS OBSERVED

The steady progress of Explorers has delivered measurable benefits—factory capacity utilization and employee productivity have increased, both by 10 percent on average during the past three years.

**Ecosystem:** Explorers are connecting with their ecosystem for smart factory initiatives, albeit at a slower pace than Trailblazers.

### FOLLOWERS: On the smart factory journey

Followers have an overwhelming characteristic of “waiting until technology is proven.” While caution can be a worthy attribute in some cases, in this age of digital transformation, it can be a severe impediment. Followers are behind their peers, but it is not too late to ramp up activity and catch up quickly.



#### INVESTMENTS

On average, Followers dedicate only 13 percent of their global factory budget for smart factory initiatives, but 59 percent hope to increase investment in the coming year by 11 percent on average.



#### USE CASES

Followers’ lower investment yields fewer use cases—five on average. But these cases are generally spread across all 12 categories.



#### ADOPTION LEVEL

Followers’ smart factory initiatives are often at the “planning to start implementing” stage.



#### BENEFITS OBSERVED

Followers saw modest gains in key productivity metrics, but they do expect this to increase by 3 percent in the coming three years.

**Ecosystem:** Followers fall behind peers in connecting their ecosystem; on average, 20 percent have connected ecosystems. Glaringly, 27 percent are connected to “nobody other than production”—this is a potential opportunity for Followers to leverage.

Source: Deloitte analysis of the 2019 Deloitte and MAPI Smart Factory Study data.

## Winning approaches along the pathway to adoption

After understanding the “mindsets” of manufacturers riding the smart factory wave, we wanted to see how they got there, and we sifted through survey responses to understand the “ingredients” of successful smart factory initiatives (figure 6). What we discovered is a process that is linear and intuitive, but also tedious and often fraught with pitfalls. Fortunately, the process seems adaptable for manufacturers of all sizes, and the risks can be partially mitigated by planning and prioritizing investments.

In other words, *building the right business case and taking small steps to big wins* appear to be the defining traits of successful smart factory initiatives.

### BUILD A BUSINESS CASE

When probed about the business reasons influencing smart factory initiatives, respondents identified concrete business outcomes. Specifically, they selected improved production capacity, increased throughput, greater visibility into asset performance, and improved product/part quality

as the key reasons to start or expand an initiative. So, a business case with pointed outcomes is often a must-have. Expectedly, this is a defining trait of Trailblazers who often consider multiple outcomes as “must-haves” in building the business case.

### BE OPEN TO NEW APPROACHES

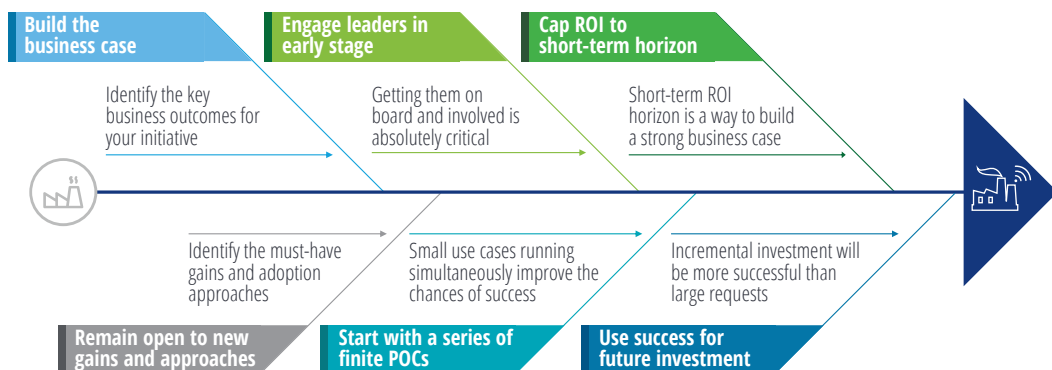
While it is tempting, and common, to go down the tried-and-true path, having multiple approaches can help achieve faster results simply because if one approach flops, an organization can test a different approach and quickly course-correct when needed. For example, Trailblazers are not fixated on just one implementation approach for their smart factory initiatives and, in fact, show a higher propensity for multiple adoption approaches. They are two times more likely than Explorers and Followers to adopt a dual approach—a combination of retrofitting and building new assets. This may be partly why they are leading in the race to smart factories.

### ENGAGE THE LEADERSHIP EARLY

Getting buy-ins from leaders, especially those in the C-suite, early on can help ease the pressure for support in the boardroom and for further

FIGURE 6

## Building the right business case helps in the success of a smart factory initiative



Source: Deloitte analysis of the 2019 Deloitte and MAPI Smart Factory Study data.

investment. As one executive noted, *“Getting them on board, involved and excited is absolutely critical. You’ll need significant support financially, emotionally, and in time invested by upper management to ensure the [smart factory initiative] will be successful.”* Followers report less success in engaging leadership to move smart factory initiatives forward.

#### LAUNCH FINITE PROOFS OF CONCEPT (POC) WITH A SHORT-TERM HORIZON

Starting small with POCs and scaling them can work in the smart factory domain. Survey responses reveal that Trailblazers had 50 to 70 small use cases running across different plants at the same time. Successful initiatives often had the backing of a formal business case with provision for additional budget to roll out more broadly. As for the return on investment, these broader projects had a short-term horizon of two to three years, another way to build a strong business case and succeed. *“Don’t be afraid to state a number and show how you can get close to it [with your proposed project]”* is one leader’s advice.

## Starting small with POCs and scaling them can work in the smart factory domain.

#### USE SUCCESS OF AN INITIATIVE TO SEEK INCREMENTAL INVESTMENT

A common route to the smart factory is to start multiple small projects that have lower individual investment, and to tie them to measurable business metrics to prove success and garner additional funds. In fact, one of the leaders of a global industrial products company we interviewed shared the example of starting with a single use case of reducing the forced outage rate resulting in 1–2 percent productivity improvement. Based on the success of that project, the company was able

to build another business case for wider rollout for overall factory productivity improvement of 2–3 percent. The larger project received funding and went on to deliver additional tangible returns. This is one of the approaches that Explorers are using to advance their smart factory progress.

## People first: It is the people that make (or break) an initiative

The ultimate success of a smart factory initiative often lies in the hands of the people involved, from the stakeholders to the initiative leaders and, importantly, those at the grassroots who work with the new technology and processes every day. How one engages with each group potentially goes a long way in determining the ultimate outcome of an initiative. So, how are companies organizing themselves and their people around smart factory initiatives?

#### GET THE RIGHT TALENT: IT HOLDS THE KEY TO SUCCESS

In our interviews and focus-group discussions with leaders, they alluded to the nuanced reality of how smart factory initiatives tend to differ by company. More than once, leaders underscored the importance of having the right people as part of the initiatives, and a visionary leader within the group to “keep the spark alive,” as one executive noted. Another executive stated, *“Ninety percent of the solution is getting the right leader with the right experience and passion. If you don’t, you’ll muddle around for years.”* Often, this person is inside the company and can come from a variety of roles. But, if a comprehensive leader with passion, experience, and expertise is not identified, manufacturers would do well to search outside because this pivotal role cannot be compromised.

## LEVERAGE DIVERSE STAKEHOLDERS TO MAKE WELL-ROUNDED DECISIONS

Key stakeholders in smart factory initiatives span production, technology, finance, and business. As such, they are well represented in strategy, implementation, and operation of initiatives, which can help in well-rounded decision-making. As one leader explained, *“It’s important to get a broad spectrum of people with diverse skills and perspectives. The team leader should allow for dissent and productive disagreements.”*

Given the transformative potential of the smart factory for every department/area of the factory, it is important that all factory departments are adequately represented on the team. While the CEO sets the business mandate, it is the diverse perspectives from the other C-suite executives and stakeholders that help unlock true smart factory benefits. Interestingly, team composition and leadership choices among Trailblazers, Explorers, and Followers are dissimilar, giving an insight into

why their outcomes for each group are different from the others (figure 7).

## MANAGE THE CHANGE WELL

Half the respondents reported managing the change by developing central teams or working groups tasked with researching, developing, and deploying smart factory initiatives (figure 8). Essentially, it is important to change how people approach their work rather than dictating new requirements. Doing things the same way on new technology won’t likely produce the desired results. Interestingly, even on this measure, Trailblazers typically do things differently from the others—they apply multiple approaches to manage change. In addition to central teams, they develop centers of excellence to coordinate and connect smart factory initiatives and they develop value targets and measurement plans to assess their progress. This could well be part of the reason Trailblazers move faster on the adoption curve and realize greater benefits.

FIGURE 7

### Manufacturers implement multiple solutions to manage the change introduced through smart factory initiatives

	TOTAL	TRAILBLAZERS	EXPLORERS	FOLLOWERS
A central team researches, develops, and deploys initiatives	50%	✓	✓	✓
A measurement plan to assess progress against objectives	34%	✓	✓	
A center of excellence coordinates and connects initiatives in the business units	33%	✓	✓	
A defined communication process to explain the implications to all stakeholders	33%	✓	✓	
Engage external third parties to help manage initiatives	30%	✓		

Note: Percentages denote the share of manufacturing executives implementing the respective solution.

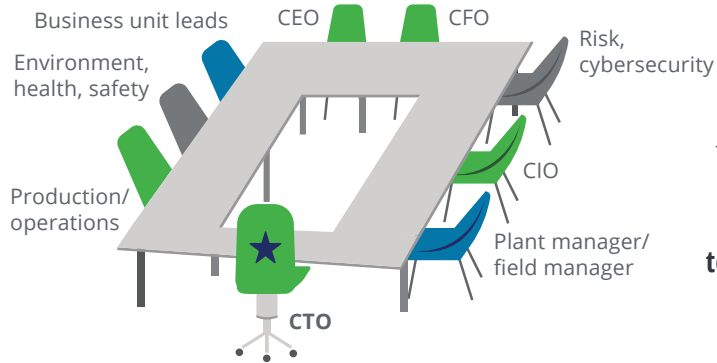
Source: Deloitte analysis of the 2019 Deloitte and MAPI Smart Factory Study data.

FIGURE 8

### The smart factory boardroom: Different roles, different voices

★ Primary smart factory leader    ■ Top five active stakeholders    ■ Moderately active stakeholders    ■ Least active stakeholders

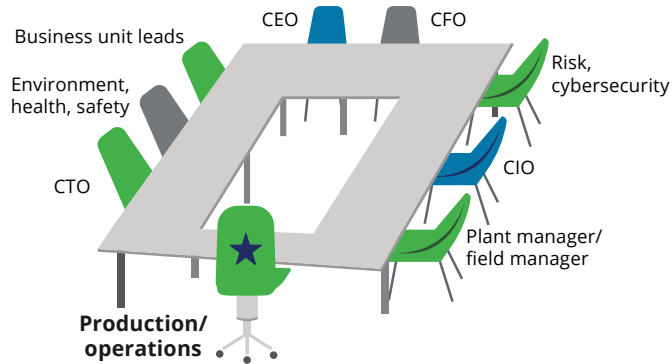
#### TRAILBLAZER'S BOARDROOM



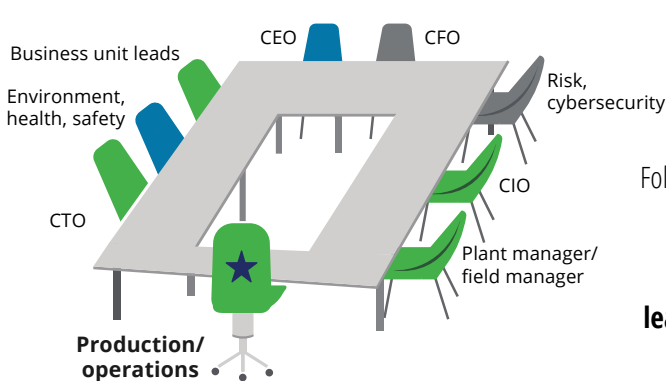
The primary leader of Trailblazer's smart factory initiatives is the CTO and team. The CTO as the primary leader of smart factory initiatives likely explains the **fast pace of technology implementation** by Trailblazers.

#### EXPLORER'S BOARDROOM

Explorers have production/operations professionals as the primary smart factory leaders. The average representation from all business areas for Explorers is 1.5 times higher than for Trailblazers, likely explaining a **more consensus-driven implementation approach**.



#### FOLLOWER'S BOARDROOM



Similar to Explorers, Followers' smart factory initiatives are led by professionals from production and operations. Followers report a lower share of C-suite executives as the primary stakeholder than Trailblazers and Explorers, implying that **Followers have less leadership support to implement smart factory initiatives**.

Source: Deloitte analysis of the 2019 Deloitte and MAPI Smart Factory Study data.



## Obstacles along the way: Challenges and risks

With rewards come risks. One of the biggest challenges of smart factory adoption is that many organizations simply *do not take any action* on smart factory investment and initiatives. Nineteen percent of respondents “have not thought about [smart factory transformation]” and 30 percent are “thinking about it, but currently not planning any initiatives” (figure 9).

There is a possible explanation for the lack of interest. Identifying the initiative, finding the initiative champions/advocates, building the business case, gaining the funding, and launching the initiative reflect the complexity of smart factory adoption. These are all *high-stake decisions* and not everyone is ready to run the risk of failure. As one executive noted, “*In a production environment,*

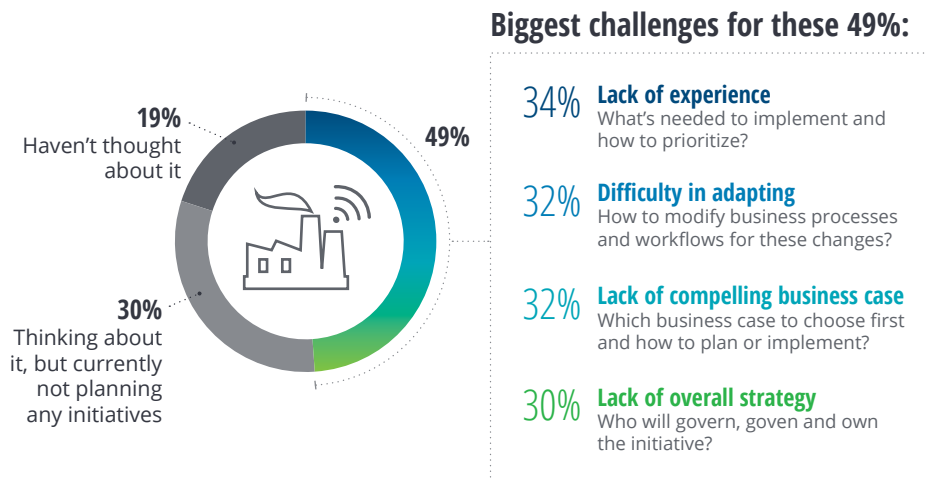
*making a mistake can bring a production line down or harm a human worker, so the stakes are very high.*” This, again, brings to the fore Trailblazers’ nimble approach to decision-making and implementation.

## Operational risks rank number one across cohorts.

Respondents identified other risks too—operational risks rank number one across cohorts. Followers put it at the top because of concerns including disruption to the day-to-day business and the prospect of loss resulting from inadequate or failed experiments or change. Additionally, all enterprises are exposed to cyber risk regardless of their digital maturity.

FIGURE 9

### Lack of experience is preventing manufacturers from launching smart factory initiative



Source: Deloitte analysis of the 2019 Deloitte and MAPI Smart Factory Study data.

## CYBER RISK CAN UPSET THE BEST LAID INITIATIVES

A particularly daunting operational risk for even the most confident manufacturing leader is cyber risk. Cyber threats are pervasive and can have disastrous effects if smart factory initiatives are implemented without taking precautions, such as creating a cyber risk strategy. Industrial companies are becoming a popular target. Unfortunately, many seem unprepared. The 2019 Deloitte and MAPI Smart Factory Study results indicate that a significant number of companies (24 percent) do not perform annual cyber risk assessments. Even among those that do, such evaluation is often in the form of a vulnerability assessment, which is often inadequate for the complexities of the production environment. Because of the unique mix of information technology (IT) and operations technology (OT) in factories, most require a different approach than IT-only environments.

Assessing risk in the OT environment requires knowledge of devices and business processes, so alignment with business leaders can be crucial. People, processes, and technology will overlap, and companies should look beyond traditional IT tools to assess and address risk in the OT manufacturing environment. Building a mitigation and prevention strategy that centers on security, vigilance, and resilience can be key toward managing risk in the smart factory.<sup>7</sup>

In an environment with such high stakes, the capabilities of smart factory technologies can help to mitigate many risks. Examples include vision systems that preemptively identify issues, real-time monitoring to prevent worker injury, and autonomous technologies that can take over dangerous tasks. While the volume of risks increases in a smart factory environment, the value that smart factory initiatives can deliver is generally worth the potential risks. What is needed from company executives is awareness of these potential risks and comprehensive mitigation

## MANAGING RISK IN THE SMART FACTORY

1. Consider human safety foremost and evaluate all new technologies through this lens.
2. As you connect the factory to your broader communications and computing networks, have a nimble risk mitigation plan that evolves as smart factory initiatives mature.
3. Avoid a single point of failure by taking actions proactively. Segmenting the production line and having more than one network channel are some ways such failures can be avoided.
4. Standardize policies on risk, disaster recovery, etc. across vendors providing connected equipment.
5. Consider a layered or “stacked” security approach to strengthen overall resilience.

planning. There are some underlying approaches to managing risks in smart factory adoption that typically hold true for all cohorts.

## The playbook: Pathways to value realization

Manufacturers—whether already “running smart” or yet to invest in smart factory technologies—can harvest business value by managing production with digital technologies. But what should they do exactly? In the playbook below, we recommend 10 common approaches that can be used to identify and initiate smart factory initiatives that will likely yield results (figure 10). These actions are not in a particular order and will likely appeal to companies based on the adoption pattern (Trailblazer, Explorer, Follower) that most closely resembles their current approach to smart factory initiatives.

FIGURE 10

## Pathways to value realization

### Learn from EXPERIENCE



#### Embrace experimentation

A global aerospace and defense manufacturer designed a solution driven by a combination of robotics and software to increase the speed and efficiency of inspecting components on the factory floor. Through two industrial robots equipped with sensors and machine learning algorithms, the company designed an automated system capable of inspecting parts as large as 200 feet. This solution reduced the inspection time by 40 percent. The company is now expanding this technology beyond its headquarters in the United States to Europe, and to other applications.

Best applies to: **Trailblazers** and **Explorers**



#### Replicate early leaders' successes

A global auto parts manufacturer implemented IoT solutions to reduce unplanned factory downtime and ensure operations continuity. Through a series of three programs, the company first enabled machinery and assets using IoT solutions and then deployed smart factory use cases (such as inspection robots, force sensors, and measurement devices). Using the data captured from assets, the company analyzed asset performance and tracked the assets remotely. The pilot program was then expanded to an entire production line in a US plant. Through this approach, the company was able to predict and prevent system failures, leading to a 100 percent reduction in manual inspection time.

Best applies to: **Followers**

### Set FOUNDATIONS



#### Assemble a cross-functional team

A global industrial goods conglomerate created a new role of chief digital officer (CDO) to drive adoption of digital technologies such as artificial intelligence (AI). The CDO formed a new team of existing and new employees and worked with the company's leadership to identify digital opportunities across all business areas. The team then launched a pilot digital transformation initiative to improve operational efficiency at one of the facilities. Following the success of the initiative, the company invested in an AI company to advance its own AI capabilities.

Best applies to: **Explorers** and **Followers**



#### Keep employees at the center

A leading US manufacturer of tools and equipment started a technology platform transformation program using the human resources and finance functions. The intention was to drive a digital culture and enhance employee productivity. The company rolled out employee and manager self-service digital programs as well as mobile capabilities for employees on the go. Through the new platform, it was able to support and engage a diverse workforce using persona-based engagement and adapt to the future of work imperative.

Best applies to: **Trailblazers** and **Explorers**



#### Perform regular factory walks to identify potential use cases

A US industrial products manufacturer hit a productivity plateau. Performance data for its equipment was not captured, which was a barrier to productivity planning. After a ground-level review of one struggling production line, the company piloted a customized internet-of-things (IoT) solution on a given production line. The IoT-enabled solution could extract data from all equipment on that line, giving data-driven insights to the leadership. Based on these insights, the board approved a business case; financial benefits included more than US\$70 million savings in the form of incremental revenue and capex avoidance. The company's leadership expanded the pilot to a full-factory asset intelligence program.

Best applies to: **Explorers** and **Followers**

*Continued* ›

FIGURE 10 *continues*

### Focus EFFORTS



#### Make targeted investments

A global automotive supplier has earmarked more than US\$40 million to digitize and implement smart elements across its factories in Europe over a period of four years. The company has identified five areas for these investments, including smart energy management, to potentially reduce energy consumption by 10 percent. The company also intends to gather performance data from their manufactured products and use the insights for creating digital product designs, reducing production time by half. Through all the initiatives, the automotive supplier expects an overall 15 percent improvement in quality.

Best applies to: **Trailblazers**, **Explorers**, and **Followers**



#### Focus on pain points

A US tools manufacturer implemented an array of smart solutions to increase asset visibility at a factory in North America. The company enhanced the visibility on asset availability using IoT-enabled sensors and enterprise visibility solutions. Based on asset and production data, floor managers performed a labor remapping exercise, allocating more resources to labor-critical processes. The solutions yielded 10 percent labor efficiency gains, increasing the utilization rate from 80 percent to 90 percent. The company also observed an incremental improvement in production quality, with defects per million reducing by 16 percent.

Best applies to: **Explorers** and **Followers**



#### See more through virtual factory

A global consumer products manufacturer deployed digital twins of more than 100 factories to track assets and operational data. This approach lets the company make real-time changes to optimize production output and reduce inventory costs.

Best applies to: **Trailblazers** and **Explorers**

### Scale INITIATIVES



#### Apply AI to the factory data set

A technology equipment manufacturer deployed a mobile IoT system to collect data and information from disparate technologies, systems, and assets in a factory onto a single platform. The IoT platform, connected by a cloud management system, aggregated data and generated insights on all connected assets. Using this system, the company could better track its assets, and schedule maintenance and repair, minimizing the downtime. The system led to one-time savings of more than US\$200 every time a traditional cable-based connection was replaced by a wireless sensor. Additionally, the manufacturer could leverage advanced analytics to improve decision-making.

Best applies to: **Trailblazers** and **Explorers**



#### Connect better with the external ecosystem

A global manufacturing company has more than 1,500 raw material suppliers. To get better insights on inventory and additional stock for replenishment, the company intends to get all the suppliers on a centralized digital platform.

Additionally, just 150 suppliers account for 80 percent of the company's spend. Management intends to first bring 75 percent of these major 150 partners on a single digital platform. This approach could help increase inventory visibility by 65–75 percent.

Best applies to: **Trailblazers** and **Explorers**

Source: Deloitte analysis.

## Final thoughts

As the 2019 Deloitte and MAPI Smart Factory Study results reveal, the promise of the Fourth Industrial Revolution can be delivered through smart factory initiatives, and smart factories are beginning to pay off for early adopters. The results also appear to reinforce the potential upside of factory transformation by using digital technologies to change the very work is done.

Complexity is added not just from technology but also from nontechnology challenges, such as managing the multifaceted risks and the **human aspect** of introducing, sponsoring, and launching initiatives. Manufacturers can extrapolate study results to identify their own adoption approach to smart factory initiatives and consider the pathways suggested in the playbook to further advance their efforts and build for success. ●

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# Redesigning stadiums for a better fan experience

**Putting sports fans at the center of  
smart stadium transformation**

BY CHRIS ARKENBERG, PETE GIORGIO,  
AND CHAD DEWEESE

In the competition for sports fans' business, stadiums face tough opponents, from parking hassles to high-definition TVs. How can teams and owners compete? With a digital transformation that offers fans a holistic experience.

## Introduction: Game day

The rumble and roar of 80,000 fans cheering on the edge of their seat as burly champions vie for victory. Team colors waving from the stands beneath floodlights hung like stars. An impossibly large ring of video screens faceted with zoomed-in views and gameplay stats broadcast out to millions more. The in-stadium fan experience is unlike any other. Done well, these smart stadiums can become the heart of a city—crucibles of identity and community.<sup>1</sup>

And yet stadium attendance has stagnated.<sup>2</sup> Ticket prices are too high for many sports fans who have built comfortable “digital nests” at home with enormous TV screens, surround sound, and access to 24/7 games and commentary.<sup>3</sup> Many also watch on the go, getting updates from social media and livestreaming apps rather than committing three hours to watch a game in real time.<sup>4</sup> As Deloitte's 2019 *Digital media trends survey* highlights, people now have an abundance of entertainment literally at their fingertips, vying for their time and attention.<sup>5</sup>

These technological and social changes have unsettled the role of the stadium in many American lives—and are pressuring those who build and manage stadiums to further differentiate and deliver better fan experiences. As more of these experiences require digital transformation, the costs can rise and generating returns can become more challenging.

With enormous scale and reach, National Football League (NFL) stadiums can be a proving ground

for fan experiences that can be applied to all large entertainment venues. Among sports in North America, the NFL is the largest in terms of visitors, revenues, and viewership.<sup>6</sup> In one year, a typical stadium will fill more than 500,000 seats just for NFL home games.<sup>7</sup> And although stadium attendance has been cooling, viewership—and revenues from broadcasting live football games—are higher than ever.<sup>8</sup> In 2018, NFL broadcast games were 46 of the top 50 most-watched American TV programs.<sup>9</sup> Indeed, TV rights generate a significant portion of NFL revenues.<sup>10</sup>

**For fans at home, is seeing a raucous, packed stadium, with thousands of spectators surrounding the field, a necessary part of watching the game on TV? Arguably, it is.**

NFL teams and stadium owners—groups that sometimes overlap—find themselves in a paradox: They need to focus on high-quality broadcast experiences while also trying to get people to the games. This begs the question: For fans at home, is seeing a raucous, packed stadium, with thousands of spectators surrounding the field, a necessary part of watching the game on TV? Arguably, it is, with the scale and physicality of the social spectacle conveying the impact of live competitive sports. As an integral component of engagement, investing in stadiums may be critical to the future of sports.



Now, many stadium CIOs and CMOs, responsible for expanding attendance and growing revenues, are moving to the center of generating fan engagement. By digitizing the customer journey from ticketing to postgame and beyond, they are getting closer to the fans and working to deliver more personalized experiences. With a better understanding of the customer, stadium CMOs and CIOs are employing next-generation marketing technologies that treat each fan individually and determine the optimal ways to engage while gaining a greater ability to model, predict, and support their behaviors.<sup>11</sup> This is where the CIO and CMO can collaborate to sell more tickets, drive more concessions, and deliver more personalized experiences that deepen fans' relationships with their teams.

“This is really about supporting the passion that fans have for the sport and for their teams,” says Pete Giorgio, Deloitte’s US Sports leader. “Bringing a holistic approach to delivering a great stadium experience can bring teams and fans closer together, at home, on the go, and throughout the year.”

There are obvious costs to this, from hardware upgrades to integrating the many disparate data silos that sports organizations have. But by doing so, teams can develop a more detailed view of their fans that can be used to better understand and meet their needs while laying the foundation for next-generation fan experiences.<sup>12</sup> How stadium owners minimize barriers, engage audiences, and delight fans may be critical to their venues' future.

## Upgrading to a better fan experience

Getting fans into the stands can require many steps that can introduce friction and tarnish the stadium experience. Deloitte’s 2018 Fan Engagement survey

shows that a good fan experience for most people starts with four core factors.<sup>13</sup> The stadium must be safe, comfortable, and clean. The view from the seats should meet expectations. People want to see high-quality games. And they expect an exciting atmosphere within the stadium. On average, survey respondents weighted these four qualities 50 percent higher than the next closest factors.

**Increasingly, fans require better reasons to leave the comfort and convenience of their homes, and teams are looking for more sophisticated ways to encourage them to do so.**

However, the survey also shows that the basics, such as cost and quality of concessions or navigation in the stadium, typically score low in satisfaction. Meeting the basics is necessary but hardly guarantees an experience so positive that fans won't opt to watch the game elsewhere. Increasingly, fans require better reasons to leave the comfort and convenience of their homes, and teams are looking for more sophisticated ways to encourage them to do so.

It can start by putting the fan at the center. Stadiums are mapping the customer journey as a holistic system across many touch points. In doing so, they are starting to upgrade those touch points to be more intelligent, while partnering with service providers to develop the data layer that can tie it all together.<sup>14</sup>

Let's follow the fan journey and consider how technology upgrades are helping modernize the stadium to make it easier, more exciting, and more intelligent.

## BUYING TICKETS AS THE ON-RAMP TO DATA-DRIVEN FAN ENGAGEMENT

The fan's journey begins with ticketing, where teams can onboard them to stadium services. Stadiums, like music venues and movie theaters, are increasingly requiring fans to download tickets to their smartphones' mobile wallets, then use their phones to badge through the turnstiles.<sup>15</sup> This is an opportunity to encourage fans to install the team's mobile app and walk them through its functionality. The app for the United Kingdom's new Tottenham Hotspur soccer stadium includes features to help fans plan their day around a visit to the stadium complex, taking advantage of dining, retail, and other entertainment.<sup>16</sup> As we will see, the mobile touch point can deliver incentives tailored to fans' individual interests and histories.

Stadiums might consider the practice of some theme parks and cruise ships of providing guests with connected bracelets that manage hotel access, park admissions, purchases, and other digital touch points without requiring guests to access their smartphones, much less their actual wallets.<sup>17</sup> Such wearables can reduce the friction for access and make it easy for guests to make purchases, earn rewards, and unlock tiered VIP experiences while capturing customer data that can be used to better anticipate and incentivize their behaviors. Sports ticket holders might even wish to show off their status with a team-branded band they could wear year-round.

## GETTING THERE: STADIUMS SHOULD PLAY A ROLE IN TRANSIT

Getting to the stadium is perhaps the largest challenge. Car ownership and use have been dynamic in the last decade, showing both gains and declines.<sup>18</sup> The rise of on-demand transportation services is affecting how venues optimize for mobility, especially since many stadiums are

located outside of city cores. With some venues, fans can now arrange transit and parking beforehand through logistics partners.<sup>19</sup> Ticketing packages could bundle transportation through on-demand services, public transit systems, and companies developing autonomous buses, all through the stadium app. More ambitious new developments should align real estate with rail hubs, but the takeaway is that stadiums can't assume that fans will happily battle traffic to make it to the stadium. Venues should work to make the process less onerous.

## BEYOND TAILGATING

Increasingly, there are more pregame options than a beer in the parking lot before the game. The newest stadium developments are mixed-use destinations. The Los Angeles Stadium and Entertainment District, often referred to as Hollywood Park for the Inglewood race track that previously occupied the land, will deliver a 70,000-seat stadium for the Rams and Chargers NFL teams.<sup>20</sup> The privately funded 298-acre development is planned to include 2,500 units of housing and 620,000 square feet of retail space, along with a 300-room luxury hotel and casino.<sup>21</sup> Notably, it will also be home to the league's NFL Network cable TV channel.<sup>22</sup>

Ticket holders can be offered discounts for a pregame lunch at one of the park's restaurants, and their purchases can be added to a rewards program. Caesars Entertainment was an early pioneer in data-driven rewards, building a strong analytics capacity for its Caesars Palace Las Vegas casino.



Caesars closely tracks customer behavior and spending, enabling more personalized interactions while promoting spenders in its Total Rewards program.<sup>23</sup> Such programs could extend to the entire stadium complex, offering a comprehensive view of fans' interaction with the team and a chance for them to upgrade to more exclusive VIP services. A public restaurant on the stadium grounds could offer return guests the chance to “level up” and earn tickets to the game.

“Rising ticket prices challenge the value of live events as well as fans' ability to attend,” observes Zack Sugarman, senior vice president at Wasserman, a sports marketing and talent management company. “Our findings have shown us that price is a priority in getting fans to an event, but it is quickly forgotten upon attending.” The value of the in-stadium experience is clear, but it gets muddled between high ticket prices and the ease of staying home. To better customize value for more fans, leading stadiums are evaluating the customer journey with a more granular, data-driven approach.

## Welcome to your personalized smart stadium experience

After lunch at the park, fans might use the tickets stored in their mobile wallets to pass through the turnstile into the stadium—a touch point initiating a broader response from the stadium's experience and marketing layers, such as a personal greeting and mobile push notification offering a deal on favorite concessions. While this is a simple example, its simplicity rests on considerable transformation.

Retail marketing technology focuses on generating demand by targeting customers based on their profiles. Success depends on the amount of customer data a business has collected and analyzed, typically requiring centralization and integration of many preexisting data silos. The business can then add customer data management platforms to derive more accurate customer personas. These data-driven personas—for example, males age 18 to 24 who attend 35 percent of games and have bought merchandise representing a certain player—can be used to build incentives and rewards that convert them to sales. Machine learning can further subdivide these groups for greater personalization, and update personas based on conversions. Ultimately, the goal is to move from models of groups to those of individuals.

## The value of the in-stadium experience is clear, but it gets muddled between high ticket prices and the ease of staying home.

Marketers sometimes refer to these services as offering a 360-degree view of the customer that can be leveraged with cognitive technologies and recommendation engines. For example, they can identify a persona willing to pay extra for a package that includes transport to and from the game, with in-stadium access to exclusive player content on the team's mobile app. They can further incentivize these personas with special merchandise and discounts, adding the purchases to their rewards program. The conversion rate—the likelihood that a fan will buy and attend based on the promotion—is optimized using data and predictive profiling. Personas can then be updated based on who acts on the promotion and who doesn't.

### THE DATA DEAL: TRADING PRIVACY FOR VALUE

Stadiums have historically gathered data to optimize entrance, flow, and concession lines. Security concerns have driven more data gathering to protect fans from threats;<sup>24</sup> some stadiums now use facial recognition technology to identify attendees and to understand their characteristics.<sup>25</sup> Most fans tacitly understand that they relinquish many privacy protections upon entering a stadium, where at any moment roving cameras might put their photo on a Jumbotron. But advances in data collection that shift the proposal from aggregate, nonpersonal information to very specific user data—from posting pictures of cheering crowds to monitoring individuals' movements and purchases—may invoke challenges to this new world of marketing technology.

Privacy is often a dialogue about the tradeoffs between security and value. Amid the current uproar over data privacy, it's worth remembering that many customers want the personalized experiences that data analytics enable, even at the cost of their anonymity. If stadiums and brands can deliver value quickly, fans may be more likely to share their personal information. Conversely, failures to secure this data from misuse, and reselling or overusing the data in ways that are perceived as intrusive, can quickly escalate into the national dialogue. Teams should be thoughtful about delivering clear value to fans while protecting their personal information.

These capabilities also enable teams to improve their value proposition to sponsors, offering more granularity. For example, a fan persona could include a fondness for a certain concession. In our fan journey, badging through the turnstile might invoke a push notification for discounts sponsored by a brand. The ticket holder could purchase the concession through the team's mobile app and be notified when it's ready for pickup. The conversion could then grant the fan access to additional content on the app. This example underscores the capabilities and revenue growth opportunities that emerge from a holistic view of the fan experience that is coupled with a strong data strategy.<sup>26</sup>

### In the seats: Keeping fans happy and engaged

The rumble and roar grow louder as the ball is snapped and thrown. The team bracelet on your wrist pulses faster, in sync with the heartbeat of the running back dashing to the end zone. Your glasses render numbers hovering over the player showing his speed and distance covered as he scores for the home team while chats from stadium friends scroll

down the side of your view. You stomp your feet in rhythm with 80,000 fans, inflating a giant balloon on the Jumbotron until it finally bursts. From the end zone, the running back opens a camera stream that broadcasts a personal message out to VIP ticket holders. Your smartphone lights up: The bet you placed on the play earns a free sponsored concession. Across the stadium, fan jerseys glow with LEDs blazing the teams' colors as machine algorithms review the play and stitch together a highlight reel for distribution to networks, social media, virtual reality (VR), and augmented reality (AR).

This future vignette is mostly powered by technology that's available today, but it relies on a more integrated and strategic approach to sensing, data analytics, and networks that sees the stadium as a platform for integrating value.<sup>27</sup> In this scenario, IT strategy is not a tertiary role. It is central to the future of stadium entertainment.

Fans spend the bulk of time in their seats. To get them closer to the game, many stadiums are suspending gigantic display boards above the field, amplifying the spectacle. The stadium at Hollywood Park will feature a 70,000-square-foot

double-sided ring display ensuring views of the field from every seat—and opening more programming opportunities.<sup>28</sup> The boards can help fans feel more connected to the larger-than-life champions on the field than they might watching games at home. When game play is slow, the stadium can still capture fans' attention by engaging and gamifying them.

Increasingly, stadiums are leveraging smartphones to vie for the fans' attention. Giorgio notes that “teams shouldn't worry about fans looking at their phones as long as they're still engaging with the team.”

Successful in-stadium mobile apps require reliable connectivity, but 80,000 people in one place—most of them actively online—can quickly overload networks and degrade service. This is a growing pain point for both fans and service providers. The Atlanta Braves worked with Cisco to deliver comprehensive Wi-Fi coverage for fans at SunTrust Park, cohering a bevy of third-party vendor networks into one integrated network.<sup>29</sup> The system also supports the ad network the team runs across 1,350 screens throughout the stadium.<sup>30</sup> In the United Kingdom, the new Tottenham Hotspur soccer stadium worked with Hewlett Packard Enterprise to develop a network that supports both fans and stadium operations. The network has been designed with Wi-Fi and beacon technology that can deliver real-time push notifications to direct fans to specific food and beverage outlets and restroom facilities.<sup>31</sup> It also helps stadium operators redeploy staffing to support areas of congestion while predicting future demand.

In-stadium mobile apps should also quickly prove their value to users. To date, few teams have effectively delivered this value. All of them should consider upgrades that are attentive to ease of use, with utilities such as wayfinding and concession that encourage fans to launch—and keep

## Successful in-stadium mobile apps require reliable connectivity, but 80,000 people in one place—most of them actively online—can quickly overload networks and degrade service.

using—the stadium app instead of their established favorites. Once the app is active, additional features can reinforce engagement. In a sense, modern stadiums are media houses that can deploy content delivery networks (CDNs), offering specialized programming unavailable outside the venue. With a strong stadium CDN and dynamic mobile apps, fans can have more personalized content delivered to their devices based on their data profiles. For instance, at halftime, the app could automatically send a sponsored player interview to fans who took advantage of a brand promotion.

With regulatory changes in betting, stadium apps could include support for wagering. Deloitte's 2018 survey of TV sports audiences found that more than half of US respondents are much more likely to watch a game on which they have placed a bet.<sup>32</sup> This same correlation can draw fans to stadiums while encouraging them to stay focused on game play. Savvy team apps could integrate these features, possibly tying them into fantasy football leagues and highlighting stats of a fan's fantasy players.

Done well, a mobile app can enable a team to develop a social network, channels for social streaming from athletes, a way to deliver special views and stats of the game play, direct purchasing and ordering, and a platform to stay engaged with fans throughout the year. Just as the stadium should be a compelling physical destination, many teams are working to make their apps a regular destination as well. By developing a strong

technology layer, stadiums can support mobile engagement while laying the foundation for compelling next-generation experiences.<sup>33</sup>

### DELIGHTING THE FANS WITH MIXED REALITY

There is growing interest in the role that AR and VR might play in the fan experience. Adoption of each depends on advances in hardware capabilities, cost, and ergonomics that are yet to be fully realized. However, both are near enough to practical usability that the future of media and entertainment should consider their implications. AR can offer wayfinding and identification of other fans, such as your friends in the seats across the field, and enable social sharing of fan-generated markups, such as graffitied cheers and taunts. New or distracted fans could use AR as an intelligent lens that displays information about what is happening on the field at any moment. With sensors working their way into uniforms, teams are getting more real-time data about their players. Acknowledging data sensitivities, some of this data could be offered to fans as special annotations rendered in AR. This is common in video games, and with the rise of esports, such interactions may inform more of the experience of live sports.

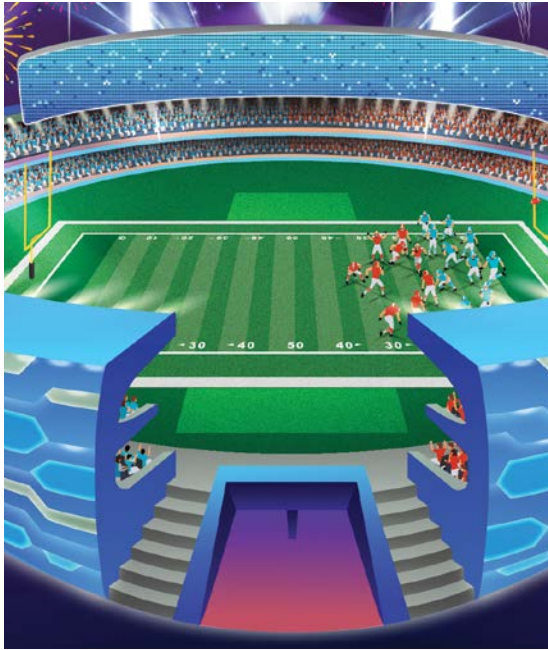


## AR can offer wayfinding and identification of other fans, such as your friends in the seats across the field, and enable social sharing of fan-generated markups, such as graffitied cheers and taunts.

VR is now being used to offer preconstruction views of proposed stadiums.<sup>34</sup> This allows stakeholders to test for impact, flows, view occlusion, and other characteristics that can hinder a good fan experience. For fans, the NBA has developed a courtside view from a 360-degree camera that can be accessed through VR headsets.<sup>35</sup> This offers the immersion of the live event without being there physically, perhaps tugging at the paradox mentioned earlier of investing in stadiums while enabling fans to have better remote experiences. A VIP pass could reframe this in terms of exclusivity, offering a VR postgame locker-room experience or a 360-degree helmet cam. In the near term, stadiums can experiment with theme-park features that offer VR immersion on the bench or at the edge of the end zone.

### STAYING CONNECTED WITH FANS AFTER THE GAME

When fans head for the nearest exit, engagement need not end. Mobile apps can deliver machine-generated highlights and stats based on the fan's interests, and can offer sponsored incentives to visit stores, bars, and restaurants in the mixed-use complex. When done right, the mobile app can offer reasons for fans to continue using it even in the off-season—to stay engaged with the team and players, manage their fantasy leagues, engage with other sports and events sponsored by the team brand, connect with fans, and find rewards and incentives for year-round experiences at the



stadium complex. Interactions and conversions on each of these add more information to the fan profile that can then inform more personalized experiences and incentives. All can be ways to make the relationship more personal, deliver better experiences, and uncover ways to delight fans and make them feel special.

## The final quarter

Times of change require investments in the future. Stadiums are chasing fans amid a sea of cheaper entertainment alternatives and increasingly lavish home viewing environments. And yet the stadium experience remains exceptional for its scale, its grandeur, and the live community that fans can't find anywhere else. To successfully navigate the currents of change, teams and stadium owners should invest in a holistic approach to optimizing the stadium experience around the fans.

First, stadiums should upgrade their networks to guarantee fans the same service they're used to everywhere else. They can develop networks that deliver location awareness through beacon technologies—and content delivery systems that can be optimized for in-stadium programming to Jumbotron, screens, and mobile devices.

Second, they should integrate all touch points on the customer journey by upgrading interfaces such as ticketing and point-of-sale to be digital and connected, and by developing a comprehensive data strategy that centralizes all the data from those touch points. Effectively integrating data from across the enterprise can be key to unlocking its potential. Once this customer data platform is developed, it can be further integrated with customer relationship management (CRM) and enterprise resource planning (ERP) systems.

Third, stadiums should unlock monetization opportunities from their customer data by developing rich personas and user profiles. With machine intelligence, these profiles can be automatically evaluated for incentives, churn, discounts, and rewards. This level of fan intelligence can enable better delivery of customized and personalized content while supporting incentive modeling that generates revenue and attendance. As with churn modeling in CRM, such systems can suggest which incentive packages are most likely to convert a specific fan or persona to a purchase.

**The fundamental challenge for teams lies in delivering truly exceptional stadium experiences that are beyond anything possible elsewhere.**

Fourth, successful mobile applications may be critical to staying engaged with fans. Fans will likely expect immediate and enduring value to keep them on the team's platform instead of just opening their favorite social network. Value can be based on utilities, but it should also be delivered through discounts and rewards, as well as the opportunity for a regular fan to access a VIP experience that makes them feel special.

The fundamental challenge for teams lies in delivering truly exceptional stadium experiences

that are beyond anything possible elsewhere. As stadiums become more computational, connected, sensing, and data-driven, our need to be entertained, to share, and to express ourselves will likely be met by novel technologies that surprise and fascinate. And yet the age-old excitement of physical competition continues to thrive and express itself in both old and new ways. With the help of sensing, data analytics, and next-generation digital experiences, sports teams have tremendous opportunities to support their fans' passion and loyalty. ●



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**Esports graduates to the big leagues**

Arenas aren't just for traditional sporting events anymore—esports tournaments are becoming large-scale social events, both in-person and online. Explore how their explosion in popularity could shape media companies in the future.

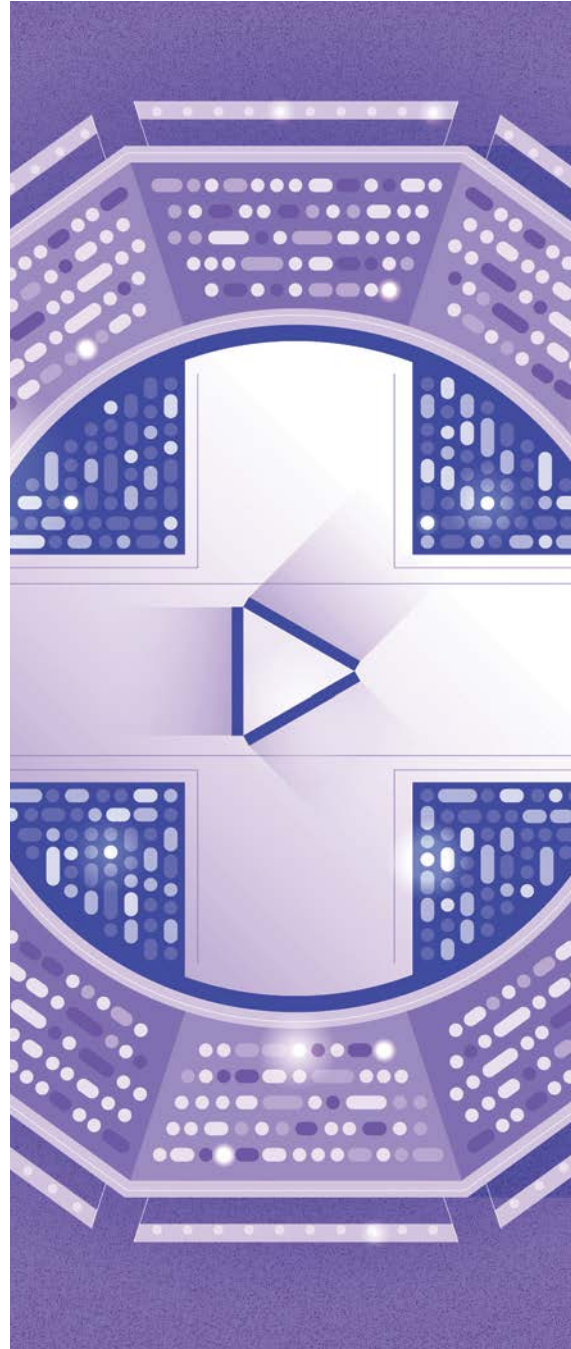
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## Let's play!

### THE EUROPEAN ESPORTS MARKET

**C**OMPETITIVE VIDEO GAMING—A growing global phenomenon known as esports—has hit the big time in Europe, where it is packing stadiums, encroaching upon established media's traditional entertainment offerings, and attracting sponsors from a wide range of industries. With estimated revenues of 240 million euros in 2018 alone, Europe's esports industry has grown by about 24 percent annually since 2016. Similar growth is expected over the next few years, with an expected revenue of 670 million euros in 2023.



Continued growth could translate into big revenues for individual gamers, game developers, esports leagues and franchises, event organizers, and media companies alike. More than two-thirds of European esports revenue in 2018 came from sponsorships, advertising, and media and streaming rights, with ticketing, merchandise, and game publisher fees—paid to esports organizers for hosting events—making up the balance. Prominent transactions include a 20 million–euro investment in the French esports clan Team Vitality by Rewired Advisory, a Switzerland-based venture capital firm with an esports division, in November 2018, and a 17 million–euro investment in UK-based esports clan Fnatic by a group of investors led by tech entrepreneur Lev Leviev in May 2019.

Businesses wanting to participate in esports' growing popularity in Europe could still face several challenges. In Germany, for instance, revenues from the sale of media rights for premium esports content have experienced slower-than-expected growth. This may be because German esports fans have traditionally considered esports viewership to be “for free,” accessing matches through dedicated online platforms that do not charge for their content. However, initiatives such as the Virtual Bundesliga—an efootball championship run jointly by the DFL Deutsche Fußball Liga and EA SPORTS<sup>1</sup>—are opening esports to a broader audience, providing a solid foundation for future growth.

Concerns around minors' viewership of and participation in esports also exist, especially regarding the ability of game publishers, event organizers, and teams to ensure that game viewers and players are of an appropriate age. Many event organizers are working with authorities and game industry organizations to address this concern. For example, Germany's gamescom, the world's biggest computer and video game event, has put restrictive admission controls in place, and exhibitors are required to ensure that their content is not visible to younger children.

In the near future, the European esports industry may receive a boost from the introduction of “closed” franchise leagues such as Riot Games' League of Legends European Championships (EU LEC) franchise. Unlike “open” franchises that determine division participation through promotion and relegation, all games in a closed franchise take place among a defined set of players or teams. This can prompt more consistent viewership among fans of particular players or teams, as well as increase the franchise's appeal to advertisers, sponsors, and media rights buyers that appreciate knowing who will be playing which games in advance. However, it remains to be seen how much traction this model can gain in Europe, where open leagues are currently the norm. ●

## Businesses wanting to participate in esports' growing popularity in Europe could still face several challenges.

To learn more, read *Let's play! The European esports market* on [www.deloitte.com/insights](http://www.deloitte.com/insights).



## Artful investment


### BLENDING ART INTO THE WEALTH MANAGEMENT PICTURE

**N**O ONE IN the wealth management industry is oblivious to the opportunities offered by the art market. Auction sales data has long indicated that art is a long-term asset whose value often remains protected: a smart choice for high-net-worth individuals (HNWIs) looking to invest in collectibles.

So why haven't art sales grown at the same pace as HNWI wealth over the past decade? Between 2008 and 2018, the average HNWI's financial wealth more than doubled, yet global art market sales increased by only 9 percent. Something appears to be standing in the way of investors' full commitment.

New findings from Deloitte's 2019 annual art and wealth management survey, which polled art collectors, art professionals, and wealth managers from around the globe, suggest several reasons for this reticence. One key insight is that today's HNWIs do not generally base decisions on the same factors as their grandparents, or even their parents: They prioritize emotional satisfaction alongside financial gain when considering art purchases. This perhaps reflects the younger generation's greater technological connectivity, as well as a heightened awareness of social injustice and their own global footprints. For these modern-day HNWIs, buying a valuable painting is not always enough to bring them gratification. They also have their eyes on art technology (ArtTech) start-ups, noncommercial art, and cultural projects and institutions, all of which they could potentially fund through innovative investment and financing programs.

Global awareness has also put a spotlight on the art market's transparency—or lack thereof. Today it is common to demand an end to opaque practices that increase the risk that a work of art may be forged, or that art purchases may be a front for money laundering. Anti-corruption measures extend to practically



**75 percent** of this year's surveyed art collectors said that lack of transparency was the biggest threat to the art market's reputation, the strongest consensus on this point since the survey introduced this question in 2016.

every industry, and art is no exception. Here, our survey makes clear that much of buyers' trust in the art market has eroded due largely to their perception that it lacks transparency. Indeed, 75 percent of this year's surveyed art collectors said that lack of transparency was the biggest threat to the art market's reputation, the strongest consensus on this point since the survey introduced this question in 2016.

Regulation and technology are stepping up to address opaque practices. The European Union's 5th Anti-Money Laundering Directive, effective as of January 2020, includes the art trade and will likely have a significant effect on all aspects of the market. Technology, too, is being brought to bear, with ArtTech startups using blockchain, big data, data analytics, and artificial intelligence to help increase transparency. Still, achieving enough transparency to support a thriving art investment market requires action from all stakeholders in the art and financial services industries, and potentially even from governments. A common vision is needed, as well as standards and guidelines to achieve it.

Wealth managers should consider how their clients are perceiving art as an asset class. Adopting a new approach to art and wealth management services can help wealth managers gain a competitive edge, satisfy investors' emotional as well as financial interests, and foster closer ties with clients. Eighty-six percent of surveyed wealth managers said that they view art and collectibles as integral to a wealth management advisory service—the highest percentage since our survey's inception in 2011. These are the ones who have spotted new opportunities in the art market's rising tide of change, and who will likely be best positioned to reel them in. ●

To learn more, read *Artful investment: Blending art into the wealth management picture* on [www.deloitte.com/insights](http://www.deloitte.com/insights).

**CONNECTED BUSINESS AND SOCIETY**

**TECHNOLOGY AND ETHICS**

**LEADERSHIP**

**HUMAN PERFORMANCE IN A DIGITAL WORLD**

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# Ethical tech

## Making ethics a priority in today's digital organization

BY CATHERINE BANNISTER, BRENNAN SNIDERMAN,  
AND NATASHA BUCKLEY

ILLUSTRATION BY ALEX NABAUM







Yes, disruptive technologies enable tremendous opportunity for organizations to become smarter, more agile, more flexible, and more responsive. But technologies are becoming integral to organizational processes before many people have fully considered the ramifications of their usage.

As some leaders are learning, some applications, devices, and systems raise ethical dilemmas each time employees use them. Stories of organizations encountering new challenges related to privacy, algorithmic bias, and a range of other technology-related ethical issues illustrate the reputational and even financial risks for organizations.

But organizations and their leaders seldom develop an overall approach to the ethical impacts of technology use—at least not at the start of a digital transformation. Further, companies that don't consider technology to be their core business may simply assume that these considerations are largely irrelevant, even as they increasingly rely on advanced digital and physical technologies to run their day-to-day operations.

For most organizational leaders, it's no longer possible to *not* be enmeshed in technology, no matter the industry or sector. Leaders and their organizations simply can't call themselves technologically savvy if they're not thinking about the ethical implications of how their employees, customers, and others within their ecosystems are using technologies.

In fact, the ethical use of technology, or *ethical tech*, is inextricably linked to, and an extension of, tech-savviness. Being tech-savvy means more than being able to define use cases for cloud or artificial intelligence (AI)—it extends to understanding some of the potential ethical dilemmas that designing or using these technologies can present. Indeed, to be truly savvy in the age of advanced, connected, and autonomous technologies, leaders should think beyond designing and implementing

technologically driven capabilities. They should consider how to do so responsibly from the start.

Over the past year, Deloitte has conducted multiple global quantitative studies examining broader questions around digital transformation,<sup>1</sup> attitudes toward the Fourth Industrial Revolution,<sup>2</sup> and the development of specific technologies such as AI.<sup>3</sup> Each of these studies asked at least a few questions about leaders' thinking around ethical uses of technology. As authors of and contributors to those studies, we were curious if there were common themes emerging from the respective data sets that could provide insight into not only technological progress but progress with respect to ethical tech.

## The ethical use of technology, or *ethical tech*, is inextricably linked to, and an extension of, tech-savviness.

Looking across this data, we see a relationship between a company's digital and technological progress—in other words, its tech savviness—and its focus on various ethical issues related to technology. Our research suggests that companies that are more advanced digitally tend to be more concerned with and focused on technology-related ethics than companies still early in their digital journey. But it is not this technological maturity alone that appears to drive their focus on ethical tech. These companies are also typically supported by leaders committed to exploring and considering the intended and unintended impacts of technology

## WHAT DO WE MEAN WHEN WE TALK ABOUT ETHICAL TECH?

When we consider the question of ethics, it is critical to draw the distinction between *corporate and professional ethics*—ethics related to questions of business, professional conduct, humane treatment of workers, and/or corporate and social responsibility—and *ethics of technology*. What do we mean when we use the latter term?

The World Economic Forum argues that “technologies have a clear moral dimension—that is to say, a fundamental aspect that relates to values, ethics, and norms. Technologies reflect the interests, behaviors, and desires of their creators, and shape how the people using them can realize their potential, identities, relationships, and goals.”<sup>4</sup>

Ethical tech is, at its heart, a conversation focused on the relationship between technology and human values, the decisions we make toward technological advances, and the impacts they can have. The notion of ethical tech refers to a set of values governing the organization’s approach to its use of technologies as a whole, and the ways in which workers at all levels deploy those technologies to drive business strategy and operations. It is a multifaceted concept that can encompass a wide variety of issues, from data privacy to bias in algorithms, from replacing humans with machines to a commitment to not manipulating data or human responses. And just because organizations may not have developed ethical tech frameworks doesn’t mean leaders are ignoring issues: Deloitte’s research suggests that leaders’ biggest social and ethical concerns brought about by digital innovation apart from privacy are related to cybersecurity risks, job replacement, and the unethical use of data.<sup>5</sup>

As we examine what ethical tech *is*, it is also important to specify what it is *not*. It is not limited to general compliance-related issues or questions of legality; it is neither a stand-alone, siloed effort nor a black-and-white set of blanket policies that dictate strict *right* and *wrong* answers to every scenario. Ethical situations are unique and varied, and a robust ethical tech program allows leaders and employees to apply a decision framework to each situation to make the most appropriate judgment.

disruptors, surrounding themselves with input from a diverse and inclusive set of stakeholders, and fostering an organizational culture of continuous learning, debate, transparency, and open dialogue.

What lessons can leaders and their organizations take from these findings as they consider their own approaches to technology? And given the pace of change around advanced technology today, how can leaders continue to build their organizations’ digital maturity and tech savviness while creating an overarching approach to ethical tech that can remain relevant in the future?

Here, we seek to answer these questions by drawing on insights from the surveys and analysis

from our recent global studies, as well as lessons drawn from our work on tech-savvy leadership. Indeed, ethical tech can be thought of as an enabler of growth on an organization’s digital journey and a natural extension of tech-savviness rather than just one more compliance requirement.

## Organizations turning an ethical lens on technology

Organizations of all ages, sizes, and sectors pay attention to corporate and professional ethics. Most companies have a code of conduct, and most, if not all, HR leaders consider ethics integral to their work and their organization. However, the

ethical use of technology is less understood for many organizations and their leaders. In a 2019 study, fewer than a third (30 percent) of respondents completely agree that their leaders are highly concerned with ethically using Industry 4.0 technologies.<sup>6</sup> Similarly, another recent study found that just 35 percent of respondents believe their organization's leaders spend enough time thinking about and communicating the impact of digital initiatives on society.<sup>7</sup>

While it may make sense to see ethical tech as a yet-to-be-explored discipline given that many organizations are still learning to be “tech organizations,” we found in our research that some companies—both technology-based digital native companies and non-digital natives—are engaging in ethical decision-making in the design and adoption of disruptive technologies from the start. Which organizations are these, and more importantly, why are their leaders more focused on the ethical use of technology than others?

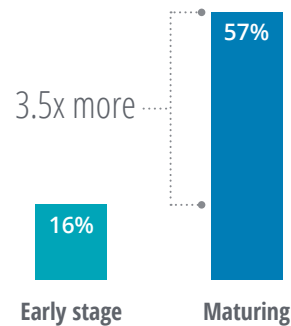
### THE LINK BETWEEN DIGITAL MATURITY AND TECH-SAVVINESS

One reason why some organizations pay more attention to ethical tech may have to do with their level of digital success. Companies that are more digitally advanced appear to be more committed to understanding the implications of the technologies with which they work. Approximately 57 percent of respondents from organizations considered to be “digitally maturing” say their organization's leaders spend adequate time thinking about and communicating digital initiatives' societal impact, compared with only 16 percent of respondents from companies in the early stages of their digital transformation (figure 1). Further, nearly 80 percent of the digitally maturing companies surveyed have explicit policies in place to support their ethical standards with respect to digital initiatives, versus only 43 percent of early-stage companies.<sup>8</sup> And these digitally maturing companies are not limited to digital natives.

FIGURE 1

### Leaders at digitally maturing companies are 3.5x more likely to be thinking about tech ethics

Percentage of “strongly agree” and “agree” responses



Source: MIT Sloan Management Review and Deloitte research conducted for Gerald C. Kane et al., *Accelerating digital innovation inside and out: Agile teams, ecosystems, and ethics*, Deloitte Insights, June 4, 2019.

Indeed, digital maturity may breed a rise in ethical awareness. With respect to specific technologies, for example, the continued growth of AI has led to increased concern about the ethical implications of implementing a technology capable of “higher thought” and decision-making. As with digital maturity in general, recent global AI research suggests that those companies with more experience in leveraging AI specifically are also more likely to be concerned with its ethical risks: As the number of AI production systems undertaken by a company increases, respondents' stated concern about the ethical risks of AI grows as well.<sup>9</sup>

Early on, as a company begins to implement AI systems, leaders' primary concern is likely learning how best to leverage the technology and how to acquire the skills needed to implement new AI systems—rather than, say, consciously building in responsible approaches from the start. As a company gains experience implementing these initiatives, awareness and understanding of potential ethical challenges such as algorithmic bias or the potentially significant effects of

inaccurate data sets on autonomous decision-making—both ethically and financially—may start to become evident. At this point, leaders can hardly avoid contemplating ways to anticipate and address potential ethical issues.

The connection between being tech-savvy and a focus on responsible use of technology can be understood in several additional ways. First, given their position further along the digital journey, those organizations that are more advanced digitally have the benefit of experiencing firsthand the ripple effects of a disruptive technology, whether in their product or service offerings or in their business processes. They may also find they need to care more about ethics as a matter of both practicality and necessity: They have more at risk if an issue or ethical breach arises and, given the relative pervasiveness of technology across their operations, a higher likelihood that related ethical questions will arise.

In contrast, companies still in the early stages of digital transformation may not be focused on ethical tech because they may still be trying to determine what their digital strategy is, including which technologies will be involved. Due to their relative lack of experience, leaders also may not fully appreciate particular technologies' potential implications or downstream effects.

## The impact of a culture of responsibility on ethical tech

On a deeper level, leaders and organizations reporting a higher concern about ethical tech demonstrate several additional characteristics that may further explain why they pay attention to this topic more than others. While any one organization may not display all of these characteristics, taken together they point to something noteworthy: The notion that leaders and organizations that possess cultures focused on a bigger picture—one beyond their own sphere

# *looking back* Deloitte on technology and ethics 1977

“A serious question faces our society today: Can it guarantee each citizen’s constitutional right to privacy, given the magnitude of information that is routinely collected in the files of both government and business? In the public’s mind, this concern is linked to a developing technology that enables one’s personal history to be flashed on a screen at the touch of a button. What is the role of the computer in this issue of information privacy? Are the public’s concerns valid?”

**Donald R. Wood**  
Principal, Touche Ross



of responsibility—may also be more likely to consider the implications of new technologies on their community, society, and the future.

**A deeper commitment to social impact.**

Companies that are more concerned with the ethical implications of technology may be predisposed to think about potential ethical challenges in general. For example, we find in our Industry 4.0 research that leaders in organizations that aim to ethically use Industry 4.0 technologies are more likely to report developing socially conscious products or services. Fully 62 percent of respondents who “completely agree” that their organization is highly concerned with ethically using Industry 4.0 technologies report that their organization generated new revenue streams from socially conscious products/services in the most recent fiscal year, compared with 50 percent of those who report lower levels of concern.<sup>10</sup>

## Companies that are more concerned with the ethical implications of technology may be predisposed to think about potential ethical challenges in general.

**More likely to support inclusion and diversity.**

Most leaders understand the need for diversity and inclusion for numerous reasons related to business and ethics, but the degree to which they apply their values to day-to-day decision-making varies. Organizations should cultivate a diverse set of voices and experiences to explore and mitigate for potential consequences of technology. Such diversity can also generate trust

between an organization and its stakeholders, critical to generating broad commitment and engagement for ethical tech. Our Industry 4.0 research suggests that companies more focused on ethical tech are more than twice as likely to make strategic technology decisions based on the input of a diverse and inclusive set of stakeholders (32 percent) as those less concerned with tech ethics (15 percent).

**Ready to embrace—and lead—times of change.**

Leaders who report that their organization is highly concerned with ethics are also far likelier to note that they feel ready to lead their organization through the changes associated with the Fourth Industrial Revolution, with 48 percent noting this compared with 28 percent of those whose organizations are less concerned about ethics. This general feeling of readiness may go hand-in-hand with tech savviness, as our research has also shown that leaders with the most experience and familiarity with advanced technology are also far more likely to feel prepared to lead, hire, and train their talent.<sup>11</sup>

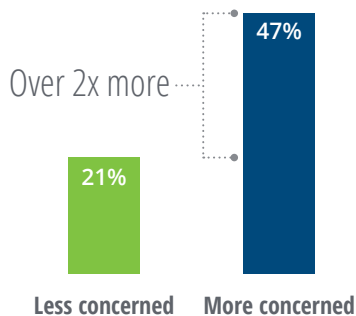
**Structured decision-making behaviors embedded in the culture.**

Leaders who follow an orderly process or framework when making strategic technology decisions provide clarity and structure for organizations to advance digitally. In addition, a structured approach to making technology decisions may provide greater visibility into potential ethical issues and how to manage them. The Industry 4.0 study notes that only three in 10 leaders completely agree their organizations have clearly defined decision-making processes to support Industry 4.0 development. And those organizations with a clear approach to decisions also appear to be more concerned with ethical tech: Nearly half (47 percent) of respondents whose

FIGURE 2

## Those who are more concerned with the ethical use of Industry 4.0 technologies are more likely to have a clearly defined decision-making process

Percentage of “strongly agree” responses to “My organization has a clearly defined decision-making process”



Source: Research conducted for Punit Renjen, *How leaders are navigating the Fourth Industrial Revolution: Our latest survey of Industry 4.0 readiness*, Deloitte Insights, January 20, 2019.

organizations are concerned follow clearly defined decision-making processes; among those who are less ethically concerned, only 21 percent say the same (figure 2).

## Beyond culture: The role of leadership

When it comes to setting expectations, leaders typically play a critical role in creating a culture that ensures both their organizations and the people within them consider technology’s implications for their stakeholders and make decisions with those potential effects in mind.<sup>12</sup>

Leaders, in particular, are in a position to help their organizations look at the bigger picture and adopt the sense of responsibility necessary for supporting ethical decision-making. They should not only

clearly communicate their own positions on the importance of ethical behavior but set the tone to help their teams develop an ethical mindset that they can infuse into their roles and daily decisions.<sup>13</sup>

Some organizations are signaling that their leaders recognize this mandate by appointing chief ethics officers to deal with general questions of corporate and professional ethics. In fact, leaders who have long worked to instill an ethical mindset in general business practices can use that attitude to inform not only their companies’ use of specific technologies but also their technology strategy as a whole—positioning them, in many cases, as industry leaders. Indeed, questions around the social and ethical implications of technology use are giving rise to new types of ethics leaders focused specifically on these topics.<sup>14</sup>

For example, Salesforce has appointed a chief ethical and humane use officer to guide the company’s use of technology. The function aims to ensure that the company has a clear framework in place to guide technological decisions, with the executive bringing together internal and external stakeholders and experts to ensure the framework is flexible enough to account for emerging technology use cases and transparently communicated throughout the organization.<sup>15</sup> For their part, leaders at Microsoft recently created an AI and Ethics in Engineering and Research Committee, composed of senior leaders from across the company working together to proactively monitor and address issues that may arise as the company advances development of its AI platform and related solutions. Examples of areas on which the committee has focused include addressing bias in AI systems and implementing requirements of the General Data Protection Regulation.<sup>16</sup>

The board’s role is another important component in helping business leadership sense and anticipate the risks and opportunity of technology,

and create a culture that embraces ethical technology decision-making. Not only can the board help the organization develop a “holistic” understanding of technology and strategy—board members can use their own unique leadership experiences to provide additional perspective on the ethical implications of technology design and use. While leaders should consider having at least one technologist on the board, directors need not all be experts in technologies such as AI and blockchain. Bringing strategic and operational expertise to bear, and taking steps to be more collectively tech savvy, are ways boards can support and guide the organization with an awareness of ethical tech considerations.<sup>17</sup>

Finally, just because leaders may not be making ethical tech an express area of focus doesn't mean it's not a concern. Even if they have no specific program or initiative in place, tech-savvy leaders may be more concerned about ethics and advanced technology than they think they are. For example, data from Deloitte's global AI study demonstrates that leaders are concerned about a variety of factors related to AI. While 32 percent of respondents rate “ethics” in general as a top-three area of concern, many of the other areas of concern also map closely to ethical concerns: fear of making the wrong decisions, a technology or algorithmic failure in a life-and-death context, being held legally responsible for failures, and technological failures that erode consumer trust.<sup>18</sup> These concerns can, in turn, filter into more ethically driven policies or practices, even if there is no overarching, formalized approach to responsible use of technology. Indeed, prioritizing responsible tech use at the leadership level can motivate organizations to create a broader set of resources, assets, and tools to help people

recognize ethical dilemmas, evaluate alternatives, and make technology decisions.

## Next steps for leaders and their organizations: Embrace an ethical technology mindset

It is becoming increasingly important for tech-savvy leaders and their organizations to be aware of ethical decision-making's role with respect to technology disruptors. It's not enough to adopt the vocabulary and syntax of technology disruption. Organizations also need to learn to recognize the ethical issues those disruptors may introduce and build the muscle memory to apply a consistent method for identifying ethical courses of action. Leaders and employees can build this muscle memory through their commitment to ethical decision-making and by promoting a culture that supports it. The *ethical tech mindset* reflects the cultural characteristics that leaders and their employees can embrace to support their efforts (figure 3).


## It is becoming increasingly important for tech-savvy leaders and their organizations to be aware of ethical decision-making's role with respect to technology disruptors.

- **Drive toward a shared, inclusive, cross-functional responsibility.** Ethical tech is a shared responsibility that should engage all functions and be championed at the top. When speaking of ethics and AI technologies, Mala Anand, SAP president of intelligent enterprise



FIGURE 3

## The ethical tech mindset

-  Drive toward a shared, inclusive, cross-functional responsibility
-  Be ethically driven from the start
-  Make ethical tech part of a holistic, tech-savvy approach
-  Make it relevant, specific—and flexible
-  Make sure it's more than compliance
-  Equip your people with the resources to respond
-  Ensure your approach can evolve

Source: Deloitte analysis.

solutions and industries, notes, “Delegating responsibility [to the technology department] is not the answer. Creating ethical and effective AI applications requires engagement from the entire C-suite. Getting it right is both a critical business question and a values statement that requires CEO leadership.”<sup>19</sup> Additionally, since most if not all individuals within an organization use technology to some degree, ethical tech is a topic that touches everyone. Leaving the responsibility of its development to a few groups or functions can promote the idea that it’s not something everyone needs to think about.

- **Be ethically driven from the start.** To be proactive and stay ahead of potential ethical tech challenges, consider designing new

technology-driven products and services with ethical principles in mind from the start. This can help organizations to anticipate and avoid, rather than having to be reactive after a situation arises. Instead of tacking on ethical ideas at the end of the product development cycle, consider incorporating ethical tech considerations at the beginning of your tool/strategy and product/service design.

- **Make ethical tech part of a holistic, tech-savvy approach.** Ethical tech policies are not meant to replace general compliance or business ethics but rather to strengthen them. Just as your approach to cybersecurity hasn’t taken the place of your company’s more general privacy policies, your ethical tech approach should complement, not replace, your overall approach to ethics and serve as its logical extension in the digital realm. At the same time, however, many companies are expanding the mission of existing functions (compliance and ethics, learning and development, inclusion, etc.) to include ethical tech, as well as maintaining a connection to a separate technology ethics program. Doing so can help keep technology ethics top of mind across the organization and encourage executives to consider the distinctions between technology-related ethical issues and broader corporate and professional ethics concerns. These connections can also help avoid the creation of functional silos with respect to ethics overall.
- **Make it relevant, specific—and flexible.** Develop a guiding framework that addresses technology use cases specific to your organization and its culture. As you work through the ethical tech decision-making framework, test out its relevance by applying it to specific technology use cases your organization regularly encounters and the way your people work, both together and individually. This can help ensure that you can

craft guidance that is both relevant to your needs and sufficiently flexible to evolve with new technological implementations.

- **Make sure it's more than compliance.**

Ethical tech awareness, recognition, and decision-making frameworks should be part of the organization's cultural DNA—and not “just” a compliance or policy activity. It's important that everyone in the organization recognizes potential technology-related ethical dilemmas. People who aren't directly involved or responsible for technology shouldn't be able to use that as an excuse to remain unaware of the potential for issues to arise and to be able to recognize them even when they are less obvious. This is especially key for non-digital native organizations, where the ripple effects of day-to-day uses of technology may be less obvious to leaders and teams.

- **Equip your people with the resources to respond.**

Teams and individuals should have the resources they need to make ethical decisions regarding technology. As with most issues bigger than any one person, when faced with the growing number of potential technology ethics challenges that can arise, workers are likely to wonder what they can do. It is, therefore, important that organizations provide their workers with the relevant resources, assets, and tools to help employees recognize ethical dilemmas, evaluate alternatives, and make (and test) ethical tech decisions.

- **Ensure your approach can evolve.**

With technology evolving rapidly and unpredictably, approaches to ethical tech cannot be “set it and forget it”—they should be evaluated and updated as needed. Given the speed with which markets are changing, policies developed even in the past few years may not directly address current risks. When developing policies or

frameworks to guide technology decisions, do so with an expectation that they will likely need to adapt and adjust as technologies change and market conditions evolve.

Concern about the ethics of technologies is nothing new. But as organizations accelerate their use of disruptive technologies throughout their business processes, products, and services, leaders cannot lose sight of the ripple effects—and potential ethical considerations—that result.

Indeed, regardless of how advanced your organization is digitally, every organization is becoming a technology organization. Therefore, ethical tech matters. While our research conducted over the past year demonstrates how digitally advanced organizations are more focused on ethical tech, it's likely that the prioritization level has increased overall and that even more organizations are making it a priority in the wake of ethical dilemmas highlighted in the news and in political debates. Leaders should examine technology choices from multiple angles to ensure the decisions they make on how to use disruptive technologies are not only strategic but savvy.

For those leaders who have yet to make ethical tech a focus, the opportunity to begin is now. For those leaders who are more focused already, keep in mind that the speed with which markets are changing and technology is evolving may render ethical technology policies developed even in the past few years inadequate to address current risks.

Ethical tech depends on leaders making it a priority, molding it into the culture of their organizations, and developing ethical decision-making processes that are considered, thoughtful, and driven by technological experience and a diversity of input. By embracing an ethical technology mindset, organizations can anticipate and respond to ethical challenges that emerge over time. ●

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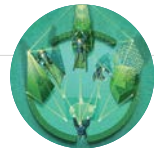
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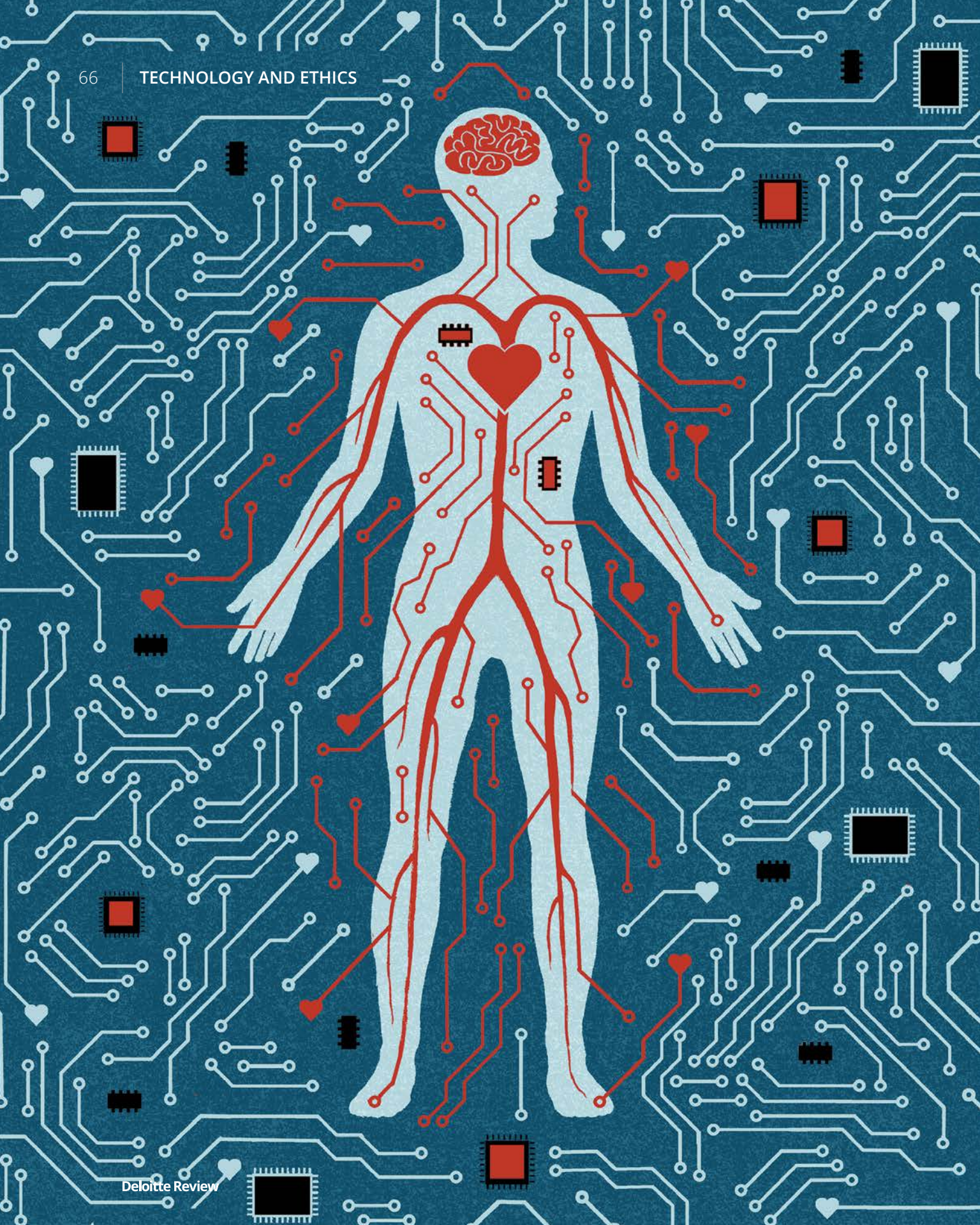
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# Human values in the loop

## **Design principles for ethical AI**

BY JAMES GUSZCZA, MICHELLE A. LEE,  
BEENA AMMANATH, AND DAVE KUDER

*ILLUSTRATION BY JAMES STEINBERG*

## “This has to be a human system we live in.”

— Sandy Pentland<sup>1</sup>

**M**ORE THAN 60 years after the discipline’s birth,<sup>2</sup> artificial intelligence (AI) has emerged as a preeminent issue in business, public affairs, science, health, and education. Algorithms are being developed to help pilot cars, guide weapons, perform tedious or dangerous work, engage in conversations, recommend products, improve collaboration, and make consequential decisions in areas such as jurisprudence, lending, medicine, university admissions, and hiring. But while the technologies enabling AI have been rapidly advancing, the societal impacts are only beginning to be fathomed.

Until recently, it seemed fashionable to hold that societal values must conform to technology’s natural evolution—that technology should shape, rather than be shaped by, social norms and expectations. For example, Stewart Brand declared in 1984 that “information wants to be free.”<sup>3</sup> In 1999, a Silicon Valley executive told a group of reporters, “You have zero privacy ... get over it.”<sup>4</sup> In 2010, *Wired* magazine cofounder Kevin Kelly published a book entitled *What Technology Wants*.<sup>5</sup> “Move fast and break things” has been a common Silicon Valley mantra.<sup>6</sup>

But this orthodoxy has been undermined in the wake of an ever-expanding catalog of ethically fraught issues involving technology. While AI is not the only type of technology involved, it has tended to attract the lion’s share of discussion about the ethical implications.

Many concerns about AI-enabled technologies have been well-publicized. To cite a few: AI

algorithms embedded in digital and social media technologies can reinforce societal biases, accelerate the spread of rumors and disinformation, amplify echo chambers of public opinion, hijack our attention, and impair mental well-being.<sup>7</sup> Experts warn of AI technologies being weaponized. Semiautonomous vehicles have been reported to fail in ways the owners did not expect.<sup>8</sup> And while fears of “smart” technologies stealing human jobs are often overstated, respected economists highlight growing inequality and lack of opportunity for certain workforce segments due to technology-induced workplace changes.<sup>9</sup>

**Until recently, it seemed fashionable to hold that societal values must conform to technology's natural evolution—that technology should shape, rather than be shaped by, social norms and expectations.**

Thanks in part to concerns like these, there have been increasing calls for AI to be designed and adopted in ways that reflect important cultural values. In a recent editorial, the investor Stephen Schwarzman urged companies to take the lead in addressing ethical concerns surrounding AI. He comments, “If we want to realize AI’s incredible potential, we must also advance AI in a way that increases the public’s confidence that AI benefits society. We must have a framework for addressing the impacts and the ethics.”<sup>10</sup>

And indeed, a large number of AI ethics frameworks have appeared in recent years. For example, a team at the Swiss university ETH Zurich recently analyzed no fewer than 84 AI ethics declarations from a variety of companies, government agencies, universities, nongovernmental organizations, and other organizations.<sup>11</sup> While the team identified some inconsistencies, there is also reassuring overlap in the broad principles articulated. In another such effort, the AI4People group led by Luciano Floridi analyzed six high-profile AI ethics declarations. They concluded that a set of four abiding, higher-level ethical principles—*beneficence*, *non-maleficence*, *justice*, and *autonomy*—captured much of these six declarations’ essence.

These four principles are rooted in major schools of ethical philosophy and, in fact, have been widely embraced in the field of bioethics for several decades.<sup>12</sup> It is perhaps unsurprising that they adapt well to the AI context. Writing for *Harvard Data Science Review*, Floridi and coauthor Josh Cowls note: “Of all areas of applied ethics, bioethics is the one that most closely resembles

digital ethics in dealing ecologically with new forms of agents, patients, and environments.”<sup>13</sup>

In his book *Bit by Bit*, the prominent computational social scientist Matthew Salganik has recently advocated the same core principles to help data scientists evaluate the ethical implications of working with human-generated behavioral data. Salganik comments: “In some cases, the principles-based approach leads to clear, actionable solutions. And when it does not, it clarifies the tradeoffs involved, which is critical for striking an appropriate balance. Further, the principles-based approach is sufficiently general that it will be helpful no matter where you work.”<sup>14</sup>

This essay attempts to illustrate that ethical principles can serve as *design principles* for organizations seeking to deploy innovative AI technologies that are economically profitable as well as beneficial, fair, and autonomy-preserving for people and societies. Specifically, we propose *impact*, *justice*, and *autonomy* as three core principles that can usefully guide discussions around AI’s ethical implications.

FIGURE 1

### Three core principles can help leaders think through AI’s ethical implications



Source: Deloitte analysis.

looking back  
**Deloitte on  
computers and human  
capabilities**  
1966

“While computers will be a major factor in our lives in the years ahead, they will not obsolete either modern man or modern management. Computers supplement of skills of man; expand the horizons of man’s knowledge; endow him with new power to resolve problems, and to explore new ones.”

**Robert M. Trueblood**

Chairman, Touche Ross,  
Bailey & Smart



Achieving ethical, trustworthy, and profitable AI requires that ethics deliberations be grounded in a scientific understanding of the relative strengths and weaknesses of both machine intelligence and human cognition. In short, being “wise” about AI presupposes being “smart” about AI. For example, discussing ways to promote safe and reliable AI requires understanding why AI technologies—often created using forms of large-scale statistical analysis such as deep learning—succeed in some contexts but fail in others. Likewise, discussions of algorithmic fairness should be informed by both an appreciation of the biases and “noise” that affect unaided human decisions, and an understanding of the tradeoffs involved in different conceptions of algorithmic “fairness.” In each case, ethical deliberations are more productive when informed by the relevant science.

At the same time, this essay does not prescribe *how to apply* the core principles. Organizations differ in their goals and operating contexts, and will therefore adopt different declarations, frameworks, rule sets, and checklists to help guide the responsible development of AI technologies. Furthermore, applying fundamental principles to specific problems often requires evaluating tradeoffs between alternatives whose perceived relative importance varies across individuals, organizations, and societies. We suggest that a grasp of core principles can help individuals and organizations more effectively create ethical frameworks and deliberate specific issues.

### **Impact: Promoting acceptable outcomes**

Two widely recognized ethical principles are *non-maleficence* (“do no harm”) and *beneficence* (“do only good”). These principles are grounded in “consequentialist” ethical theory, whose proponents have included John Stuart Mill and Jeremy Bentham, and which holds that the moral quality of an action depends on its consequences.<sup>15</sup>





## NON-MALEFICENCE: AVOID HARM

### Themes

Safety, reliability, robustness, data provenance, privacy, cybersecurity, misuse

### Examples

- Refraining from causing intentional harm through phishing, cyber breaches, weaponized AI, or “fake news”
- Avoiding unintentional harm due to false positives, faulty data, poor model specification, or poor algorithm operationalization

### “FIRST, DO NO HARM”

Non-maleficence prescribes that AI should avoid causing both foreseeable and unintentional harm. Examples of the former could include weaponized AI,<sup>16</sup> the use of AI in cyberwarfare, malicious hacking, the creation or dissemination of phony news or images to disrupt elections, and scams involving phishing and fraud. But of course, the great majority of organizations building or deploying AI have no intention of causing needless harm. For them, avoiding unintended consequences is the paramount concern.

Avoiding harmful AI requires that one understand AI technologies’ scientific limitations in order to manage the attendant risks. For example, many AI algorithms are created by applying machine learning techniques, most prominently deep learning, to large bodies of “labeled” data.<sup>17</sup> The resulting algorithms can then be deployed to make predictions about future cases for which the true values are unknown. Such algorithms are used today to estimate the likelihood that a borrower will repay a loan, a student’s expected grade point average if admitted to a university, the odds that an

X-ray image is a cancerous tumor, or the chances that the red object in front of a car is a stop sign.

The “artificial intelligence” moniker notwithstanding, however, these algorithms are not based on the sorts of conceptual understanding characteristic of human intelligence.<sup>18</sup> Rather, they are the product of statistical pattern-matching. Therefore, if automatic techniques or naïve statistical methodologies are used to train algorithms on data that contain inaccuracies or biases, those algorithms themselves might well reflect those inaccuracies or biases. This basic truth of machine learning has a key ethical implication: A machine learning algorithm is only safe and reliable to the extent that it is trained on (1) sufficient volumes of data that (2) are suitably representative of the scenarios in which the algorithm is to be deployed.

A case study discussed by the prominent machine learning researcher Michael I. Jordan illustrates how a failure to appreciate such risks can lead to physical harm. In this case, an AI device was designed to estimate the likelihood of a fetus having Down syndrome based on ultrasound images. At a certain point, the input data’s format, the resolution of the ultrasound images, changed: The AI began processing higher-resolution images to compute its estimates. This change resulted in a significant uptick in the machine’s Down syndrome diagnoses. This uptick was due not to previously unrecognized cases, but to the images’ higher resolution producing spurious statistical artifacts which the algorithm (trained on lower-resolution images) misinterpreted as Down syndrome indicators. It is likely that thousands of people opted for amniocentesis procedures, putting their babies at risk, based on these faulty diagnoses.<sup>19</sup>

Knowing that machine learning algorithms perform reliably only to the extent that the data used to train them suitably represents the scenarios in which they are deployed, an organization can take steps to identify and mitigate

the risks arising from this limitation. Some tactics might include:<sup>20</sup>

- Assessing the training data’s provenance—where the data arose, what inferences were drawn from the data, and how relevant those inferences are to the present situation—to assess an algorithm’s applicability.
- Restricting algorithms’ use to environments in which they are likely to be reliable. For example, autonomous vehicles could be restricted to special lanes that are off-limits to (unpredictable) human drivers, pedestrians, and animals.<sup>21</sup> Similarly, a chatbot could be designed to avoid collecting personally identifiable information (PII), or to ignore certain words in order to lessen the risk of being gamed.<sup>22</sup>

## Being "wise" about AI presupposes being "smart" about AI.

- Coupling humans, who are capable of common-sense reasoning and flexible decision-making, with algorithmic systems. For example, a semiautonomous vehicle could use AI not to replace the human operator, but to help him or her drive more safely.<sup>23</sup> Similarly, rather than replacing human experts (such as physicians, caseworkers, judges, claims adjusters, teachers grading student papers, or editors flagging unacceptable social media content), algorithms can be designed to help manage workloads and debias these experts’ decisions by providing statistically derived indications. In high-stakes scenarios, a pragmatic default might be to assume the need for human-computer

collaboration, and treat full machine autonomy as a limiting case.<sup>24</sup>



### BENEFICENCE: ADVANCE THE FLOURISHING OF PEOPLE AND SOCIETIES

#### Themes

Human flourishing, well-being, dignity, common good, sustainability

#### Examples

- Using AI to improve medical care, deliver public benefits, create safer environments, or improve educational outcomes

## AI FOR GOOD

The principle of beneficence, reflected in many AI ethics declarations, holds that AI should be designed to help promote the well-being of people and the planet. In the book *Tools and Weapons*, Brad Smith used the term “inclusivity” to denote a similar idea, citing AI technologies created to help people overcome visual or hearing impairment. Beneficent AI applications can run the gamut of physical and emotional well-being, and operate at both individual and collective levels. Some examples are:

- An early application of affective computing (also called “emotional AI”) that aimed to help autistic people, who characteristically have difficulty inferring other’s emotional states, better navigate social situations.<sup>29</sup> Such deep learning-based systems can often infer emotional states from facial expressions better than many humans, and thereby function as “emotional hearing aids” to help decipher others’ behavioral cues.

## AI'S COMMON-SENSE GAP

AI is best defined in functional terms as *any* kind of computer program capable of achieving a specific goal ordinarily associated with human intelligence.<sup>25</sup> At one end of the spectrum, AI encompasses such rule-based systems as robotic process automation (RPA). At the other end, many of today's headline-grabbing applications result essentially from large-scale statistical analysis: The application of supervised machine learning techniques to large data sets. One of these techniques in particular, known as "deep learning," underlies many familiar AI applications, such as chatbots and the image recognition systems used to help pilot cars or flag tumors in X-rays.

When researchers first introduced the term "artificial intelligence" in the 1950s, the aspiration was to build computer systems that manifest human-level general intelligence. Today, however, "AI" has largely come to denote more focused, narrow applications that do not possess the flexibility of human thought. The old idea that "general" AI would mimic human cognition has given way to today's multitude of practical, narrow AIs that operate very differently from the human mind.

Unlike human intelligence, AI algorithms do not possess common sense, conceptual understanding, notions of cause-and-effect, or intuitive physics. As an illustration, a human can use common sense and contextual awareness to learn a new bit of slang based on just a few encounters. A machine translation algorithm, in contrast, would need to be exposed to many pretranslated examples to hopefully get it right.<sup>26</sup>

Their lack of common sense, the inability to generalize or to consider context, makes AI algorithms "brittle," meaning that they cannot handle unexpected scenarios or unfamiliar situations. As Gary Marcus and Ernest Davis comment in their book *Rebooting AI*:

Without a rich cognitive model, there can be no robustness. About all you have instead is a lot of data, accompanied by a hope that new things won't be too different from those that have come before. But that hope is often misplaced, and when new things *are* different enough from what happened before, the system breaks down.<sup>27</sup>

Some commentators have suggested that the auto industry's overly optimistic forecasts of the arrival of fully autonomous vehicles were likely influenced by the neglect of this fundamental point.<sup>28</sup>

- "Data for good" initiatives that use AI algorithms to identify high-poverty areas by analyzing satellite imagery, flag houses that pose a high risk of lead poisoning to their residents, recognize which high school students are at risk of not graduating on time, or identify police officers at greater risk of experiencing adverse events.<sup>30</sup>
- Chatbots that deliver cognitive behavioral therapy interventions to help ameliorate conditions such as low-level depression and anxiety.<sup>31</sup>
- Social robots that incorporate "growth mindset" interventions to help children stay focused in learning environments.<sup>32</sup>
- Wearables paired with gamification or other behavioral "nudge" interventions designed to prompt healthier behaviors.<sup>33</sup>

- Data-rich apps, again infused with behavioral nudge design, designed to help gig workers save small amounts of money each day to better achieve their financial goals.<sup>34</sup>

Interestingly, while non-maleficence was the third-most common principle in the AI ethics declarations studied by the ETH Zurich team, the principle of beneficence appeared in less than half of them. It is possible that this disparity reflects a prevalence of alarmist discussions of AI that focus more on harm, but dwell less on AI's potential to help debias human decisions, extend human capabilities, and improve well-being.

## Managing tradeoffs

Ethical deliberations often involve managing tradeoffs between different principles that cannot be simultaneously satisfied. Tradeoffs between beneficence and non-maleficence are common.

For example, the public might be willing to accept a certain fatality rate associated with autonomous vehicles if it is lower than the fatality rate resulting from humans operating more traditional vehicles.

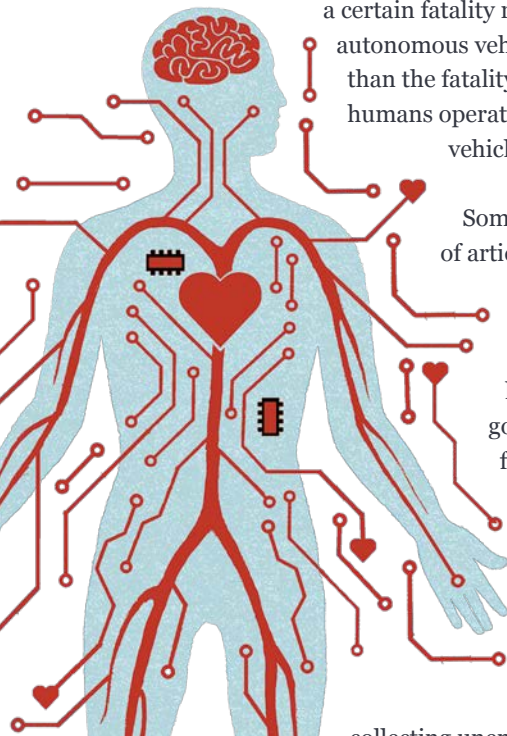
Sometimes, the process of articulating an ethical tradeoff can spur innovations that render the tradeoff less fraught. One government agency, for instance, commissioned a machine learning algorithm to identify people at relatively high likelihood of improperly

collecting unemployment insurance

(UI) benefits. For unavoidable technical reasons, any such algorithm could have yielded a large number of false positives—mistakenly flagging legitimate claims as improper.<sup>35</sup> If the agency had simply used the algorithm to feed an automatic decision rule of the form “If the score exceeds  $x$ , deny benefits,” the inevitable false positives would have led the agency to deny needed UI benefits to large numbers of deserving people.

For this reason, the data science team instead designed the AI system to function as a “nudge engine.” Instead of denying benefits to high-scoring individuals, the agency delivered well-timed behavioral “nudge” pop-up messages—such as “nine out of 10 of your neighbors in [your county] report their earnings accurately”—to claimants the algorithm flagged as suspicious. These messages did no harm to individuals inaccurately flagged by the algorithm, but they had the desired effect among people who were in fact improperly claiming benefits. Randomized controlled trials of the system revealed that the machine learning-targeted nudge messages cut improper UI payments by approximately 50 percent.<sup>36</sup>

The broader point is that ethical AI requires organizations to consider not only *predictions*, but *interventions* as well.<sup>37</sup> Often, “classical economic” interventions such as setting prices, offering or withholding treatment, and delivering punishments or rewards are the only ones considered. The newer science of choice architecture expands the toolkit with “soft” interventions that can allow organizations to act ethically on ambiguous algorithmic indications.<sup>38</sup> In cases where nudge interventions aren't strong enough, ethical deliberation should help guide policy decisions about how machine-generated predictions are acted upon. For example, a certain predictive algorithm could be deployed either to deny benefits or provide proactive outreach to help at-risk cases.



A still broader point is that technological innovation, often involving multidisciplinary thinking, can also make it possible to mitigate difficult ethical tradeoffs. The increasingly popular tagline “human-centered AI” can perhaps be interpreted as a call to take human and societal needs into account when developing uses for AI technologies.<sup>39</sup>


### Justice: Treating people fairly

Justice is another core ethical principle that appears frequently in AI ethics declarations.<sup>40</sup> In the ETH Zurich analysis, it encompasses such related concepts as inclusion, equality, diversity, reversibility, redress, challenge, access and distribution, shared benefits, and shared prosperity.

Much of the conversation about justice as it relates to AI revolves around “algorithmic fairness”—the idea that AI algorithms should be fair, unbiased, and treat people equally. But what does it mean for an algorithm to be “fair”?

It is useful to distinguish between the concepts of procedural and distributive fairness. A policy (or an algorithm) is said to be *procedurally* fair if it is fair independently of the outcomes it produces. Procedural fairness is related to the legal concept of due process. A policy (or an algorithm) is said to be *distributively* fair if it produces fair outcomes. Most ethicists take a distributive view of justice, whereas a procedure’s fairness rests largely on the outcomes it produces. On the other hand, studies by social psychologists and behavioral economists have shown that people often tend toward a more procedural view, in some cases caring more about being *treated* fairly than the outcomes they experience.<sup>41</sup>

While AI algorithms often attract criticism for being distributively unfair, many such discussions implicitly invoke procedural fairness as well. For example, some critics believe that giving female



**PROCEDURAL FAIRNESS:  
PROMOTE FAIR TREATMENT**

*Themes*  
Algorithmic bias, equitable treatment, consistency

*Examples*

- Facial recognition software that recognizes dark-skinned faces just as reliably as light-skinned faces
- Internet searches that avoid amplifying implicit societal biases



**DISTRIBUTIVE FAIRNESS:  
PROMOTE EQUITABLE OUTCOMES**

*Themes*  
Shared benefits, shared prosperity, fair decision outcomes

*Examples*

- Addressing growing inequality due to technology-induced workplace changes
- Avoiding algorithmic biases leading to unfairness in hiring or parole decisions

names and voices to digital assistants can reinforce societal biases.<sup>42</sup> Common examples point to cases where societal biases are reflected in the data sets used to train algorithms:<sup>43</sup> Searches for “CEO” may yield disproportionate images of white men,<sup>44</sup> and facial recognition systems have been shown to be less accurate when identifying individuals with darker skin.<sup>45</sup>

Clearly, the outputs of algorithms like these can be distributively unfair in that they could encourage biased outcomes: white males securing a

disproportionate number of high-paying jobs, or higher autonomous vehicle accident rates among dark-skinned pedestrians due to the software's poorer performance in recognizing darker-skinned individuals.<sup>46</sup> But even setting outcomes aside, such algorithms may impact many people's sense of procedural fairness. For example, webcams that struggle to recognize dark-skinned faces, or internet searches for "CEO" that yield primarily male faces,<sup>47</sup> might be considered inherently objectionable regardless of the impacts on functionality or career progression.

Addressing such issues typically requires that the statistical methodologies used to create algorithmic systems incorporate appropriate ethical deliberation. Recall the point made above that machine learning algorithms are reliable only to the extent that they are trained on suitable data sets. For many applications, it is desirable to train an algorithm on data that reflects the way the world *is*. To accurately forecast sales, for instance, an algorithm must work with data that is representative of the population of likely customers. But what if faithfully representing the world as it is means possibly perpetuating an unfair state of affairs? In such situations, the desire for fairness may motivate the construction of training samples that reflect judgments about the way the world *ought* to be—an ethically influenced choice.

Just as data science should incorporate ethical deliberation, so should ethical deliberation be informed by careful data science. A spate of important research was prompted by a 2016 *ProPublica* investigation that revealed that a widely used recidivism algorithm had a much higher false positive rate for blacks than whites.<sup>48</sup> Intuitively, this difference might seem blatantly unacceptable. But if (1) the overall recidivism base

rate is higher for blacks than for whites and (2) the algorithm manifests "predictive parity" in the sense that a high score means approximately the same probability of reoffending, the higher misclassification rate for blacks is a mathematical inevitability.

This result is representative of a growing body of research pointing to mathematically inevitable tradeoffs in different conceptions of algorithmic "fairness."<sup>49</sup> An emergent theme is that, as with impact, assessing the "fairness" of an algorithm will often involve evaluating tradeoffs rather than making a binary determination.

## Discussions of algorithmic fairness should reflect not only the shortcomings of machine predictions, but the shortcomings of human decisions as well.

A further point is that discussions of algorithmic fairness should reflect not only the shortcomings of machine predictions, but the shortcomings of human decisions as well. The behavioral economist Sendhil Mullainathan points out that the applications in which people worry most about algorithmic bias are also the very situations in which algorithms—if properly constructed and implemented—also have the greatest potential to reduce the effects of implicit human biases.<sup>50</sup>

For example, hiring is a realm notorious for its susceptibility to cognitive unconscious biases that may affect who eventually gets the job. A well-known field study in the United States, co-led by Mullainathan, demonstrated that simulated resumes with black-sounding names attracted significantly fewer interviews than comparable resumes with white-sounding names.<sup>51</sup> In contrast,

Michael Lewis's *Moneyball* illustrates that properly constructed algorithms can outperform unaided human intuitions in predicting who is most likely to succeed on the job.<sup>52</sup>

Naïvely training machine learning algorithms on “convenience samples” of data can quite possibly encode and reinforce human biases reflected in the data. At the same time, Mullainathan's point implies that simply avoiding algorithms altogether can *also* be ethically problematic. Unlike human decisions, machine predictions are consistent over time, and the statistical assumptions and ethical judgments used in algorithm design can be clearly documented. Machine predictions can therefore be systematically audited, debated, and improved in ways that human decisions cannot.<sup>53</sup>

## Autonomy: Respecting humanity and self-determination

Put simply, autonomy is the ability of people to make their own decisions. The Stanford Encyclopedia of Philosophy provides a somewhat more expansive definition:

Autonomy is ... the capacity to be one's own person, to live one's life according to reasons and motives that are taken as one's own and not the product of manipulative or distorting external force.<sup>54</sup>

Many of the principles discussed in the various AI ethics declarations, such as transparency, explainability, privacy, and dignity, can be viewed as aspects of respect for autonomy.<sup>55</sup>

In bioethical contexts, the autonomy principle is often invoked in the context of people's freedom to choose whether to receive medical treatments or participate in medical studies. Its applicability to AI is perhaps equally obvious. When humans

employ autonomous systems, they cede, at least provisionally, some of their own autonomy (decision-making power) to machines. However, autonomous systems can provide human users with clues about when it is appropriate to cede some of their autonomy, and also give the ability to override the system at appropriate points.<sup>56</sup>

Handing over some portion of one's autonomy to an intelligent machine need not pose an ethical problem. In fact, doing so can sometimes be the more ethical choice. For example, the use of diagnostic decision trees (a common type of statistically derived AI algorithm) in emergency rooms can improve the accuracy of triage decisions for patients suffering chest pain. The algorithm is good at a specific kind of task that humans are generally poor at: combining risk factors in consistent and unbiased ways. In one sense, a physician who uses the algorithm gives up part of his or her autonomy—but in a deeper sense, the algorithm can actually enhance the physician's autonomy, acting as a kind of cognitive prosthesis or assistant that can help the physician achieve the goal of better treating the patient.

### AUTONOMY DOES NOT REQUIRE EXPLAINABILITY

The medical decision tree is an example of what is increasingly called “explainable AI”—AI tools whose processes and indications are understandable, in varying degrees, by human users. Though typically less accurate than more complex algorithms, decision tree models are sometimes preferred in medical contexts because of their relative transparency and intuitive nature.<sup>57</sup> Explainability can be viewed through the lens of promoting human autonomy: If a diagnostic algorithm is easy to understand, a physician can make an informed judgment about when it is appropriate to let the algorithm guide the decision. Greater *comprehension* allows for more informed decision-making and the ability to choose.



## COMPREHENSION: EXPLAIN HOW TO USE AND WHEN TO TRUST AI

### Themes

Intelligibility, transparency, trustworthiness, accountability

### Examples

- Explainable AI algorithms helping judges or hiring managers make better decisions
- A vehicle operator understanding when to trust autopilot technology
- An AI-based tool informing decision-makers when they are being “nudged”
- A chatbot not masquerading as a real human

Unfortunately, many forms of AI, such as medical decision algorithms derived from deep learning or the algorithms used to pilot semiautonomous vehicles, do not afford similar transparency or interpretability. Providing “why” explanations to accompany black-box predictive algorithms is an ongoing area of research.<sup>58</sup> But today’s state of the art is such that full explainability is not always a realistic goal. Yet this need not raise an ethical red flag: Explainability might not always be necessary or even desirable. In such low-stakes scenarios as product recommendations, there may be little demand for the explanations behind specific algorithmic outputs. And in high-stakes scenarios, the additional accuracy provided by complex algorithms might trump the desire for transparency and explainability. This is yet another example of an ethical tradeoff that should be deliberated.

In scenarios involving highly complex algorithms, the concept of *trustworthiness* might be a more useful organizing principle than explainability.<sup>59</sup>

For example, few drivers or airline pilots fully understand the inner workings of their semiautonomous vehicles. But through a combination of training, assurances provided by safety regulation, the manufacturer’s reputation for safety, and tacit knowledge acquired from using their vehicles, the user develops a working sense of the conditions under which the vehicles can be trusted to help them achieve their goal of safely getting from point A to point B. It is notable that recent examples of semiautonomous vehicle crashes have resulted from unwarranted levels of trust placed in driver assistance systems.<sup>60</sup> To reduce the risk of accidents, what is needed is not full explainability but rather a working sense of the conditions under which the algorithmic system should and should not be trusted.

## NUDGING IN THE SERVICE OF AUTONOMY

Most discussions of AI’s impact on human autonomy focus on the type of *deliberative* decision-making that the cognitive scientist Daniel Kahneman calls “System 2” or “thinking slow”:<sup>61</sup> diagnosing a patient, hiring a worker, releasing a defendant on bail. But AI technologies can also affect more *reflexive* “System 1” or “thinking fast” decision-making. For example, people are disproportionately likely to choose the default option, the option described in the most intuitive language, the option that comes up first in the search engine, or the option they believe similar people tend to make. Because of such innate tendencies, what Richard Thaler and Cass Sunstein call “choice architecture”—or “nudging”—can significantly influence people’s decision-making.

For example, recall the state agency that, in using an AI algorithm to flag potentially fraudulent UI claims, chose to selectively “nudge” claimants toward honest behavior rather than selectively cut off benefits based on the algorithm’s output. This use of behavioral nudges allowed the agency to avoid the unintentional maleficence of denying



needed benefits to legitimate claimants. But nudging can also have implications for autonomy. For example, nudge interventions shouldn't mislead with false information or otherwise manipulate people to act in ways that go against their self-interest.<sup>62</sup> Recall the ethical imperative to avoid “manipulative or distorting external forces.”

Commentators increasingly warn of the autonomy-threatening potential of AI technologies infused with behavioral design. In a recent *Scientific American* editorial, a distinguished group of scientists commented:

Some software platforms are moving towards “persuasive computing.” In the future, using sophisticated manipulation technologies, these platforms will be able to steer us through entire courses of action, be it for the execution of complex work processes or to generate free content for internet platforms, from which corporations earn billions. The trend goes from programming computers to programming people ... The magic phrase is “big nudging,” which is the combination of big data with nudging.<sup>63</sup>

The overarching—and legitimate—fear is that AI technologies can be combined with behavioral interventions to manipulate people in ways designed to promote *others'* goals. Examples include, behavioral algorithms coupled with persuasive messaging designed to prompt individuals to choose products, political candidates, privacy settings, data-sharing agreements, or gig work offers that they might not choose if they had better self-control or access to better information.

However, the flip side is that nudging ethically carried out can often *enhance* rather than diminish human autonomy. For example, AI algorithms can customize and target behavioral interventions that, when embedded in data-rich, digital environments,

can make it easier for people to save more for retirement, engage in healthier behaviors, drive more safely, and more effectively manage time and collaborate on the job.<sup>64</sup> Just as a medical decision tree enhances physicians' autonomy by enabling better deliberative decisions, so too can effective choice architecture enable boundedly rational individuals to better achieve their goals through improved reflexive or habitual decisions. In each case, the AI is autonomy-enhancing.

Furthermore, the choice architecture pioneer Cass Sunstein points out that in many situations, *denying* people the benefits of smart choice architecture can in fact *undermine* their autonomy. For example, when tasked with navigating a complex set of health or employee benefit choices, an algorithm might be used to highlight an appropriate default choice (with the full menu of choices a click away). Avoiding such choice architecture might force the individual to spend a great deal more time researching and deliberating this decision, potentially impairing his or her ability to pursue other goals that he or she deems more important. In such a case, Sunstein would say that people should be given the option to “choose not to choose.”<sup>65</sup>

**Cass Sunstein points out that in many situations, *denying* people the benefits of smart choice architecture can in fact *undermine* their autonomy.**

The central issue in these considerations appears to be *control*. Respecting individual autonomy requires that people have the freedom to make their own choices—including, paradoxically, the freedom to choose to be “nudged” or guided in ways that they believe enhance their well-being.



## CONTROL: ALLOW PEOPLE TO MODIFY OR OVERRIDE AI WHEN APPROPRIATE

### Themes

Consent, choice, enhancing human agency and self-determination, reversibility of machine autonomy

### Examples

- Decision-makers (such as a vehicle operator) can override an algorithm that is clearly going astray
- Choice architecture enables access to the full menu of choices if the algorithmically generated default isn't acceptable

Once again, the concept of *trustworthiness* is paramount. When presenting people with a deliberately designed choice architecture, it is incumbent upon the architect to communicate to users that they are, in fact, being nudged, to give

them the ability to opt out (in this case, see the full menu of choices); and, most importantly, cultivate their trust that the choice architect has designed the choice environment in ways that help them achieve their goals.

## Ethical AI by design

Ethics is often viewed as a constraint on organizations' abilities to maximize shareholder returns. But we suggest a different perspective: that ethical principles can serve as design criteria for developing innovative uses of AI that can improve well-being, reduce inequities, and help individuals better achieve their goals. In this sense, the principles of impact, justice, and autonomy can help shape AI technologies in ways that achieve what marketing, management, and design professionals, respectively, call customer-centricity, employee-centricity, and human-centricity. Developing trustworthy AI technologies that safely and fairly help advance these goals is a distinctly 21st-century way for organizations to do well by doing good. ●

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# Innovating for all

**How CIOs can leverage diverse teams to foster innovation and ethical tech**

BY KAVITHA PRABHAKAR, KRISTI LAMAR,  
AND ANJALI SHAIKH

*ILLUSTRATION BY KEVIN WEIER*

Many chief information officers (CIOs) recognize that tech teams with diverse backgrounds and mindsets can support innovation and drive transformational growth by openly sharing perspectives, focusing on user-centric design, and consciously exploring potential outcomes to avoid unintended harmful results. In this article we share how CIOs can intentionally build environments that support responsible technological innovation.

## Guarding against unintended consequences

A lifesaving innovation in automobile manufacturing—airbags—entered the mainstream in the early 1990s. By October 2001, the National Highway Traffic Safety Administration estimated that airbags saved more than 7,500 lives. But these early airbags also killed 195 people during this period, mostly children and women under 5’2”.<sup>1</sup> Shorter drivers and children sit lower in the front seat, so they are more likely to absorb the full force of a deploying airbag. Until 2011, the federal government did not require crash testing with female dummies—only large male dummies.<sup>2</sup> If women and small passengers had been considered, during the design and testing, it’s likely that there would have been significantly fewer airbag-related deaths during these years.

Fast-forward to today. While professions such as medicine have a Code of Medical Ethics—“first, do no harm”—technologists tend to lack an overarching, consistently applied code of ethics to guide their innovations, many of which have been developed with a focus on being first-to-market and revenue generation.

Ethan Zuckerman, director of the MIT Center for Civic Media and associate professor of the practice in media arts and sciences at MIT, agrees: “Technology has always been a catalyst for change, but technology has also been capable of harm. It

sometimes causes harm even in situations where people are cognizant of its ability to cause harm.”<sup>3</sup> Companies can waste vast amounts of time and money creating something that may exclude a customer group or providing a service that customers want but with undesirable side effects that must be fixed after deployment. Perhaps even worse, they may build solutions that undermine customer trust—think of the many problems that have resulted from lax data security and confusing privacy controls.

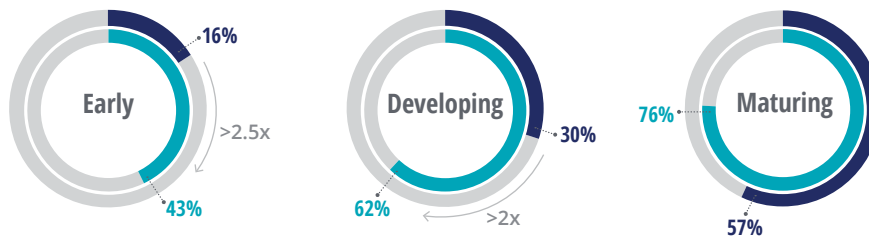
The good news is that many organizations are starting to recognize that innovation and ethical tech need to be taken into consideration together. The fifth annual *MIT Sloan Management Review* and Deloitte study of digital businesses found that companies that innovate more are more likely (76 percent) to have adopted policies that support their organization’s ethical standards for their digital initiatives than companies that innovate less (43 percent). However, in companies that innovate more, a smaller percentage (57 percent) believe their leaders spend enough time thinking about and communicating the impact the organization’s digital initiatives have on society, while only 16 percent of companies that innovate less agree with this statement (figure 1).

While the need for ethical tech design is not new (see the sidebar, “From our vantage point: Ethical tech” on page 86), what is new is the accelerating speed at which companies can churn out

FIGURE 1

## Digitally maturing companies are more innovative and more likely to have adopted policies to support their organizations' ethical standards in digital initiatives

- Our organization has explicit policies in place to support our ethical standards with respect to our organization's digital initiatives
- Our organization's leaders spend enough time thinking about and communicating the impact our organization's digital initiatives have on society



60% of CIOs from maturing companies say their company is spending enough time thinking through the impacts of their organization's digital initiatives.

Source: Gerald C. Kane et al., "Accelerating digital innovation inside and out," *MIT Sloan Management Review* and Deloitte Insights, June 4, 2019.

technology-based innovations, many with unintended societal and business risks. In addition, artificial intelligence (AI), descriptive analytics, and data mining identify patterns that can aid breakthroughs, but they can also perpetuate stereotypes and biases that are hidden in the data.

According to Ray Kurzweil, author of *The Singularity is Near*, our overall rate of progress is doubling every decade: "We won't experience 100 years of progress in the 21st century—it will be more like 20,000 years of progress."<sup>4</sup> With this exponential growth rate, laws and regulations intended to protect individuals from harm likely cannot keep up. Perhaps the key is to ensure that the needs of all potential customers are considered from the beginning of the design process. But codesigning with customers is easier said than done, especially for large organizations. Instead, Zuckerman encourages CIOs to focus on "ensuring there is a diverse set of voices at the table so that their collective understanding is less naïve and less biased." He explains that diversity can help design

teams detect unexpected problems and develop understanding of others' sensitivities. "It can be helpful to have people on a team who are trained not just to say, 'here is a problem I will solve it,' but also to say, 'how did that problem come about?' This is really what it means to think critically about technology."



## FROM OUR VANTAGE POINT: ETHICAL TECH

Ethical tech refers to discussions, practices, and decision-making behaviors that can help organizations explore, understand, and mitigate the potential consequences of disruptive technologies. These discussions are the natural evolution of tech-savviness, whereby nearly every individual operating in business today benefits immensely from increasing their fluency in the language of disruption. By extension, organizations can also reap rewards from their employees' enhanced ability to recognize and debate the potential effects of applying emerging technologies, as well as to weigh alternatives in the design, implementation, and adoption of these tools.

Ethical tech may often be confused with business ethics—which is covered by compliance, legal, and risk. Ethical tech can be aligned to these entities, but the policies in place often do not provide a method for how to deliberate and address ethical tech dilemmas that take into account the diverse needs and demands of larger user bases (figure 2). Catherine Bannister, US development and performance leader at Deloitte US, says, “It is important to determine whether and where an organization might apply checks and balances in order to pivot or pause a technology initiative if potential problems are identified.”<sup>5</sup> Not only can a framework for ethical tech decision-making allow a company to anticipate and avoid potential landmines, but setting clear parameters around how to identify and evaluate tech dilemmas can also enable a company to innovate faster.

FIGURE 2

### Ethical tech can be achieved through decision-making behaviors informed by a diverse and inclusive perspective



Source: Catherine Bannister, Deloitte, US development and performance leader.



Some CIOs, such as Sabina Ewing, chief information officer of Pfizer Upjohn, understand the importance of taking an ethics-first approach to tech design by building diverse teams that reflect the myriad mindsets and backgrounds of the end consumer. She explains that “technology today is ubiquitous, and, in and of itself, it’s nondiscriminatory.” However, she stresses that as “customer demographics expand, CIOs and IT leaders have to be careful to think about the potential outcomes—and that comes by ensuring that the people building and designing technology have varying opinions.”<sup>6</sup>

Many forward-thinking companies and universities are taking the lead on defining an ethical foundation to guide tech design and innovation.<sup>7</sup> Judith Spitz, PhD, founding program director of the Initiative for Women in Technology and Entrepreneurship in New York (WiTNY) at Cornell Tech, says, “Diversity is more important than ever. A diverse workforce is your first line of defense against algorithmic bias.”<sup>8</sup> Having people with a wide range of experiences and mindsets at the table who are free to question, build, and govern technology design can help avoid unintended biases before deployment, sidestepping possible harm to individuals and the company’s brand and reputation.

## Being the voice of the customer

Deloitte’s Center for Consumer Insights reports a seismic shift over the last 50 years, from a homogenous US population to one that’s incredibly diverse and heterogenous across all key demographics: race, age, generation, health, ethnicity, economics, and education (figure 3). It’s important for companies to understand these changes to identify pockets of opportunities for innovation.<sup>9</sup>

Many forward-looking companies are creating teams and roles that reflect their diverse customer

base to help organizations innovate to drive transformational growth. Mindy Simon, CIO of Conagra Brands, believes diverse teams create a competitive advantage by fueling disruptive innovation—leading to better products and solutions for customers. She says, “We believe diverse teams create a competitive advantage by fueling disruptive innovation. When our team’s diversity reflects the diversity of our customers, we are able to create products and solutions that consumers will use every day.”<sup>10</sup>

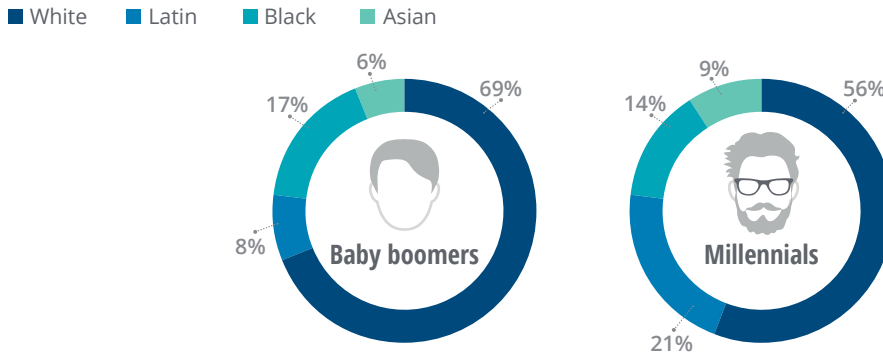
A 2013 Harvard survey identified two types of diversity: inherent and acquired. Inherent diversity traits are ones you are born with (gender, race, sexual orientation, etc.). Acquired diversity traits

### FROM OUR VANTAGE POINT: NECESSITY IS THE MOTHER OF INVENTION

Diversity is important for enabling both innovation and ethical tech. Nishita Henry, chief innovation officer at Deloitte Consulting, affirms that “diversity catalyzes innovation.” She points out that diversity often uncovers opportunities for innovation, as well as solutions: “Multiple viewpoints from different industries, economic backgrounds, educational experiences, genders, and ethnic backgrounds can provide the perspective on what should be innovated on—and solving those problems requires that same diversity.”<sup>11</sup> Leveraging diversity in innovation becomes even more important in this day and age, where we should make sure that emerging tech—such as AI and automation—are applied equally and consistently. She agrees that CIOs should focus on the diversity of their workforce, but also advises CIOs who are looking to partner within the technology and innovation ecosystem to consider a set of diversity criteria and culture that they want to see in their partners.

FIGURE 3

## The consumer base is now more diverse and heterogeneous, leading to a broader consumer base with varied sets of demands and needs



Millennials, who now represent **30% of the population**, are more diverse than any other generational cohort in US history.

Source: US Census Bureau, 2017 report, Pew Research Center.

are gained through experience (education, places where you've lived, socioeconomic background, etc.). The study showed that organizations with leadership teams that have a combination of at least three inherent and three acquired diversity traits out-innovate and outperform the others; these organizations are 45 percent more likely to report growth in market share and 70 percent more likely to report capturing a new market. Perhaps more surprisingly, when even one member of the leadership team shares the targeted customer's ethnicity, the entire team is 152 percent more likely to understand the customer.<sup>12</sup>

American Express is elevating its commitment to understanding the customer through its diversity and inclusion (D&I) strategy, which includes regular reviews of its goals, metrics, and the diversity within its workforce. Licenia Rojas, senior vice president and unit CIO at American Express, is proud of helping to create a workforce that reflects a diverse customer base and being part of an organization where D&I is part of the company's DNA.<sup>13</sup> Rojas leads a team providing technology support for the organization that is responsible for

all of American Express' external and internal servicing functions, with a focus on driving a best-in-class servicing experience for customers and colleagues.

For American Express, having a diverse team and allowing everyone to share from their perspective is a strategic imperative. She explains, "The diversity of the teams at American Express results in being able to get representation of different customer segments and customer needs across various markets, enabling them to drive innovation and growth." For example, her team continually considers facts such as that women control 75 percent of discretionary spending worldwide, and that the spending habits and incomes of millennial consumers may not allow them to make buying decisions similar to other generations.<sup>14</sup>

Rojas shared a recent example of a previous small business owner who joined the team and has been able to bring great perspective from being on the other side of the table. This has benefited the entire team as they think about their digital transformation initiatives that impact their

small-business-owner customer segment. She says, “These diverse perspectives also are helping us consider new ways to use disruptive and emerging technologies—machine learning, blockchain, robotics/automation—to create the best experiences for our customers. When you have individuals from diverse backgrounds, they will drive innovation and transformation—it’s a fact.”

## Deploying the transform- ational power of all

Many design dilemmas began with a homogeneous group of people designing products, processes, or services without thinking through how other types of people might be affected by a or prefer to use the technology. Now, IT leaders at leading companies are proactively changing that dynamic by seeking individuals who represent the full range of stakeholders—customers, employees, and other end users—to foster innovation and help ensure their voices are heard from the beginning of the design and decision-making process.

Our conversations with CIOs and other leaders who are committed to embedding diversity and inclusion within technology teams led us to several suggestions for other CIOs and IT leaders.

- **Avoid “just checking the D&I box.”**  
“Diversity isn’t a silver bullet. It’s important to encourage varying opinions; gender or race alone doesn’t determine that someone will think differently,” says Ewing. Diverse thinking spans socioeconomic backgrounds, generations, education, geographies, cultural differences, and more. Effective leaders encourage each person to summon the courage to express their unique perspectives, secure in the knowledge that their insights are contributing to a better outcome. Even when opinions are not fully changed, progress toward more ethical and innovative tech outcomes can be made when individuals leave with a broader perspective

# *looking back* Deloitte on women in the workforce

1947

“According to statistics compiled from income tax returns, five million families in the United States are wholly dependent upon the earnings of women. These significant figures should convince anyone that to women, jobs are a serious matter, not, as has been charged in some quarters, just a source of pin money.”

## Jennie Palen

First female principal and  
first female department head  
at Haskins & Sells



than when they came in. She emphasizes, “There must be a legitimate dialogue, not just diversity for name’s sake—which requires all voices can be heard.”

## “We must shine a mirror on ourselves and raise awareness that our experience is personal, not universal.”

— *Catherine Bannister, US development & performance leader, Deloitte*

- **Ensure all voices are at the table.** If you have a technology that removes human discretion from human problems, you may have a higher obligation to design in such a way that the end users are involved in the requirements of the system. Educating and raising awareness to help teams ensure that the team represents the customer demands and expectations is fundamental—and often requires looking at all levels within the organization. Sheree Atcheson, head of diversity and inclusion at Monzo, says, “Most of the diversity within an organization—women and underrepresented minorities—is still typically found in mid- and junior-level roles. Leaders need to ensure they are bringing mid-management along on the journey to understand the benefits of diversity and inclusion and providing junior-level team members an opportunity to speak up as well.”<sup>15</sup>
- **Increase awareness of biases.** Diverse teams and defined processes are critical, but overcoming bias begins with individuals becoming aware of their own unconscious biases.<sup>16</sup> Companies are increasing awareness using tools, workshops, and tests, such as those offered by Project Implicit, a nonprofit organization led by international researchers to

help teams uncover biases across many categories, from race to religion to sexuality to weight. Its goal is to educate the public about hidden unconscious biases. Other techniques, such as focus groups or partnering with organizations that speak for underrepresented groups, can also build awareness of our biases.

- **Embed ethical design into the process.** Rather than building in ethics considerations after things have gone awry, the “do no harm” thinking should be built into the process from day one with the customer in mind, with the goal of creating transformational—not just incremental—change. Angela Antony, CEO and founder of Scoutible—an AI platform designed to eliminate unconscious bias from the hiring process—practices what she preaches. As she thinks about the ethical tech design of her own system, which tackles traditional hiring practices that are mired in unconscious biases, she says, “Building ethical technology doesn’t have to be time-consuming if it’s integrated from the start.”<sup>17</sup>

While “tech ethics” and “ethical tech” have recently entered the business lexicon, there’s nothing new about the need for considering potential unintended consequences to others when designing innovative products, processes, and solutions. But as technology becomes omnipresent and pervasive in our lives, it is the CIO’s responsibility to create technology that delivers innovative benefits without unintended harmful outcomes.

Many leading CIOs are adopting responsible tech approaches and building diverse and inclusive teams that reflect the mindsets and backgrounds of the end customer while bringing a variety of experiences and worldviews to the table. With new technologies rapidly emerging on the horizon, this is only the beginning of the evolving conversation about how organizations can generate transformative growth through emerging

technology while avoiding consequences that exclude or harm others.

But the responsibility for technological innovation that ensures human- and customer-centric design

doesn't start and stop with the CIO. They can lead their teams by facilitating conversations that go far beyond avoiding damage to others—they can help build a more inclusive world. ●

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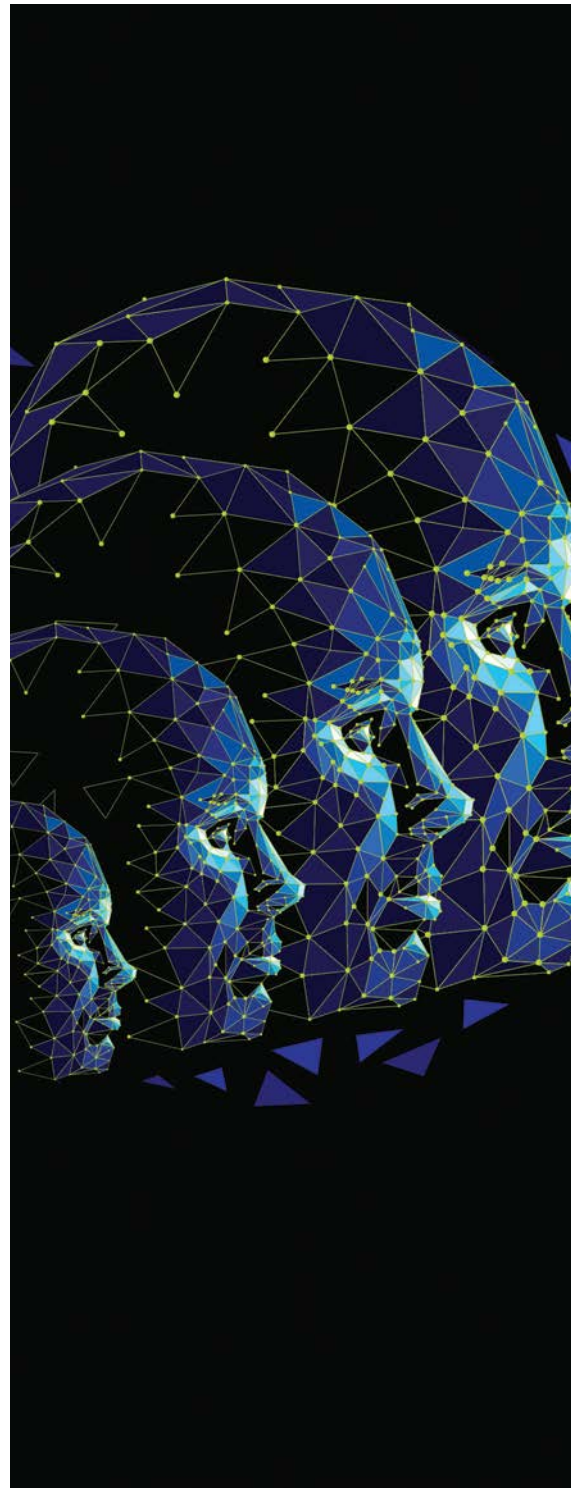
# Automation with intelligence

## REIMAGINING THE ORGANIZATION IN THE “AGE OF WITH”

**2**020 LOOKS TO be a breakout year for intelligent automation, as more organizations explore technologies such as robotic process automation (RPA) and other artificial intelligence (AI) tools to automate work that formerly required human intelligence to perform. Fifty-eight percent of the executives in our 2019 global intelligent automation survey reported that their organizations had “started their intelligent automation journey,” with 8 percent saying they were automating at scale (51 or more automations)—double the percentage that said the same in 2018.

Surveyed executives estimated that intelligent automation would decrease costs by 22 percent and increase revenue by 11 percent, on average, over the next three years. Notably, organizations that were automating at scale reported that their implementations had already reduced costs by 27 percent. Intelligent automation efforts may also exceed expectations: Respondents whose organizations were piloting intelligent automation (1–10 automations) said that they expected an average payback period of 15 months, but respondents from organizations that were automating at scale reported an average payback period of only nine months.

A surprising proportion of respondents seemed unaware of the implications of intelligent



automation for their workforce. Forty-four percent of surveyed executives said that their organizations had not yet calculated how their automation strategies will affect roles and tasks within their workforce, while 60 percent reported that they had not looked into whether automation will require their workers to retrain. This finding is the more surprising because automation has the potential to yield greater value when combined with workforce redesign—as well as giving organizations an opportunity to improve the human experience as roles are redesigned and work is made more meaningful.

Our findings point to six success factors among respondents that were achieving value from intelligent automation:

- **An enterprisewide strategy for intelligent automation.** Companies with an enterprisewide strategy reduced costs by an average of 24 percent and increased revenue by an average of 8 percent. Organizations without an enterprisewide strategy reduced costs by an average of only 14 percent and increased revenue by an average of 3 percent.
- **Combining RPA with AI.** This appears to be one of the most powerful factors driving the extent to which an organization’s automation efforts increased revenue. Organizations that had combined RPA and AI as part of their intelligent automation strategy reported a 9 percent average revenue increase as a result of their automations; those using only RPA reported just a 3 percent revenue increase.
- **Adequate technology, infrastructure, and cybersecurity.** Organizations with a supportive IT function and that had the required technology, infrastructure, and cybersecurity in place reported an average 21 percent cost reduction, compared to an average 13 percent cost reduction among organizations that lacked these attributes.
- **Mature process definitions, standards, and processes.** Organizations that had mature process definitions, standards, and processes were able to increase back-office workforce capacity by an average of 19 percent, compared to only 12 percent among organizations that did not.
- **A clear understanding of how to capture value.** This appears to be a strong factor driving the extent of an organization’s cost reductions from automation. Respondents who reported having a clear understanding of how to capture value from intelligent automation said that their organizations reduced costs by 21 percent on average, while those who lacked a clear understanding reduced costs by only 15 percent.
- **Radical simplification driven by a need for cost reduction.** Seventy-three percent of the organizations automating at scale said that the main purpose of their strategy was radical simplification driven by a need for cost reduction; only 61 percent of piloting organizations took the same stance.

The future of intelligent automation is full of potential. To successfully exploit the possibilities, organizations will need to develop a clear path to scalability that delivers quantifiable results and return on investment. ●

To learn more, read *Automation with intelligence* on [www.deloitte.com/insights](http://www.deloitte.com/insights).



## The future of health

**H**EALTH IN 2040 will be a world apart from what we have now. Digital transformation—enabled by radically interoperable data, artificial intelligence (AI), and open, secure platforms—can allow the health care industry to address consumer well-being more proactively. Cultural changes are now encouraging consumers to take a broader, more complex view of their health that focuses on maintaining mental and physical well-being rather than seeking treatment only when sick or injured.

By 2040, streams of health data, together with data from a variety of other relevant sources, will likely merge to create a multifaceted and highly personalized picture of every consumer's well-being. Consumers today are already growing accustomed to wearable devices that track activity. As these data-gathering devices become exponentially more sophisticated, they can aid in identifying conditions, risks, and suboptimal behaviors so that they can be addressed early. Analyses conducted by a tech-enabled toilet, for example, might be able to spot biomarkers that could indicate a potential change in health status long before symptoms appear.

At the same time, consumers' attitudes toward their own health are likely to shift toward sustaining well-being rather than responding to illness. Demand for health services that offer ongoing advice and support will likely rise. Greater emphasis on well-being and prevention could result in fewer and less severe diseases, which could allow people to avoid many of the catastrophic conditions—and health care expenses—that exist today.



Many health care industry incumbents—providers, health plans, and pharmaceutical, medical device, and biotechnology companies—may be understandably hesitant to drive change in a marketplace that they currently dominate.

For those who do become ill, sophisticated tests and tools could mean that most diagnoses (and care) can take place at home. Treatment can become highly personalized, drawing on a wealth of data and AI-based tools to create customized insights into a consumer's health.

Armed with highly detailed personal information about their health, consumers can own their health data and play a central role in making decisions about their health and well-being. Indeed, health care in 2040 will likely be organized around the consumer, rather than around the institutions that drive the current health care system. Accustomed to transformations that have occurred in other sectors, such as e-commerce and mobility, consumers will likely demand that health care follow the same path to become an integrated part of their lives.

Many health care industry incumbents—providers, health plans, and pharmaceutical, medical device, and biotechnology companies—may be understandably hesitant to drive change in a marketplace that they currently dominate. Given their strong foothold in the existing ecosystem and their ability to navigate the regulatory environment, these organizations may be well-positioned to lead from the front. However, a number of technology-focused companies are beginning to disrupt the existing market. Legacy stakeholders should consider whether to disrupt themselves or isolate and protect their offerings to retain some of their existing market share. Incumbent players that are able to reinvent themselves could help usher in the future of health, while some could succumb to competition coming from outside the traditional industry boundaries. ●

To learn more, read *Forces of change: The future of health* on [www.deloitte.com/insights](http://www.deloitte.com/insights).

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**HUMAN PERFORMANCE IN A DIGITAL WORLD**

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# 2029



# A new mindset for public sector leadership

## Take the #TenYearChallenge

BY REBECCA GEORGE, ALEX MASSEY, ADAM KING, AND ED RODDIS

ILLUSTRATION BY SHOTOPOP

Have you taken the #TenYearChallenge? For the uninitiated, it is a social media dare in which people share a photo of themselves from 2009 alongside a current snap. Whether you join in or not, it is a reminder of how much we—and the world around us—change over a decade.

For leaders in government and public services, it raises three questions: How has the public sector environment changed in the past 10 years? What has this meant for the capabilities its leaders now need? And, crucially, what can leaders do now to prepare themselves for the 10 years ahead?

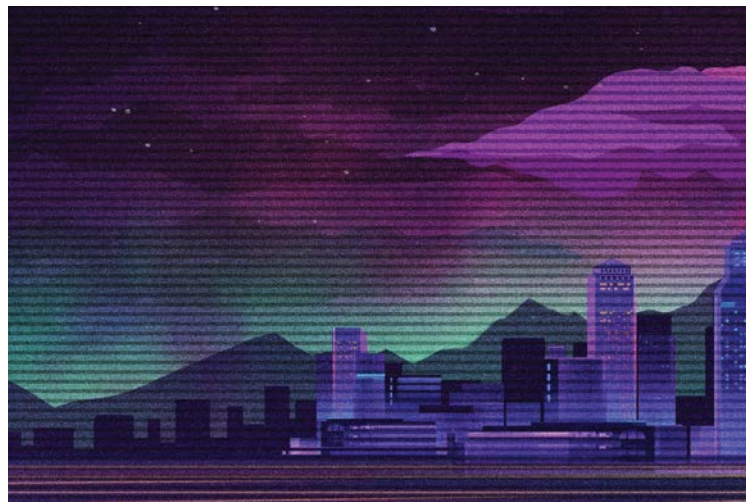
## The public sector in 2009

The public sector was in a very different place in 2009. In the United Kingdom, for example, the size of the government workforce was at its highest level since records began, and health spending was at a historic high.<sup>1</sup> But as then Prime Minister Gordon Brown dealt with the fallout from the global financial crisis, the then opposition leader, David Cameron, warned of a coming “age of austerity.” In the years that followed, austerity under Cameron’s government drove down budgets and headcounts across public services, while at the same time stimulating new business models, a shift to shared services, and an emphasis on digital transformation. And now, in 2019 leaders across the UK public sector are grappling with various challenges, such as alleviating citizens’ demand for their services, driving inclusive economic growth, and managing the implications of the United Kingdom’s exit from the European Union.

Brexit aside, most of these trends are equally evident in governments and public sectors around the world. Spending power has fallen, public sector workforces have shrunk, organizational models have diversified, and technology is central to change, while citizens’ expectations have continued to soar.<sup>2</sup>

## The breadth of public sector leadership

Leadership in the public sector is a broader concept than many commentators acknowledge. Think of all the leadership positions across government and the public services: school principals, medical directors, military officers, police chiefs, government officials, heads of service, and research scientists, to name but a few. Then there are directors and chief executives of local government, health care providers, educational institutions, and more. And there are nonexecutive and elected representatives at multiple levels. Some of these jobs require deep technical knowledge, some daily interaction with citizens, and others an ability to manage spending negotiations with finance ministries and departments. Leadership also takes place at all levels in an organization—not just in the C-suite. In other words, public sector leadership is diverse across multiple dimensions.



The public sector mission, however, in many cases, is timeless. In local government, officials and elected representatives will always want to make their area a great place in which to live, work, and invest. In health care, clinical and nonclinical staff will always want the best outcomes for patients. And in government, departmental officials will always want to develop workable policies and deliver programs that bring political commitments into being. What has changed across the entire public sector is the environment in which these missions are pursued, provoking at least five fundamental shifts in what is expected of public sector leaders.

## Five shifts in what is expected of leaders

The first shift is that more than ever, creativity is needed to get results. In this age of budget restraint, public sector bodies often need to “make do and mend,” finding new and creative ways to deliver results. This often involves working with the private and voluntary sectors, which means that relationships need to be built with stakeholders in very different organizations with very different cultures. It can also mean that

leaders need to embrace new technologies and iterative, agile approaches to change, not least in digital transformation, where success can depend on the courage to experiment, fail fast, and adjust in order to keep a project moving forward.

Second, leading in the public sector has become more challenging and relentless than ever, and as a result, personal resilience has become a “must have.” Leaders tend to be talented people who are excellent at what they do, but in today’s public sector, they are more stretched than ever. Many are asked to deliver more and more with less and less, often in uncertain policy environments. But they are all committed to doing their utmost because they have a strong sense of integrity and public service.

Resilience is a hugely positive characteristic, but it should not be mistaken for invincibility. Leaders are not impervious to stress, burnout, or other factors that can affect their well-being. All leaders need to understand their own limits and know when to take time out to reenergize. One of the most encouraging workplace trends in recent years is that taboos about mental health in the workplace are increasingly breaking down. The best and boldest leaders have become champions for the well-being of others, as well as guardians of their own.



The third shift in the past 10 years is a blurring of the limits and boundaries of leadership. Fewer public sector leaders operate solely within their own organization. At a local level, services increasingly converge around the citizen as the most effective way to improve outcomes. Nationally, it's hard to separate public health from education, national security from transport and border security, housebuilding from homelessness, and infrastructure projects from industrial strategies.

## The best and boldest leaders have become champions for others' well-being as well as guardians of their own.

As a result, in order to make progress, the best public sector leaders are working together and ignoring traditional boundaries. This has changed their approach from “direct” organizational leadership to “networked” leadership. Leaders now need to connect effectively with peers and exert influence over people who are outside their hierarchy, which requires different skills and behaviors from the old command-and-control approach. This shifting boundary between the public, private, and third sectors means that collaborative system leadership is more important than ever.

The fourth shift is that the public sector has become more complex. Increased complexity requires leadership styles that embrace ambiguity, ask the challenging questions, and don't look for easy answers. Where leaders have risen through a technical or specialist route, they are now likely to need a far broader set of skills and mindsets. One area where different skills are needed is in driving organizational effectiveness and efficiency, where

capabilities often associated with business, such as commercial acumen, project management, and innovation, have become more necessary than ever.<sup>3</sup>

The fifth shift is a result of this increased complexity: Effective leaders cannot be all things to all people. We often expect public sector leaders to be experts in leading their organization or service, with an intimate knowledge of how legislation is passed, translated into policy, and delivered to time and budget. We expect them to maintain their

excellent specialist knowledge, and tackle anything else that comes along, whether it be technology, new methods of contracting, or new financial regulations. But in reality, they cannot do it all. That's why public sector leaders need to be masters of prioritization and building the right teams around them. They need to identify what matters most

and focus on it, revisiting that choice continually. And they need to identify the right blend of skills they need in their teams, and how to shape it accordingly.

## Looking forward: The new public sector leadership mindset

The demands on public sector leaders have changed substantially over the past 10 years, but what about the next 10? What capabilities should today's leaders and future leaders be developing?

Looking ahead to 2029, our analysis suggests the public sector will change more in the next decade than it did in the last. So much so, that new capabilities will not be enough. Next-generation leaders around the world will need an entirely new mindset to thrive in the future of government and public services. Let us explore the public sector's direction of travel and what it means for leaders.



Public leaders need to be clear on what technology can do for their organization. The days when those at the top could cheerfully admit to being a Luddite ended some time ago.

## The public sector in 2029

While governments affected by the global financial crisis have stabilized their day-to-day finances over the past decade, the dominant trend for public spending in the next 10 years remains downward.<sup>4</sup> Of course, changes in political direction can affect levels of tax and spending, but demand pressures in most advanced economies and government debt levels in many are still likely to constrain public spending power in the medium term. As a result, public sectors around the world will continue to focus on cost control, managing down citizen expectations and managing up productivity.

This means that the environment for leaders will remain challenging and support will be more important than ever. A taskforce backed by the UK government recently concluded that personal networks for leaders are at present under-developed.<sup>5</sup> Many could benefit from peer-to-peer experience as well as the kinds of coaching and mentoring that such networks would create for support and reflection. It's a model that, if successful, could be replicated at national level by governments around the world.

The difficult fiscal environment also means that the creativity leaders have developed in the past

decade will be needed even more in the next, not least in their application of technology.

Many commentators have recognized that the world is entering a Fourth Industrial Revolution, characterized by technologies that are bringing together the physical, the human, and the digital in an entirely unprecedented way.<sup>6</sup> While some larger public sector bodies around the world have begun realizing the benefits of such technologies, Deloitte research suggests that most public sector organizations are yet to invest at scale, prioritizing instead fundamentals such as cybersecurity.<sup>7</sup> Looking ahead, public sector bodies that manage high volumes of rules-based transactions could have much to gain from robotics, and the time saved in health care by using technologies like artificial intelligence could be reinvested so that clinicians can spend more time with patients. A recent study into preparing the health care workforce for future technologies called this the “gift of time.”<sup>8</sup> The potential for Industry 4.0 technologies in government is huge. Our own analysis suggests that automating tasks using artificial intelligence (AI) could free up 96.7 million working hours annually in the US Federal government, saving some US\$3.3 billion—and that is a conservative estimate.<sup>9</sup>



While the public sector may be in the early days of the Fourth Industrial Revolution, there is little doubt it will seize its opportunities in the decade ahead. Doing so means that public sector leaders have to be clear about what technology can do for their organization. The days when those at the top could cheerfully admit to being a Luddite are coming to an end.

They will also need to understand technology's wider impacts. By 2029, AI will routinely be making decisions that affect people's lives. AI-driven systems could determine the urgency of a medical appointment or the allocation of a school place, and when that happens, public sector leaders should be clear on accountability, citizens' rights, and the legal provisions about data use.

Technology will also change the size, shape, and employment mix of public sector bodies. As digital and Industry 4.0 technologies become more widespread, the number of people engaged in administrative tasks such as data entry will drop substantially, while the number of skilled digital and AI experts will rise, albeit in smaller numbers.

The loss of administrative jobs to automation should not be as brutal as many headlines suggest, but a rather more gradual process in which clerical

staff are able to develop their roles as their administrative burdens are eased. That said, managing the roll-out of AI will oblige many public sector leaders to undertake significant levels of restructuring, with all the difficulties and hard choices that it entails.

Beyond restructuring, other workforce concerns are likely to preoccupy public sector leaders in the decade to come—not least, attracting the right talent. The global supply of health and care professionals is increasingly stretched, driven in part by the demands of an aging population.<sup>10</sup> Our research suggests that at the most senior levels, many roles are difficult to fill because they are seen as relentless and overexposed to risk.<sup>11</sup>

As a result, making organizations appealing as employers able to attract, recruit, and retain the best people will be a priority for public sector leaders. Public sector bodies, like those in the private sector, will have to wage a war for talent.

Approaches to staff engagement will also need to evolve. Traditional engagement channels will not be effective as the workforce diversifies, with contractors, associates, and people with a portfolio career complementing the part-time and full-time employee base, all of which will work with increasing flexibility in terms of hours and location. As the workforce becomes more diffuse, leaders will have to rethink how they motivate and communicate with their staff and remain visible.

Leaders also need to keep up with the pace of social change in order to create an organizational culture in which staff can perform at their best. Recent years have seen some welcome developments in the workplace, with corporations reporting on gender pay gaps and the best employers investing in inclusive treatment of staff. The public sector leaders of 2029 will have to be champions for all their employees, celebrating diversity and attracting talent by empowering people to be themselves at work.



Research into millennial preferences shows that many young professionals want to work for organizations that make a positive impact.<sup>12</sup> That should work in the public sector's favor in the battle for talent, but many public bodies are yet to make the most of this advantage in their recruitment efforts.

This assessment of the next decade suggests that public sector leaders will need to adapt their mindset to meet the challenges ahead. We conclude that leaders at all levels in the public


sector can take five actions now to tilt their thinking toward the future.


Public sector leadership is not easy, and never has been. But recognizing how the world is changing and getting on the front foot with the right leadership development can go a long way to help leaders make the most of their abilities and get ready for the future. So take the #TenYearChallenge by setting aside some time to reflect on how your leadership demands have changed over time and how they could change in the years to come. ●

FIGURE 1

## Five actions public sector leaders can take to be ready for the future

- 

**01 STAY ON TOP OF NEW TECHNOLOGIES AND THEIR POSSIBILITIES**  
Take responsibility for understanding what technology can do in pursuit of your policy objectives, incorporate it into your vision, and be willing to reimagine your organization with technology working in concert with people.
- 

**02 EMBODY A GREAT PLACE TO WORK, WITH A SENSE OF PURPOSE AND INCLUSION**  
Leaders set the tone of an organization, and in the battle for talent, public sector leaders will have to set a tone that is attractive to high performers. This means nurturing a culture that embraces different ways of working, a sense of purpose that people can rally behind, and a commitment to providing an environment that welcomes all.
- 

**03 INVEST ENERGY IN YOUR OWN SUPPORT**  
Leaders need people around them that they can trust. They should maintain relationships with people who will be honest and tell them if they need to take more care of their well-being. Such networks rarely form organically, so leaders must invest time and energy to build them.
- 

**04 DEVELOP YOUR INFLUENCE AND DELIVERY NETWORK**  
As the public sector becomes more collaborative, the best leaders will be able to exert influence beyond the boundaries of their own hierarchy. The most effective leaders will be highly networked.
- 

**05 RETHINK YOUR VISIBILITY**  
As government workforces increasingly work flexibly, remotely, and across organizational borders, leaders will need to maintain their visibility by rethinking the ways in which employees experience their presence.

Source: Deloitte analysis.

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# The makings of a more confident CMO

## Three ways to increase C-suite impact

BY DIANA O'BRIEN, JENNIFER VEENSTRA, AND TIMOTHY MURPHY

ILLUSTRATION BY JOSIE PORTILLO

As fast-evolving technology and consumer behaviors collide, the role of the Chief marketing officer (CMO) has evolved substantially, increasing the CMO's visibility and *potential* for leadership and influence. The CEO and other leaders in the C-suite look to the CMO to provide data-driven insight, contribute to strategic business discussions, and demonstrate how marketing drives growth.

Despite these expectations, many CMOs struggle with C-suite acceptance, according to our new survey (see sidebar, "Research methodology"). This lack of engagement is problematic for more than just the CMO. Organizations that marginalize their CMOs may pay a price in lost opportunities: Previous research reveals that when CMOs take on a more active role in growth initiatives, success follows in the form of higher long-term growth rates.<sup>1</sup> Yet some CMOs still struggle to find a voice at the C-suite table, with many of their peers viewing them more as senior tacticians rather than vital strategic partners.

Why have CMOs struggled? And just as important, what can CMOs do to elevate their stature to more effectively engage in discussions that drive enterprise value?

Our research suggests that CMOs sometimes disadvantage *themselves* through a lack of confidence as they engage with their peers. Greater self-awareness may be a first step CMOs can take toward achieving greater influence. That said, for

that self-confidence to be justified, CMOs must actively contribute to strategic discussions—by demonstrating ownership of key competencies, speaking the common language of the C-suite, and collaborating effectively with their C-suite peers.

Based on our study findings, we recommend CMOs start with these three things:

- 1. Give yourself permission.** Out of all the C-suite executives we surveyed, CMOs were the least likely to perceive themselves as high performers, even when their C-suite peers generally thought otherwise. Some CMOs are *unknowingly* relegating themselves to the sidelines of strategic conversations. To break this pattern, CMOs can start by giving themselves permission to admit what they don't know, ask questions outside their traditional scope, and get in the mix of discussions happening around them.
- 2. Own the customer experience.** The CMO is often the C-suite executive best placed to champion the customer's voice, help the organization appreciate the experiences their customers have, and hold the data to prove how those experiences impact customer behavior. We see the CMO defer to other functions to give voice to issues around the customer's experience. CMOs should work hard to understand what the data tells them about current customers and how to keep them, or how to attract target customers. That understanding can enable the CMO to become the C-suite's go-to person on customer

### RESEARCH METHODOLOGY

This article is based on data collected for the Deloitte C-suite study, which included a survey and in-depth interviews with 575 Fortune 500 executives across the C-suite, focused specifically on how C-suite executives view CMOs' contributions. The study was conducted between October 2018 and February 2019.



experience, even if direct responsibility may lie in other areas of the organization.

3. **Be the first to connect.** As organizations increasingly become more connected with customers, partners, and employees, collaboration is a necessity to successful execution of strategy. Still, we see CMOs collaborating at a lower rate than their C-suite peers. CMOs can work to change this by intentionally connecting and finding opportunities to work with C-suite colleagues on issues that are important to each, looking for ways to use customer insight to help each CxO reach his or her goals.

## Give yourself permission

“I don’t look at my role as singularly focused on marketing and communications. I think about this role as a business strategist just as much as a subject matter expert. When I sit down to have a discussion, I think a lot about the agenda, the topics at hand. I do my own research going in; I’ve talked to others in the industry to make sure I’m adding value at the same level as another member of the C-suite.”

— Dustee Jenkins, global head of communications, Spotify

Our research reveals a striking and unnecessary crisis of confidence among CMOs. For instance, when we indexed C-suite respondents on their ability to impact strategic decision-making, the overall direction of the business, and the ability to garner support for their initiatives among their peers, CMOs gave themselves a rather harsh assessment—*only 5 percent* consider themselves high performers, the lowest in the C-suite. This stands in stark contrast to the CEOs, 55 percent of whom consider themselves high performers. The average for CEOs, chief information officers (CIOs), and chief financial officers (CFOs) is 35 percent.

Fortunately, the lack of confidence among CMOs is largely more perception than reality (figure 1). Most C-suite members perceive the CMO to be performing at a level much higher than they see themselves, especially in areas such as demonstrating financial impact, customer expertise, and initiating collaborative efforts. In nearly all cases, some of the most influential players in the C-suite—CEOs, CFOs, and CIOs/ chief technology officers (CTOs)—believe CMOs deliver effectively on multiple fronts. This is particularly true for CEOs, who give CMOs much higher marks for performance than the other members of the C-suite give them. For the CMO, who often assumes poor self-performance, this zoomed-out view suggests that much of the C-suite respects and leans on the CMO’s expertise.

That being said, the chief sales officer (CSO) and chief operations officer (COO) may still need some convincing that the CMO is generally performing at a high level. This could reflect the competition for influence within this more closely aligned subset of the C-suite, or merely the natural tension in what each of these roles tend to value strategically. This finding further points to the need for CMOs to finely tune their messaging and interact more intentionally with peers.

## RECOMMENDATIONS FOR ACTION

*Get comfortable with being uncomfortable.* Margie Warrell, a leading author on building confidence, observes that people defer to “playing it safe” after achieving a small amount of career success.<sup>2</sup> These “successes” reinforce risk aversion and fear of failure. This phenomenon is especially relevant for CMOs. After decades of being asked to manage campaigns and act as brand custodians, they are now being invited to take a more strategic enterprise role, which may sometimes mean putting themselves in uncomfortable situations, taking professional risks, and embracing the opportunity to grow. Although navigating this new frontier can be daunting, CMOs who fail to do so

run the even bigger risk of irrelevance—both perceived and actual.

*Don't ask, just do.* CMOs receive their highest evaluations from the C-suite in demonstrating an understanding of the customer (figure 1). This position of expertise is a natural “in” with C-suite colleagues. Rather than waiting for others in the C-suite to define their role and contributions,

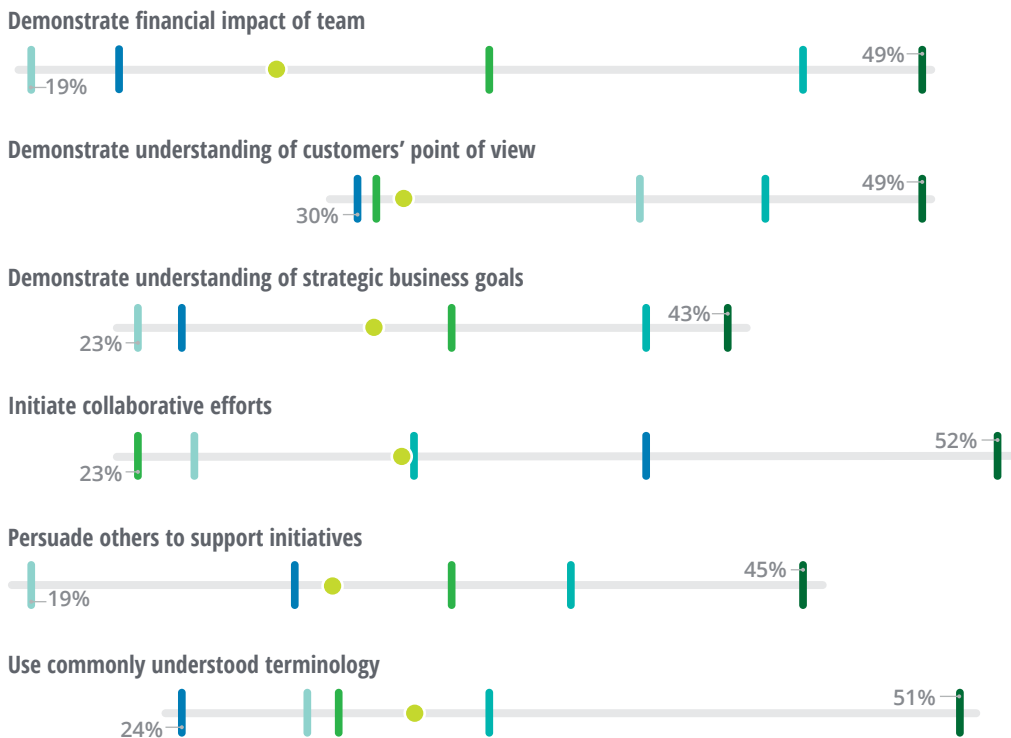
CMOs should recognize this strength and position themselves to drive conversations about the customer, fill knowledge gaps, or collaborate with peers. By deliberately drawing on their role’s natural strengths—deep understanding of the customer, skill at storytelling, and competitive insight—CMOs can begin to operate from a place of confidence and occupy their rightful seat at the table with their C-level peers.

FIGURE 1

### CMO performance perception versus reality: CMOs are not doing as badly as they think

Percentage of respondents who chose “extremely well”

Others in the C-suite evaluating their CMOs: — CEOs — CFOs — CIOs/CTOs — COOs — CSOs\*  
 CMOs' self-evaluation: ●



\* Chief sales officers

Source: Questions from Deloitte C-suite survey: Q—When working with other members of the C-suite, how well are you able to accomplish the following? (CMOs' self-evaluation); Q—When working with other members of the C-suite, how well is your CMO or equivalent able to accomplish the following? (peer evaluation of CMOs)

## Own the customer experience

“Our CMO serves as a reminder of the voice of the customer in all discussions. Not just the voice of the customers but the shoes of the customers as well. He goes out and sees customers a lot. He’s a great listener and he’s good about bringing back reflections that he gathers.”

— David Golden, former chief legal and sustainability officer, Eastman Chemical Company

While customer experience is considered the new competitive battleground, our research signals that ownership of customer experience—and its powerful economic potential—remains dispersed, meaning it lacks a clear champion among executives (figure 2). This contributes to the lack of understanding of what is valuable to the customer, making the delivery of exceptional experiences less likely.<sup>3</sup>

Not only does customer experience lack a programmatic owner in the C-suite, but relatively few see the CMO as owning the customer experience. A mere 11 percent perceive the CMO as champion of customer experience and nearly half (48 percent) believe this responsibility falls to the CSO. In some key areas such as digital transformation (1 percent) and product road map development (3 percent), the CMO is nearly invisible. Instead, the CMO is generally seen as the owner of marketing strategy (46 percent) and new markets (42 percent). One potential reason for this perception are the evolving roles of marketing, technology, and customer experience, which are blurring traditional boundary lines and often leave the CMO with the least defined role.

This lack of clarity can give CMOs an opportunity to actively cement their leadership with other members of the C-suite. Most C-suite executives see CMOs as knowing the customer and customer sentiments better than other members of the C-suite. CxOs also consistently report that CMOs

who demonstrate competency in strategic business goals and effective communication are in the best position to lead customer experience.

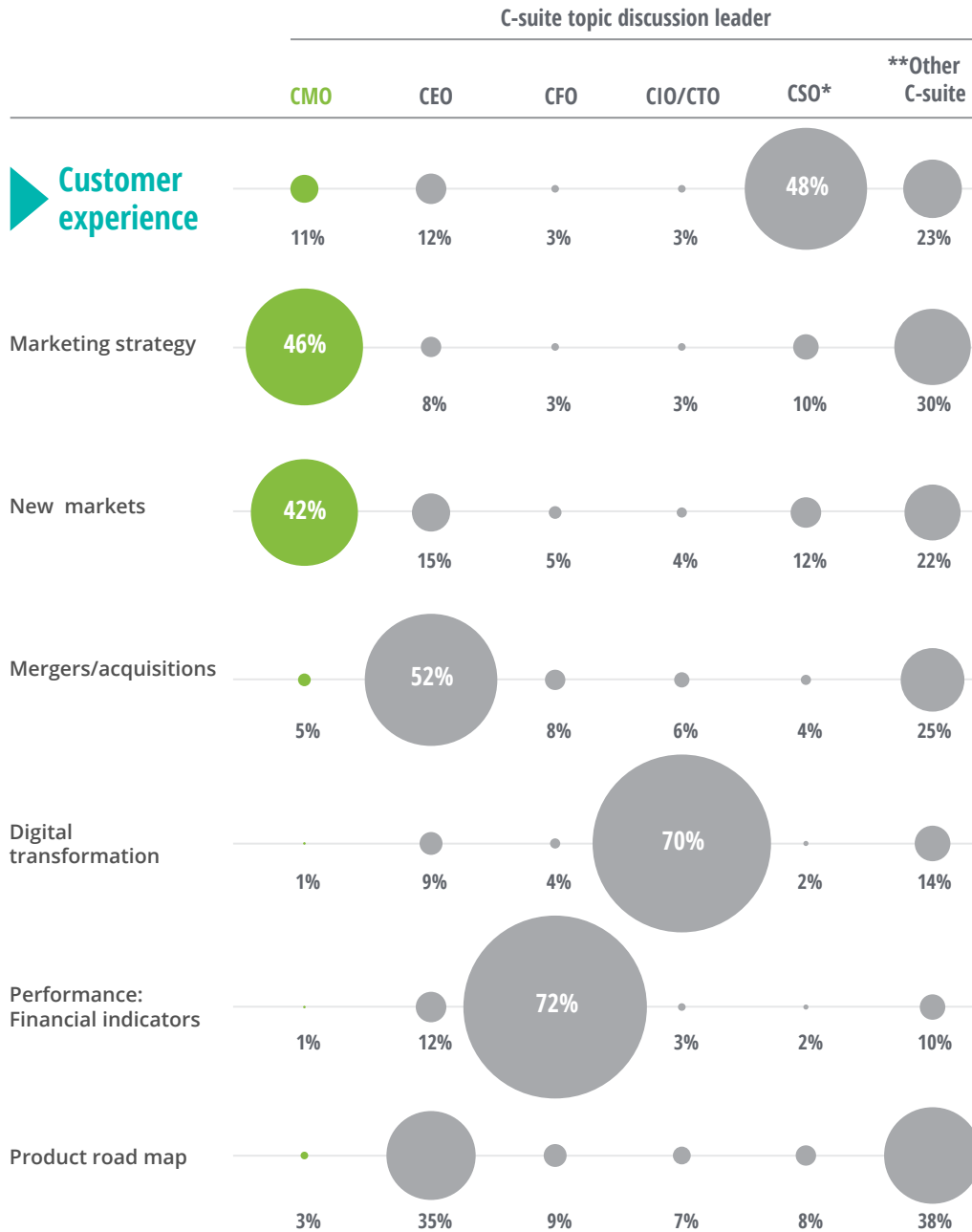
Barbara Goose, CMO of John Hancock, delivers customer insights to build the brand’s relevance with consumers and drive strategic investments for growth. She says, “We’re getting so much data so quickly that we need to make decisions much faster than in the past. But it allows us to understand customers and their journeys in ways we couldn’t before.” She also reports the John Hancock organization is “seeing the impact we can have when we leverage data to reach the right customer at the right time.” In addition to unlocking opportunity for customer connection, data also drives decisions on new products for development “or parts of the brand to invest in, to what degree, and in what order.”

The impact of that customer data centricity extends beyond marketing. “We’re helping the entire organization see how customer experience and net promoter score are tied to financial returns,” she



FIGURE 2

**The C-suite is muddled about who owns the customer experience:  
An opportunity for CMOs**



\* Chief sales officer

\*\*Other C-suite: COO, CStrategyO, CLO, CHRO, and HBU.

Source: Question from Deloitte C-suite survey: O—During typical C-suite discussion, who generally leads the conversation

says. “In some ways, it turns the organization on its head. People are reorienting to truly put the customer first. It’s an amazing transformation.”<sup>4</sup>

## RECOMMENDATIONS FOR ACTION

### *Piece together the mosaic of the customer journey.*

Peter Strebel, CMO turned president at Omni Hotels, explains that customers interact with a brand through dozens of different channels.<sup>5</sup> Technology helps CMOs move from isolated marketing campaigns to mapping and owning the entire customer journey. They can use data from customer interactions to piece together myriad customer experiences, revealing the customer journey and their expectations of the brand. Feedback from target customers will strengthen this outside view of the brand. By bringing customer insights to the C-suite, CMOs can become the chosen strategy partners and important players in making effective customer, product, and business strategies.

### *Translate customer insights into the language of business.*

CMOs can increase their acceptance from other C-suite partners by speaking the language they understand and add value to their peers’ own work. For example, by making small changes in how they demonstrate their understanding of enterprise concerns, CMOs can converse with CFOs in business or financial terms. Hugh Dineen, US CMO, MetLife, says his team “converted the metrics of marketing to the metrics of the business. Instead of talking awareness, we talked acquisition. Instead of talking consideration and purchase, we talked inquiries and close rate. Instead of talking loyalty, we talked persistency and ultimately cross-sell and upsell.”

*Never leave the customer out of the conversation.* CMOs can keep the voice of the customer central to strategic decisions and help the C-suite see risk factors, such as an overt focus on short-term revenue, a failure to anchor efforts around true competitive differentiators, or becoming too far removed from the deep motivators behind customer behaviors. CMOs should also ensure they and their C-suite counterparts talk to actual customers frequently. By initiating and encouraging their peers’ experiences with customers, CMOs can build natural customer centricity into the C-suite’s thinking.

Spotify’s Dustee Jenkins agrees, and also helps her colleagues think through the risks of potential strategies. “If we’re pursuing something, I would be very vocal about risks I see either reputationally (as we’re thinking about the impact to the consumer and how a consumer might perceive something), or it could be that the risk is in a really crowded space like video. I would help them understand based on what I’m seeing, what I’m hearing,” she says.

**“Success meant making sure that you didn’t bring something to the C-suite that didn’t have somebody else as a partner, as a sponsor for it. You made sure that you didn’t surprise anybody.”**

— *Bill Houghton, former CIO, General Motors*

## Be the first to connect

Now more than ever, market disruption and competition demand that the C-suite operate as a cohesive team rather than a group of independent

functional experts. In a 2018 study of human capital trends, Deloitte described this as the mandate for a “symphonic C-suite,” one where the CEO is a conductor who fosters connections across functions and helps every C-suite leader assess priorities and determine how each can have impact more broadly across the organization.<sup>6</sup>

CMOs are not engaging as often as the rest of the C-suite in cross-functional collaborations, only 17 percent of CxOs in our study report having collaborated with CMOs over the last 12 months (among the lowest of all C-suite positions; see figure 3). Forgoing these collaborative opportunities goes against the grain of a role that

aspires to be an enterprisewide influencer. CMOs should work to become influential strategic partners, rather than functioning merely as department heads.

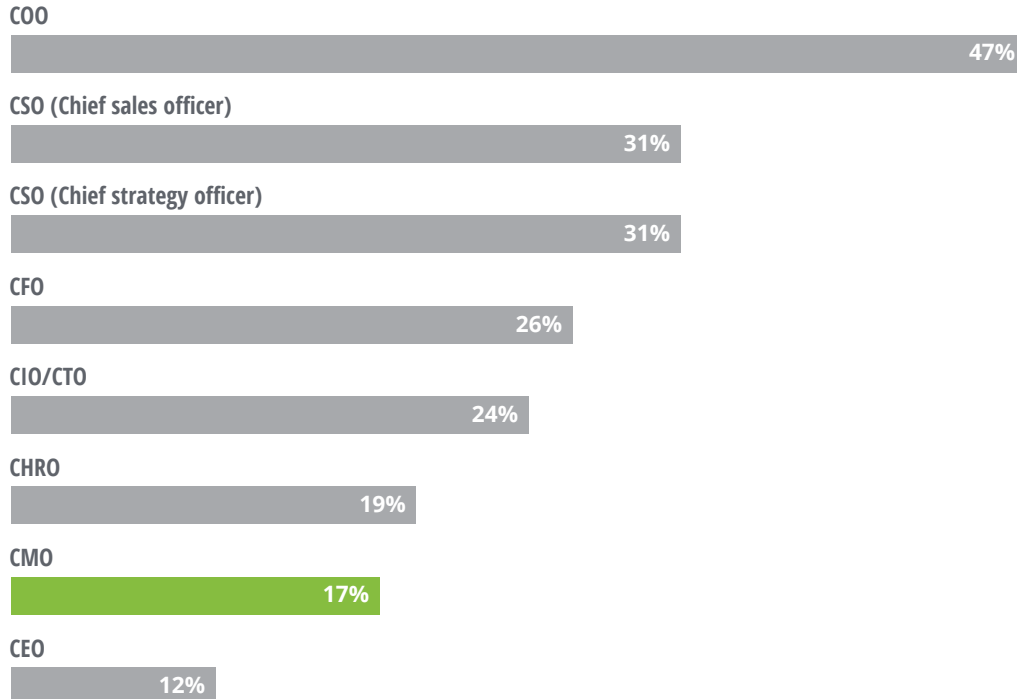
Self-identified high-performing CMOs report much higher rates of C-suite collaboration. It indicates that CMOs with confidence in their abilities and deep understanding of the customer do not shy away from cross-disciplinary collaborations, thereby reinforcing the importance of coming to the table with confidence.

These relationships with other C-suite peers can unlock new doors for the CMOs, and even get

FIGURE 3

### Who members of the C-suite say they collaborated with over the past 12 months: CMOs have a vast opportunity to collaborate more

C-suite overall



Source: Question from Deloitte C-suite survey: Q—In the past 12 months, have you worked on any initiatives collaboratively with other members of your C-suite? Select all that apply. (self-evaluation)

funding for additional CMO initiatives. For example, in one study, as many as 94 percent of CFOs indicated they would direct more funds to digital marketing if CMOs could demonstrate a direct correlation between digital campaigns and sales.<sup>7</sup>

Such opportunities are not just limited to the CFO and CMO dynamic. CMOs can work with chief sales officers to build compelling purchasing experiences, CIOs to redesign digital touchpoints, and even COOs to make customer-friendly backend customer service functions, such as return policies.

## RECOMMENDATIONS FOR ACTION

*Find problems you can solve together.* CMOs are often being left out of critical collaborations (either intentionally or inadvertently), which is most likely contributing to the general lack of CMO confidence. The onus to initiate collaborative efforts is on CMOs. By encouraging a fellow C-suite member to partner on key marketing initiatives, CMOs build

## CMOs are often being left out of critical collaborations, which is most likely contributing to the general lack of CMO confidence.

their own confidence and C-suite confidence in the CMOs. Confident CMOs work as trusted partners; they understand their peers' strategic pressures and propose ways to enable peer or joint success. Joint ownership of initiatives naturally fosters executive buy-in and avoids taking colleagues by surprise.

*Align metrics with important business priorities.* CMOs can further enhance relationships with peers by setting key performance indicators that align to the business agenda. C-suite peers, in fact, look forward to this behavior. For example, respondents to our survey consistently stated a desire for CMOs

to understand the business and demonstrate that the true impact of a major campaign on the sales force has been thoughtfully considered. They also expressed the need for CMOs to be conversant in other areas of business value beyond marketing.

One key area for CMOs is partnering with CFOs on widely accepted key financial measurements. For example, CMOs engaging with CFOs should highlight how marketing initiatives affect financial metrics, such as operating margin and shareholder value. A CFO ally helps CMOs “prove marketing’s value” for the company and in the C-suite. As former CFO of Ally Financial, Chris Halmy, puts it: “I want my chief marketing officer to bring detailed outcomes that are measurable and reflect how those outcomes are going to drive growth in the business.”

*Build an external network to bolster the internal network.* Simply by the virtue of their role and closeness to the customer, CMOs have access to wide data and external relationships beyond customers, their data, and their feedback. They can bring in independent research or dive into their experiences to bring a fresh perspective to C-suite conversations.

Samsung Electronics America’s chief privacy officer, Darlene Cedres, understands this. “Great CMOs have insights based on experience and relationships,” she says. “They talk to industry thought leaders and bring powerful information back to the C-suite. They have insights, experience, and data about our external stakeholders. They also learn about the regulatory environment in great detail.” CMOs leveraging external knowledge and making it useful to the C-suite can increase their appeal as trusted advisors for customer-related decisions.

Additionally, the very practice of connecting with that external community can build confidence to speak up in the C-suite, according to executives in

our study. Being braver about asking questions of external marketing leaders can arm the CMO with confidence to sit across the table from the CEO or business unit leaders and say they have talked to customers and CMOs, and here's the broader view.

## A more confident CMO, a more confident C-suite

CMOs have the power to enable each member of the C-suite to make more informed decisions, drive financial performance, and take the customer experience to new heights. As a group, CMOs can afford to give themselves more permission to lead with confidence, while at the same time taking care to fill knowledge gaps and collaborate with C-suite teammates. They should not fear failure—our survey results reveal that executives do not expect CMOs to have all the answers. If anything, the peer group will likely only appreciate initiatives from the CMO office.

By having confidence in their deep domain expertise in understanding the customer and artfully sharing this understanding with a strong



point of view using language appreciated by the entire C-suite, CMOs are poised to be a powerful force in the strategic direction of the enterprise and create even greater customer and business impact from their seat at the executive table. ●



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## Preempting problems with anticipatory government

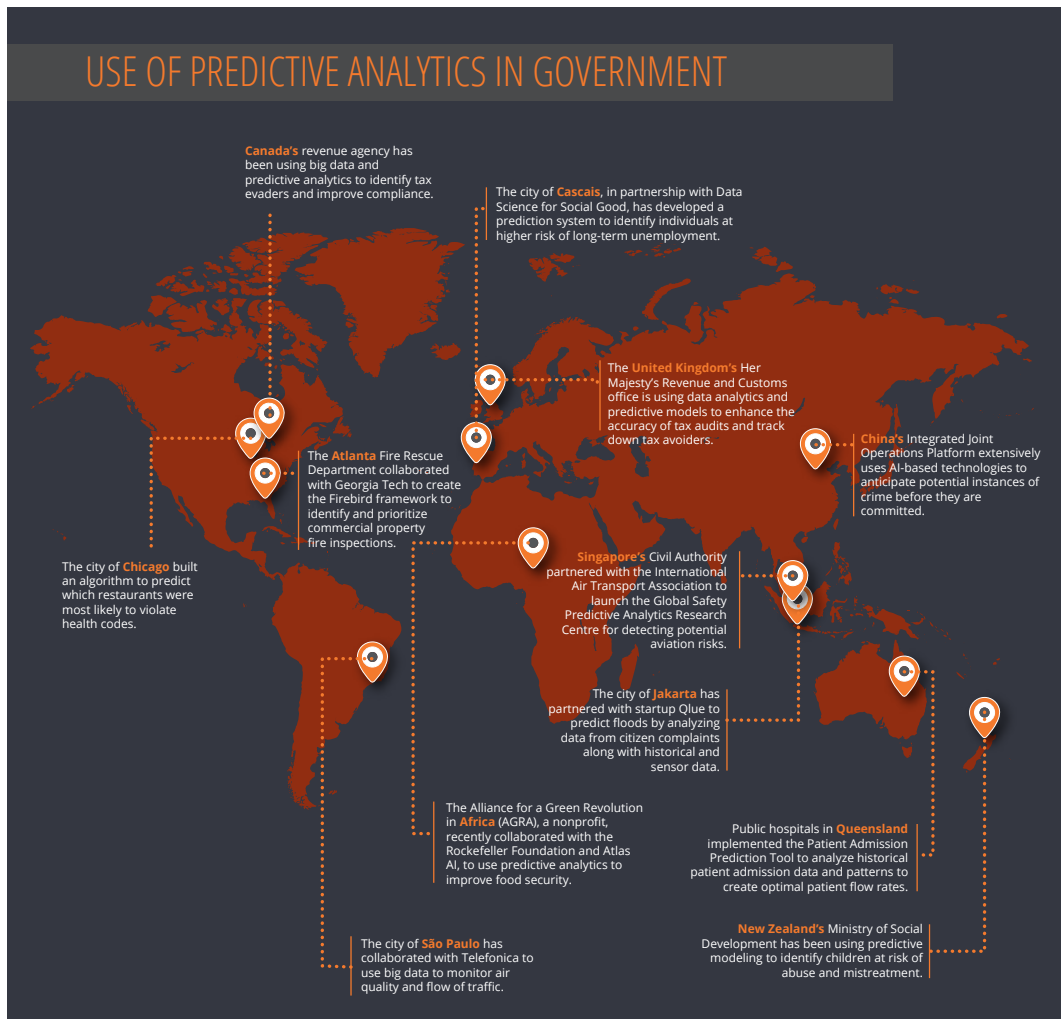
**A**N OUNCE OF prevention really is worth a pound of cure—especially in the public sector. Recent advances in predictive analytics and artificial intelligence (AI) can now help governments address problems such as fraud and opioid abuse before they become full-blown crises.

The idea that government should try to prevent problems instead of just reacting to them is not new, of course.<sup>1</sup> But today, an exponentially greater ability to analyze massive data sets has made such efforts more successful. In fact, the Ash Center at Harvard University has identified more than 200 success stories related to the use of data and analytics across the city, county, state, and federal levels in the United States.<sup>2</sup> And it's not just American citizens who are benefiting. Government agencies around the world are putting predictive analytics to good use as well (see figure).

What can predictive analytics help public servants achieve? Here are a few examples:

**Reducing crime.** The police department of Durham, North Carolina, uses AI to observe





patterns in criminal activity and identify hotspots with a high incidence of crime, thus allowing for quicker intervention. This contributed to a 39 percent drop in violent crime in Durham from 2007 to 2014.<sup>3</sup>

**Improving food inspections.** The city of Las Vegas's health department used advanced AI technologies to analyze more than 16,000 tweets daily for food-poisoning-related clues (for phrases such as "I feel nauseous," for example) to help detect venues likely to pose public health hazards.<sup>4</sup>

**Countering terrorism.** An EU initiative called RED (Real-time Early Detection) Alert aims to provide early alerts of potential propaganda and signs of warfare by using natural language processing to monitor and analyze social media conversations.<sup>5</sup> ●

**To learn more about how public sector organizations can use emerging technologies to preempt issues, read *Anticipatory government: Preempting problems through predictive analytics* on [www.deloitte.com/insights](http://www.deloitte.com/insights).**

## How are global shippers evolving to meet tomorrow's demand?

**M**OVING AND DELIVERING goods around the world is becoming ever more challenging, thanks to burgeoning shipment volume and rising customer expectations for super-speedy delivery. And the transportation and logistics industry—sometimes collaborating with the companies whose goods they ship—is evolving to meet these demands. An emerging next-generation movement-of-goods network aims to use technology to transform today's codependent but highly fragmented global shipment networks, creating more integrated, intelligent, and automated end-to-end networks that can move more goods more quickly to more places, and with more transparency and efficiency.

We see three pillars underpinning tomorrow's movement-of-goods networks. The first pillar, *connected community*, is the ability to collaborate



and connect with partners to see across the network. The second, *holistic decision-making*, is the ability to harness and harmonize traditional and new data to continuously learn and predict. And the third, *intelligent automation*, is the ability to use the right human or machine for the task at hand while automating digital processes where beneficial.

The horizontal partnerships forming around ports show how a connected community can improve visibility and efficiency. In ports such as Hamburg and Rotterdam, integrated platforms exchange critical port information—including ship arrival and departure times—to participating ports, shipping lines, and marine terminals coordinating drayage. Powered by cloud, these platforms can enable ports to orchestrate the network with real-time data exchange, optimizing ship course and speed, vessel berthing, ship offloading, and responses to schedule changes. Outside ports, digital freight platforms that match cargo to available capacity are expanding beyond their historical focus on spot-trucking to different points of the value chain, from air and ocean to rail and B2B freight.

Early adopters of holistic decision-making are using a mix of new data sources—from connected assets, cargo, and warehouses—to increase their agility to react to changing network conditions with dynamic decisions. In some cases, companies are also harmonizing these new data streams with transportation management, inventory management, and other supply chain functions. For instance, some ocean shipping giants command fleets of hundreds of thousands of IoT-enabled cold containers, transmitting data on temperature, location, and refrigeration power supply to the cloud, helping to automate oversight, exception alerts, and quality control processes at ports.<sup>1</sup>

Evidence of maturing intelligent automation can also now be found at every step in the supply chain. Some ports already feature an entirely robotic ship offloading process, while Flytrex, an on-demand drone delivery startup, automates last-mile package delivery in Iceland.<sup>2</sup> Capturing automation's full potential will likely require rethinking entire logistics systems to take full advantage of a constant flow, including an evolution away from the fixed “collect in the evening and deliver during the morning” approach toward a fluid system of continuous movement and supply.

For global movers, building a solid foundation around these pillars can be crucial. First steps toward establishing capabilities in each pillar can include initiatives to modernize applications, implement cloud solutions, secure needed talent, and mitigate cyber risk. As a company—and the ecosystem as a whole—becomes more advanced, leaders may consider technologies such as artificial intelligence, IoT, blockchain, and robotics to enhance their capabilities. While transformation is a long journey, even incremental digitization of logistics operations can deliver plenty of benefits. ●

**To learn more, read *How are global shippers evolving to meet tomorrow's demand?*  
*The future of the movement of goods* on [www.deloitte.com/insights](http://www.deloitte.com/insights).**

**CONNECTED BUSINESS AND SOCIETY  
TECHNOLOGY AND ETHICS  
LEADERSHIP**

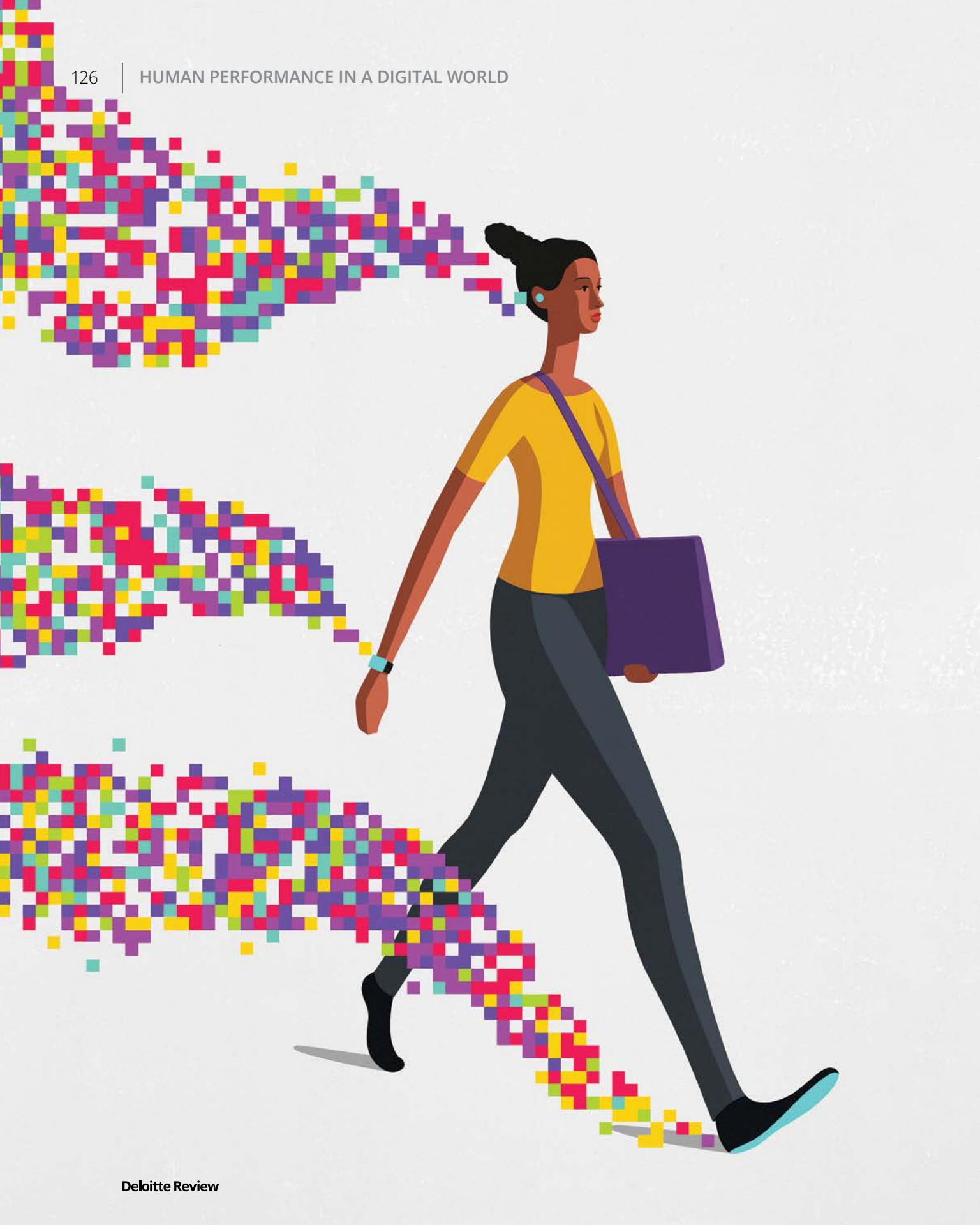
**HUMAN PERFORMANCE  
IN A DIGITAL WORLD**

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# Technologies that touch you

**How technology can help people  
bring their best selves to work**

BY MAGGIE WOOLL, STEVE HATFIELD,  
AND DULEESHA KULASOORIYA

*ILLUSTRATION BY JON KRAUSE*

*Taylor pops into the lobby vending space on the way to the elevator. She considers the day ahead as the scanner reads her bio-card: She's low on iron and B-3, a bit overhydrated, and shows early signs of the cold virus going around. Today is a group day, so she dials down focus and dials up the energy and collaboration selections. "Good morning, Taylor," the vending host, Shelley, waves from her stool. "New seasonal flavors today." Taylor pauses, then overrides her default flavor and chooses pumpkin—it is the first day of fall, after all, she thinks.*

*As the smoothie machine begins humming, Shelley mentions a favorite new TV series, then asks, "You doing okay? You seem preoccupied." "Just a little tired," Taylor says. "I've been heads-down working with a remote team for a month. I get to lead a session today, though." "You'll do great," Shelley says. "And if you want a nutrition consultation, I have slots after 2 p.m." Taylor takes a slot tomorrow afternoon and grabs her personalized smoothie—this should get me through the customer-needs profiling, analytics challenge, and new-member onboarding, she thinks as she turns to go. Her wrist vibrates, and she looks down to see a pulsing smiley face. "Thanks for chatting, Shelley—I'll definitely check out that show."*

## What does it mean to thrive at work today?

Technology enthusiasts have conjured utopian visions of the *workplace of tomorrow* for nearly as long as there have been workplaces. But actual workers—as distinct from bean-counters focused on efficiency—don't always see innovations as improvements. Now, new technologies aimed at elevating human performance have the potential to change the workplace in fresh ways.

### BEYOND TOUCHY-FEELY

Over the years, technologies aimed at improving performance have often heightened stress and pressure, doing little to either ease employees' workload or boost their creativity. But as work itself changes, along with the demands on individuals in the workforce, organizations—aided by cognitive technologies—are starting to shift the way they approach human performance.

Consider Taylor's technology-augmented arrival at work, with innovations throughout to aid her well-being and ability to contribute and collaborate. All

of the technologies depicted in her story already exist in some form, albeit not necessarily yet at the price point, scale, or reliability to make them accessible and useful in the workplace. Many are becoming available to individual consumers. But most workplaces are unprepared to benefit from them—the work and the work environments aren't designed to support, accommodate, or benefit from advances in human performance. Too many leaders dismiss these technologies and their potential benefits as touchy-feely or irrelevant to productive work.

Work, though, is changing, on both an individual and organizational level, and that alters the equation of what workplace technologies are worth considering.

In this article, we will explore the ways in which work and the demands on individuals in the workforce are changing—and how that shifts how organizations can approach human performance in the workplace. First, we will look at the array of technologies emerging to support human performance and delve into what it means to thrive at work.

# What are the technologies that touch you?

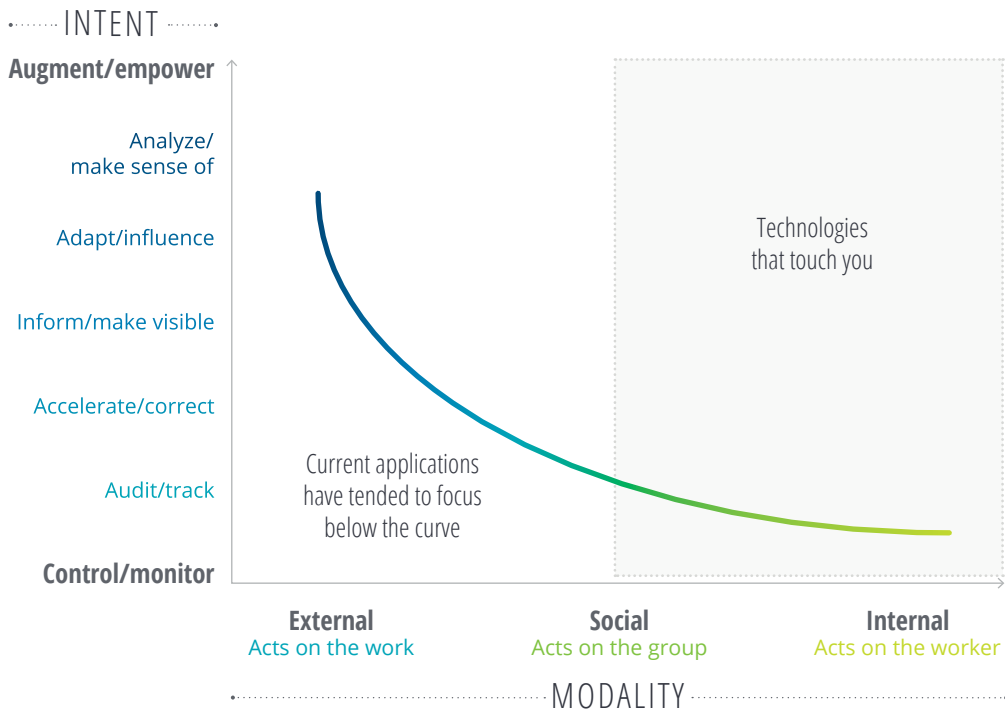
Technology is reshaping the day-to-day digital reality of the workforce through every aspect of employees' lives, and generating new tools to reshape their environment and performance. One fast-moving development: the emergence of technologies anchored on the individual.

As figure 1 suggests, technologies that might be used to improve performance can be thought of along a spectrum: from those designed to have an impact that is primarily external, focused on the work and how it is done, to those that are focused on the individual's body and physical, physiological,

and psychological function. Somewhere in between are the technologies that act on the group—some focused on the functioning of a team or group, some on the dynamics and functioning of the collective organization, some on the participation and performance of the collection of individuals coming together in a group. Even the externally focused technologies can have significant impact on the individual's physical, cognitive, emotional, and social states—often in unexpected or unintended ways. And the same basic technologies can be deployed with very different effects depending on the use case and what they target.

Organizations have tended to focus on the left-hand side, on the work. Think about workflow

FIGURE 1  
**Technologies to help improve performance**



Note: The vertical scale illustrates the range of possibilities, which are slightly different depending on whether they are being applied to the work, to the group, or to the individual.  
Source: Deloitte analysis.

automation, data collection and analysis, pattern recognition, rudimentary triage, and routing—implementing technology specifically to boost productivity. The individual worker can do more of what they currently do or do more of the higher-value parts of what they currently do. In the best cases, the technology frees the individual from rote tasks to focus on creating new and expanded value.<sup>1</sup>

Less familiar is the right-hand side. We can think of *technologies that touch* as the array of technologies designed to track, influence, or support human performance by acting on the individual rather than on the work. These might target the mind or body directly, physically or physiologically, or indirectly through the spaces and communities that shape our emotional, mental, social, and physical well-being.<sup>2</sup>

As figure 2 illustrates, these less-familiar transformative technologies target solutions that help workers master distraction, quell anxiety, be open to new ideas, connect with others, break mental models, let go of unhelpful beliefs and regulate energy and emotion, have presence, build trust, and learn faster. There has been an explosion of interest and research in this space, from both practitioners and researchers as well as

investors. In part, this is the result of advances in neuroscience, neuropsychology, and biochemistry, as well as in the exponential technologies related to sensors, processing, analytics, and materials. For example, the quality and accuracy of sensors have improved, and the types of sensors commonly available have become more sophisticated—measuring heart rate variability, blood pressure, skin temperature and conductivity, and even ambient light<sup>3</sup> rather than just steps and GPS location—providing more nuanced and clinically relevant insight into the individual through data that is increasingly contextualized and longitudinal.<sup>4</sup> As the cost of technologies used to enhance performance in professional sports and extreme work environments falls, individual consumers are beginning to access the products and services built off them, and organizations can start exploring how they can improve human performance in the workplace.

## What *are* these technologies, and how do they work?

Many performance-enhancing technologies are “hacks.” They work from the outside in, designed to augment our own awareness, motivation, and

*Shelley's “good luck” echoes behind Taylor as she heads out. She feels more at ease, even before a tiny set of angel wings flutters across her wrist and a message asks her to rate the interaction; she gives it a 4/5 and is rewarded to see that her perception was aligned. Only day two of the Impact Tracker challenge, and she'd almost forgotten to even say thank you—guess that's why I'm doing it, she thought. When Taylor steps off the elevator, her watch has interfaced with the scheduling system and flashes with a room number. As she nears the conference room, it pulses once with a “proximity opportunity,” so she pauses to read the message on her phone: Dan, an old teammate, happens to be on this floor today, showing as available and potentially working on a related topic. With a few extra minutes before her meeting, Taylor accepts the opportunity and detours around a corner to where Dan is drawing at a digital wall. After some catching up, Taylor mentions her current project, and Dan highlights some interesting connections to the model he was sketching. They agree to talk again, their personal assistants lock in a time later in the week, and Taylor walks away with a link to the wall, excited to have an entirely new use case for the analytics problem on which she's been working. As a bonus, her impact tracker logs another in-sync interaction.*

FIGURE 2

**Transformative solutions are built on an array of foundational sciences**



**Major methods of measurement**

- Heart rate/heart rate variability
- Breath rate/CO<sub>2</sub> levels
- Muscle movement/tension
- Body movement/temperature
- Skin conductance
- Body fluid composition
- Electroencephalogram
- Posture
- Galvanic skin response
- Sleep quality/quantity
- DNA/RNA/biome
- Eye tracking
- Hormones
- Inflammation
- Blood pressure/glucose
- Mood/meaning tracking
- Pattern/behavior recognition
- Emotion detection
- Voice/tone/word recognition
- Facial recognition

**Enabling technologies**

- Artificial intelligence/machine learning
- Robotics
- Pattern/emotion recognition
- Advanced sensors/mobile
- Networks
- Massive data sets
- Biotechnology
- Bioinformatics
- Nanotech
- Digital fabrication
- Augmented/virtual reality
- Blockchain

**Underlying research domains**

- Neuroscience
- Medicine
- Genetics
- Physiology
- Behavioral psychology
- Behavioral economics
- Awe/flow
- Compassion
- Resilience
- Meditation
- Happiness/meaning
- Immersion (AR/VR)
- Affective computing
- Persuasive computing

Source: Nichol Bradford, Transformative Tech Lab.

understanding to accelerate cognition, access productive states of consciousness, or achieve levels of self-regulation and control that were previously accessible only through long commitment to a disciplined practice, such as Zen meditation.

For example, a behavior-trainer device might use a combination of sensors that measure heart-rate variability, electrodermal responses, and body temperature, as well as a motion or ambient light, to detect and log an individual's emotional responses throughout the day. Applying more advanced machine learning to process and analyze these data sets, such a device can allow the user to see in context their emotional response patterns, bringing greater self-awareness. It might also feed the user a personalized check-in or intervention at the moment a certain emotional response has been registered, helping to develop individualized tools for self-regulation and control in addition to self-awareness.<sup>5</sup> This type of data can reveal patterns and inform personal or guided reflection and, with some guidance, can generate insights that can spur motivation or effect behavior change.

Not every one of these technologies works through tracking. Virtual reality (VR) technologies can create immersive environments that modify our sensory experience to induce or shift mood as well as provide opportunities to repeatedly experience highly emotional events—such as standing on a high beam, facing an angry customer, or giving feedback to a staff member—either for training or other types of therapy.<sup>6</sup> Cognition tech such as neurostimulation works by actually delivering an electric current directly into the brain to trigger neuron-firing to speed up the rate of forming new pathways while learning a new skill.<sup>7</sup>

As these examples make clear, these technologies can't necessarily replace a disciplined practice. But they can be a gateway for many just getting started. The potential is that by delivering noticeable

results sooner, more people will be motivated to achieve greater mental, physical, emotional stability—and capable of adopting the practices that will keep them there, ready to learn, adapt, and thrive.

## Great power, great responsibility

These technologies are deeply personal. By opening windows onto our behaviors, habits, and interactions, and even our patterns of thought, emotions, and biological and mental processes that we ourselves are often not fully aware of, they have the potential to aid both productivity and creativity. Many of these technologies are operating on, or generating, data that is direct and unmediated, collected straight from our physical, biological, and chemical selves, charting our physiological responses, our self-reported moods, and our emotions.

From these robust, high-fidelity data points is the promise of insight, self-knowledge, and self-control—the potential to connect the dots and name the constellations of our biology and psychology. But because this data is so powerful, there is a real risk of getting it wrong—and getting it wrong in a way that violates trust and damages relationships with customers and the workforce.

Companies need to be extremely careful and rigorous in questioning their intent, and the intent of their managers, in adopting a technology and keeping the potential for unintended consequences front-and-center. *Adopting the individual's perspective* and *making trust paramount* must form the basic guardrails of any foray into elevating human performance through technologies that touch. Doing so will go a long way toward setting the right tone to avoid getting it wrong—abusing the technology, damaging trust, or otherwise destroying its potential value for the workforce.

## THE PERFORMANCE MENTALITY

We don't tend to talk about the human body and its physicality in business, preferring the bloodless realm of numbers, strategies, and controls or the leadership mind. So while the science is more complex than we can cover here, a brief explanation of physiology may be useful.

First, when we talk about the brain, we're really talking about the nervous system, which encompasses the brain as well as the body, because so much of our body and our biological systems interface with the nervous system. Among the most basic mechanisms neurobiologists are studying is how breath, heart rate, and levels of autonomic arousal interface with how the brain processes information, forms connections, and makes decisions. If an individual can become aware of and control their breathing and heart rate, they can begin to self-regulate and choose to operate from a state—whether that is calm or intense, focused or diffuse—that is more appropriate or effective for the situation at hand, where previously they might have been reactive, stressed, or dysfunctional.

It isn't hard to see how this would begin to materially change people's decisions and their ability to focus and persevere, accommodate others, incorporate new information, and develop or adapt plans, especially in environments of rapid change, pressure, and uncertainty.<sup>8</sup> Ultimately, the various technologies and practices associated with them can be thought of as a set of tools. Being able to master multiple tools, to select a new tool for a given situation, is when you start getting to higher levels of performance.

Centering on trust and adopting the individual's perspective means going beyond legal disclaimers, transparency of data collection and usage, and protection of personal data. Those are table stakes. Your workforce doesn't care that the company has the right to monitor everything they do, and no

amount of messaging will help if managers insist on using technology primarily to track and evaluate employees rather than putting it in the hands of employees and trusting (and supporting) them in supercharging themselves.

*Taylor takes her seat in the conference room just as the session is about to begin. The first agenda item is a focusing exercise: Everyone slips on a VR headset and spends 10 minutes immersed in the same meditation program designed for expansiveness. For the working session to follow, each person picks up a small wand that offers personalized feedback. As Taylor introduces the goals for the session, an image of a balloon begins to inflate on her display—only she can see it—getting bigger the longer she speaks. When it “pops,” she wraps up her sentence and asks for questions. An unobtrusive monitor, visually indicating participation patterns and blended stress markers, turns yellow as others join the discussion but soon shows bifurcation, indicating lack of balance. Jay stops himself midsentence: “Whoa, that’s me, isn’t it?” Everyone chuckles, and lines indicating the group’s collective stress responses fade. In the ensuing calm, two of the more reserved members jump in to offer alternative assumptions. Taylor, a facilitator-in-training, is pleased, looking forward to going over her own and the group data record with her coach later, but a small vibration subtly alerts her that her attention has wandered, and she’s immediately back in the action.*

## Technologies to support thriving at work

Technologies that touch you can support thriving at work, *if* that is the intent behind implementation.

What does it mean to thrive at work? Thriving at work is about *how* we are at work. While work shouldn't bear the burden of fulfilling all our social and emotional needs or substitute for rewarding pursuits and relationships outside of work, work and the workplace should be congruent, rather than at odds, with each of us living at our best. Thriving means excelling—in a way that is healthful and sustainable. It is the foundation of performance, a combination of our own perception of how we feel in my day-to-day—am I clunking along, on the verge of breaking down, or humming along with an open road ahead, calibrated with an

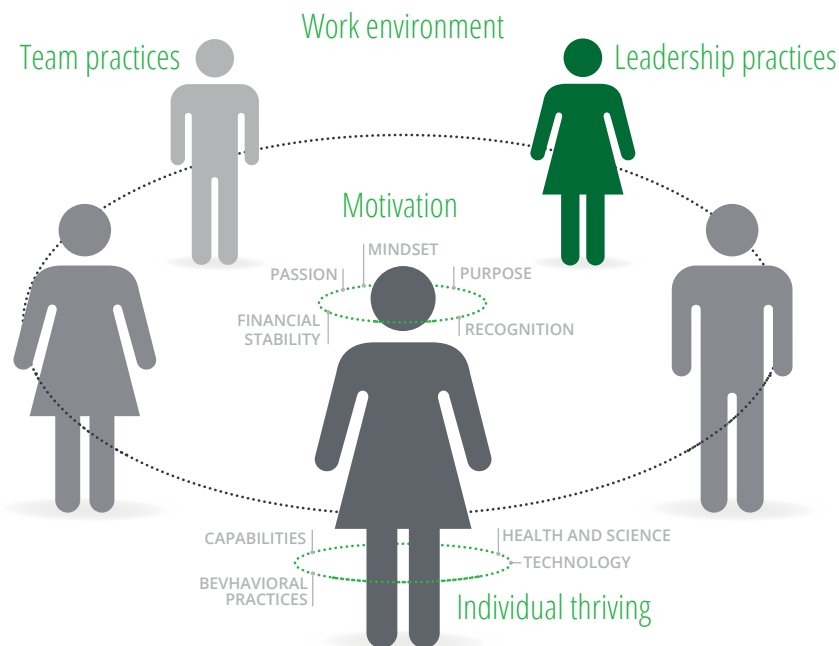
organizational assessment of our performance, delivering work that matters to the organization.

Of course, as figure 3 illustrates, thriving at work is much broader than the technologies that touch us. Our ability to thrive at work depends upon our health, behaviors, and the degree to which we develop our enduring human capabilities. It is also influenced by individual motivation, itself a complex construct, and affected by the management, leadership, and work practices around us. Technology is one piece, but an important piece, of the puzzle.

To the extent that we can shape the future, we might expect that the technologies in our daily lives integrate with our (group and individual) practices to help us do our best work *and* be our best selves, rather than working to exhaustion and retreating

FIGURE 3

### Organizational performance driven by the workforce is a combination of individual thriving and group performance



Source: Deloitte analysis.



to recover. In that respect, even the external technologies that remove rote work and stress around compliance can help us to thrive.

But as we know, work and the conditions, expectations, and tools to succeed are changing.

We are in the midst of a shift from a world of scalable efficiency—in which our organizations, systems, and practices were oriented around predictability—to a future state of scalable learning, in which conditions and requirements change more rapidly and our organizations, systems, and practices have to reorient around learning, adapting, and shaping. In this shift, doing the same things faster and cheaper won't suffice. Companies will capture financial value through differentiation and deeper relationships, continuously learning how to better address a diverse and growing customer base. This has huge implications for workforce performance and development.

In a recent survey, 81 percent of executives said they anticipate use of artificial intelligence (AI) and automation to increase significantly over the next three years, dramatically affecting employees' daily work. Only a quarter of leaders, though, report being ready to put this new technology into use.<sup>9</sup> At least some of the burden will fall on workers: Increased pressure on companies to continuously achieve higher levels of performance and deliver new and better customer value translates into increased pressure on individual employees to learn and adapt faster—and to draw on a wider range of capabilities and skills to create new value. As companies take risks and work fluidly across boundaries with a diverse ecosystem of organizations and individuals, they will need a workforce that is diverse, healthy, collaborative, adaptable, and motivated to constantly learn. High performers will be those who can shift states more readily, switching back and forth between a diffused mode in which ideas, creativity, imagination arise (and body and mind reset) and a

focused mode that plans and executes actions against a goal.<sup>10</sup>

Individuals as leaders and workers will need to be resilient to adapt to massive change. We will all need to know how to be mentally and emotionally healthy, to trust and build trust. We will also need to be rapidly learning and improving, and to embrace new tools and insights and put them to use for ourselves and our institutions. As leaders, we will need to know how to bring out the highest levels of communication, creativity, collaboration, and performance across diverse and distributed environments. And we will need to help people connect—to their colleagues, to their customers, to their passion, to purpose—and bring that to their work.

The key question: How can organizations bring technologies that touch to bear for individual thriving in ways that power organizational performance, business strategy, and competitiveness in the future? The possibilities are open, and it's easy to imagine that some of the use cases and solutions defined by today's technology offerings will prove less valid or useful over time, while new tools built around the same technologies will emerge to address more finely tuned problems. Consider just a few of the ways that technologies that touch might help us thrive:

- **What if you could learn to overcome your fears?** When you overcome barriers, negative stress decreases and possibilities open up, with the organization benefiting from your fuller contribution as you unlock more of your own potential. Immersive virtual reality–based training experiences and psychological interventions mediated through VR are already helping professionals conquer career-limiting fears such as public speaking.
- **What if you could shape your mood?** Mood affects everything from physical

performance, focus, and cognition to how we perceive and interact with others or take in new information. Sensors and stress wearables offer visibility into your physiological responses to activities and emotions throughout the day. Combined with tools that make mindfulness practices more accessible and facilitate deeper meditative states, individuals have the power for awareness and self-regulation.

- **What if you could learn without limits?**

In a fast-shifting landscape, we need the ability to continuously connect ideas, adapt skills, and deepen capabilities. To do that, you need to form and strengthen new connections in the brain. Neurostimulation and training tools enhance the brain's plasticity by using small electric currents to activate neurons during training sessions to build pathways faster.

Questions such as these, and the potential solutions, underpin some of the most pressing issues for business leaders today. Understanding these questions from the perspective of the individual and the solutions possible through technologies that anchor on the individual, opens up new ways to approach the bigger organizational challenges. Consider how different the question of *how to retool today's workforce for tomorrow* looks through the lens of individuals overcoming fears, being open to new ideas, and being trained in a neurologically optimized environment. The question of *how to attract and access the right capabilities and develop them to create broader value* might be reframed through the lens of creating healthy work environments, fostering high performance, or developing managers to coach teams in a less predictable, more fluid ecosystem-based future.

## What's holding us back?

The technologies that touch us face two fairly significant obstacles to adoption in the workplace.

For one thing, some dismiss these technologies, and the problems they address, as touchy-feely and irrelevant to business performance. This is largely a denial that the human elements the technologies affect are vital to organizational performance—and reflects a deeper lack of understanding about how the work and work environment of the future need to change for companies to succeed. This is particularly challenging for adopting team/group solutions. Individuals can still adopt personal consumer technologies at their own pace, but adopting group dynamic technologies requires both acknowledgment that the way meetings or teams or departments have always been run needs to change, and then changing group work practices to accommodate the new technologies. Without thoughtful implementation, this will likely run into resistance from managers and workers who see it as a waste of time or a threat to their status quo.

The second, and perhaps higher, barrier is suspicion and lack of trust between company and workforce. Consider the numerous recent articles about the ways our employers are keeping tabs or “spying” on us, using combinations of sensors to track our movements, technology for screen tracking, AI to parse text, IM and email communications, and website activity. Some surveillance is focused on tracking employee productivity, time spent on or off “work” activities, and response times; other surveillance is tracking potential mishandling or theft of company IP, of client data, and even sentiment analysis to try to get a read on morale and who is ready to quit. All of it seems intended to monitor, and much carries the implicit, if unstated, threat of informing punitive action, even if that is not the employer's intent.

While there are valid concerns motivating these uses—making sure valuable IP and sensitive client data isn't being improperly handled, for instance—it can create a surveillance, compliance, command-and-control dynamic rather than one of trust, value, or innovation, and potentially pits the workforce against both the organization and

The technologies that touch us face two fairly significant obstacles to adoption in the workplace. Some dismiss these technologies, and the problems they address, as touchy-feely and irrelevant to business performance. The other, perhaps higher, barrier is suspicion and lack of trust between company and workforce.

technology. When you combine that with the other most-hyped technologies—automation, algorithms, and AI—it's no wonder that the future of work is so often depicted as bleak. A 2015 *Economist* article pointed to what the author termed *digital Taylorism*, asserting that emerging technologies were being used primarily as a way to supercharge well-worn precepts of management science: breaking activities into smaller tasks, measuring everything workers do, and paying for performance against preset metrics.<sup>11</sup>

But what about technology that empowers, enables, and amplifies? What about technology that can give the worker insight into their own performance and behaviors, and give them the tools to supercharge their performance, learning, and achievement in the work environment and beyond? There is a huge difference in both intent and impact depending on who the data is collected for and what types of insights and actions derive from it. For example, one large technology firm started giving personalized dashboards to sales-team members so that individuals could gain insight into how they spend their time day-to-day and even get recommendations for expanding their network or otherwise improving performance. The dashboards aren't visible to managers<sup>12</sup>—this is technology to empower the individual. Who benefits? Both worker and organization.

In a similar vein, consider the difference in how some logistics companies are equipping the long-haul truck fleet with similar technologies to those used to differentiate insurance rates by driving behavior or to control autonomous vehicles (GPS, speed and motion sensors, video and other data recording, adaptive response tech). When brakes are applied at a certain force or the vehicle swerves, in-cab systems automatically start recording, capturing both the driver's actions and reactions and their perspective, and outside the cab to show proximity of other vehicles. Instead of using it to reward or punish behavior, this data serves as

potent, tangible feedback to the driver, letting them reexperience the incident in a training room, complete with all of the additional layers of information that surrounded the moment, to support the driver's awareness, investment in stopping risky behaviors, and adoption of more effective tactics. The aim: drivers who feel more supported, engaged, and accountable—and safer roads for everyone. Other emerging technologies, well and thoughtfully deployed, can produce similar dual benefits.

## How to move forward and take advantage of the tech for human performance?

Centering on trust and intent, and anchoring on the individual, leaders face numerous tech-aided options, some leading to dead-on-arrival big brother monitoring and devices collecting dust, others leading to individual empowerment, a thriving workforce, and supercharged organizational performance. There are a couple of paths available to safely navigate that rocky terrain.

- **Opt for a hands-off approach, waiting and seeing while individuals adopt consumer offerings on their own.** For the organization, it's low-risk and limited-reward. By taking a slightly more active role, possibly through learning or talent development, the organization can support employees in experimenting and evolving their own sets of technological tools and practices to enhance their own learning and performance. This might include curation to identify the most valid and effective products, sharing success stories from those who are embracing them, connecting workers with each other in affinity groups around certain solutions or issues so that they can learn from and support each other's efforts, providing opportunities to further develop the practices associated with a

## By taking a slightly more active role, the organization can support employees in experimenting and evolving their own sets of technological tools and practices to enhance their own learning and performance.

technology, and offering flexible subsidy programs to allow individuals to explore options and figure out what works best for their needs.

- **Embrace and harness the performance potential of technologies that touch.** As has already been discussed, these are powerful tools for performance, but they have the potential for unintended negative consequences. Proactively harnessing these tools would entail deploying technologies in a targeted way with a tailored strategy specific to the work, workforce, and work environment. In particular, this might mean deliberate interventions to enhance group performance or to take on longstanding, intransigent problems.

Organizations that choose the second path, that seek to proactively embrace and harness this trend's potential, should take the following considerations as a guide:

- **Get educated on the underlying science and methods for any tech under consideration,** and develop a framework for how the measures targeted by these technologies relate to the objectives of your organization. That begins with better understanding what type of workforce you need—what behaviors, dispositions, and capabilities the organization needs—to support the business strategies and thrive in both the near and longer term. With those objectives in mind, understand which factors related to

physiology, neurobiology, biochemistry, etc. are most significant for enhancing or degrading those objectives. In some cases, the science and research already exist to draw those connections, but individual performance and organizational performance are complex. While competitive cyclists may share an understanding of the benefit of increased VO<sub>2</sub> on their race performance, researchers don't yet have such robust evidence about how changes in CO<sub>2</sub> levels or heart rate variability directly affect the performance that matters in the workplace.

- **Design work and work environments that optimize for these factors** and for the behaviors, dispositions, and capabilities the business strategy requires. Creating work environments that allow organizations and individuals to experiment with the tools that may enhance performance, and generate meaningful data and feedback to understand what is helpful or harmful for a given individual and use case.
- **Be selective—don't layer on technology for technology's sake.** Improving human performance doesn't necessarily *require* technology. If the organization can redefine the work itself to be more meaningful or aligned to the values and interests of the talent the company needs, that will likely have positive impact on the emotional well-being and experience of stress by the individual. The hoped-for result: less-harmful physiological

responses and better cognitive performance, social interaction, group connection, ability to learn, adapt and adopt new perspectives, endurance, and ability to access core human capabilities such as creativity, imagination, curiosity, and empathy. Similarly, redesigning the work environment, including management practices and systems, to be more congruent with this type of work and the desired behaviors can be expected to reduce physical, mental, and emotional stressors that hamper individual performance today. However, having changed what can be changed in work and work environment, these technologies can be deployed to ameliorate what can't be changed (some types of work are stressful, friction—even productive friction—can be exhausting, and our lives will still prove challenging) and to give tools and insights to those working in an optimized environment to take their performance to new levels.

- **Deploy technology in a way that is least intrusive and most aligned to existing behaviors.** Maximize the chance of success by choosing solutions and designing the environment in ways that are most likely to be adopted and used by individuals to move the needle on their own and their groups' performance. Implement solutions for human performance that employ the best thinking from behavioral economics and human and organizational psychology, not just the latest technologies.<sup>13</sup> Leaders looking to equip the workforce with performance-enhancing tools and technologies need to be thoughtful in selecting tools that don't add more stress,

distraction, or cognitive load. Some of the solutions coming out make good use of haptics—forms of visual or sensory feedback that don't rely on voice, text, or standard smartphone interfaces.<sup>14</sup>

- **Plan for emergence and evolution.** Individuals will find value in different technologies and will combine them and develop practices around them in ways that uniquely support their needs and preferences. And as the technologies change and mature, and new ones emerge, so too will the opportunities to use them evolve. Avoid over-specifying. Reevaluate the way technology is deployed through the lens of how it affects individual performance, both in the immediate task and people's ability to thrive more broadly over time. Ultimately, bias toward putting technology and data into individuals' hands in ways that allow them to gain insight and improve and refine their own performance.

As we shift from a world in which standardization and speed win the day to one oriented around people, where deep relationships and new value win the customer, it's worth remembering that the goal is not to settle on one single approach or silver-bullet technology to empower and elevate your workforce. The goal—for these technologies and the work environment around them—is to support the individual as consumer, worker, leader, and group member. Leaders should look to help people be their best selves and do their best work, not just once but time and again, realizing more of their potential and achieving higher performance without burning out or fading away. ●

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# The digital-ready worker

## Digital agency and the pursuit of productivity

BY PETER EVANS-GREENWOOD, TIM PATSTON, AND AMANDA FLOUCH

ILLUSTRATION BY KATIE EDWARDS

Imagine it's Friday, just after lunch. The new college graduates you hired have had a busy week, so you've decided to host an after-work social event so they can unwind. You give one of the graduates some money and ask them to procure drinks and nibbles, confident that they will solve this open and somewhat underspecified problem. Later, during the event, you pause, reflecting that the same graduate who so easily arranged for the drinks and nibbles was unable to engage, and even balked, when you asked them earlier in the week to create a status page for their project on the company's internal wiki—a similarly scoped problem that you thought they should have been able to solve.<sup>1</sup>

## Learned helplessness versus digital agency

This inability to engage with a digital problem in the workplace—where an intelligent, otherwise competent worker proves strangely unable to use digital tools to address workplace needs—can be thought of as a form of *learned helplessness*.<sup>2</sup> The worker has learned, through many interactions with digital tools and technologies, that these tools are only to be used in particular ways to solve particular problems. Experimenting with different ways of using them often leads to unfortunate consequences: confusion, failure, or even a “bricked” device.<sup>3</sup> This reinforces the natural tendency to stick to known, habitual, “safe” tools and methods of use. After accumulating many such experiences, a worker may come to believe themselves incapable of navigating the complexities of a new digital tool, or even the digital workplace in general, without being explicitly taught how to do so—and, consequently, give up even trying.

### LEARNED HELPLESSNESS

A condition in which a person suffers from a sense of powerlessness arising from a persistent failure to succeed.<sup>4</sup>

Learned helplessness in the digital workplace is an increasingly serious problem not only for frustrated workers, but also for the organizations for which they work. Today's workplaces are saturated with—defined by, even—digital technology. Much, if not most, of an individual's work requires interacting with digital tools, and these tools are becoming ever more prevalent. The thoughtful use of digital tools can often not only make the work easier but also yield a superior result. But the more complex the digital environment becomes, the greater the danger it will evoke learned helplessness—even as the technology becomes more and more crucial to organizational success.

It's tempting to frame learned helplessness as a problem stemming from a lack of knowledge and skills. However, this is not always, or even usually, the case. Instead, it's more accurate to think of it as a problem of *unknown knowns*.<sup>5</sup> Most reasonably competent workers do in fact know how to use the digital tools at their disposal—or at least have enough knowledge and skills to be able to figure them out. However, when learned helplessness comes into play, a worker cannot make the connection between the problem in front of them and the tool's ability to help.<sup>6</sup> It's not that they don't know *how* to use the tool; it's that they don't see *why* they should use the tool *now*.

FIGURE 1

### A guide to the concepts in this article



Source: Deloitte analysis.

To highlight the distinction between knowing *how* and knowing *when* and *why*, consider the catchphrase “*Why remember what you can google?*” In a world where (more or less) all the world’s knowledge is at our fingertips if we just know how to ask for it, why try and remember everything that we might need to know? Why not treat the internet as an extension of our own memory?

For many of us, across a range of work and personal situations, googling can indeed be a productive strategy for finding information we don’t know or can’t remember. Most of us think that we know how to use internet search engines, as they’re one of the first things we encounter when we discover the internet. Furthermore, if someone doesn’t yet know how to use a search engine, it’s easy to teach them how to take a question and transform it into a search query. However, what we don’t—and perhaps can’t—teach so easily is *what questions to ask, for what purpose, and when it is appropriate to ask them*. We can show workers *how* to use a search engine, but we can’t remain always by their side to point out *when* and *why* they could or should use one.

It’s this failure to recognize the *when* and *why* that characterizes learned helplessness. What the worker with learned helplessness lacks is *agency*—or, more precisely, *digital agency*: the capacity, as an individual, to act independently and to make their own free choices in the digital workplace.

### DIGITAL AGENCY

An individual’s capacity to act independently and make their own free choices in the digital workplace.

## The art of understanding *when* and *why*

Learned helplessness is difficult to recognize in ourselves, though it can be easier to see in others. Many of us—especially digital natives who have grown up with digital technology—are comfortable around digital tools and believe that we are skilled at using them. Our familiarity breeds confidence, and we assume that we have a sophisticated relationship with the technology.

Familiarity, however, does not guarantee competence. Often, our understanding of the technology is not as good as we assume. When pressed, we cannot explain how our digital tools work, why we use them the way we do, or if there is a better way of using them.<sup>8</sup> Interestingly, it’s the digital natives who are most notable in this respect. Studies have shown that digital natives neither use technology more often nor are they more proficient at using it than digital immigrants. Indeed, many digital natives are prone to overestimating their digital skills: In one study, twice as many digital natives rated themselves “digitally proficient” as actually were digitally proficient.<sup>9</sup>

The point is that mere familiarity with digital technology does *not* inoculate people against learned helplessness.<sup>10</sup> Whether digital native or digital immigrant, experienced worker or graduate, people of all stripes are equally prone to the phenomenon. Similarly, familiarity with digital technology does not prevent people from using digital technology when it is not appropriate.

If we’re to foster digital agency in our workers, then what we must cultivate is not familiarity, but *discernment*. Discernment can be understood as a worker’s ability to identify and evaluate the opportunities and limitations of the digital workplace, and to anticipate how their actions will

## DISCERNMENT

The ability to identify opportunities and limitations in a particular context (such as the digital workplace), and to anticipate the impact of one's actions on problems arising within that context (for instance, whether using a digital tool would help or hinder a desired outcome).

affect this workplace, for good or bad. Or, put another way, workers need to be sensitive to *when* and *why* digital technology could and should be used—and when it should not.

Discernment is learned rather than innate, but it is not developed through simple familiarity with or enthusiasm for digital technology. Rather, it requires people to explore various problems in various contexts to discover, for each problem and context, how introducing digital technology changes the nature of the solution. The importance of context makes discernment domain-specific. People strengthen their discernment in a particular domain by accumulating experience in that domain; pairing this contextual understanding with their experience with digital technology's current capabilities and shortcomings; and by learning from their experiences in applying digital technology to the domain's problems.

Discernment goes beyond the mere ability ("knowing how") to use digital technology to solve a problem. Before the question of "how" even arises, discernment's greater value is that it enables a person to frame the problem in such a way that they can understand digital technology's potential uses and impacts, evaluate whether those uses and impacts are actually helpful, and only then decide which, if any, of the available tools to apply.

Consider public elections, where the gold standard is a paper-based process despite broad community support for digital (online) voting.<sup>11</sup> If we frame elections as an algorithmic problem, a digital problem, by focusing on the voting process, then the benefits of digital voting are obvious: improved accuracy (no hanging chads<sup>12</sup> or lost ballot boxes) and greater efficiency (avoiding endless counts and recounts) through automating a manual process. But the most significant challenge with running an election is not inaccuracy or inefficiency. What is most important is enabling citizens to vote anonymously and secretly, so they cannot be coerced or sell their vote; ensuring that each citizen only votes once, by recording that they have voted; and convincing the losers that they have indeed lost, by validating that each voter's intention was correctly recorded and counted. This combination of requirements cannot be met with current digital technology.<sup>13</sup>

**Discernment requires people to explore various problems in various contexts to discover, for each problem and context, how introducing digital technology changes the nature of the solution.**

The realization that digital technology is *not* an appropriate tool for elections can only come with the discernment, the sensitivity to context, to understand what the problem really is. Conversely, a lack of discernment when applying digital technology can easily result in negative outcomes, either by the failure to use technology where it might help (as in learned helplessness), or the use of technology in situations when it causes more problems than it solves.

## Four types of digital worker

What exactly does a worker with digital agency look like? Discernment is surely one of their attributes, but are there others?

One approach to understanding workers vis-à-vis their relationship with the digital workplace is to frame their attributes in terms of two dimensions (shown in figure 2). First, on the vertical dimension, we can consider how *discerning* the worker is—how sensitive or insensitive they are—when applying digital technology to their work. A worker’s level of discernment points to their sophistication in exploring and evaluating the context—the work and the workplace—when using digital technology. A digitally sensitive worker appreciates the potential impact of digital technology on their work, and ensures that the digital tools they introduce improve their work process and outcomes. A digitally insensitive worker, in contrast, does not have the same appreciation of digital technology in their work. While they may be cognizant of the new opportunities digital tools create, they are unlikely, due to their insensitivity to context, to consider

whether those tools are suitable for the particular task at hand.

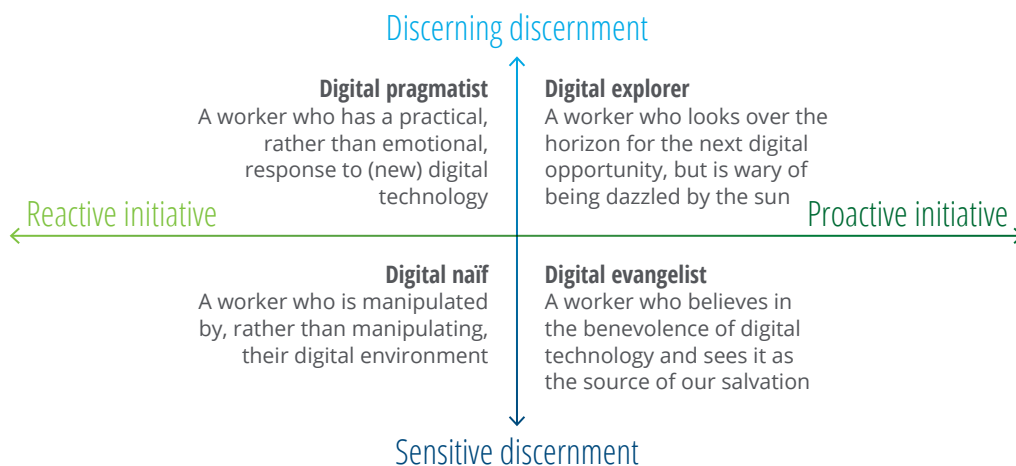
The second dimension, *initiative*, captures a worker’s sophistication in exploring and evaluating digital technology—that is, how reactive or proactive they are in integrating digital technology into their work and work habits. A reactive worker appreciates the benefits digital technology can bring to their work, but they will only seek out new digital tools when they find that their current tools are insufficient for the task. In contrast, a proactive worker both appreciates the benefits that digital technology can bring to their work and actively looks for new digital tools that will enable them to be even more productive.

Categorizing workers along these two dimensions yields four digital worker archetypes (figure 2).<sup>14</sup>

In the bottom-left corner, we have the *digital naïf*.<sup>15</sup> A digital naïf’s narrow grasp of digital technology limits their ability to use it in their work: They only know how to use particular digital tools in particular ways and in particular contexts. Theirs is the tribal knowledge of someone who

FIGURE 2

### Digital workers classified by discernment and initiative



Source: Deloitte analysis.

might have grown up with the technology and is overconfident in their skill in using it. Learned helplessness is a common problem for the digital naïf when they find themselves in an unfamiliar workplace or confronted by unfamiliar problems.

On the bottom right, we have the *digital evangelist*. They are likely a digital naïf who, at some point, became enamored with technology. While they are enthusiastic (though possibly mistaken) about the opportunities that digital technology provides, they are insensitive to how it affects their work. This puts the digital evangelist in the perverse position that their interest in the technology may actually be destructive.

A *digital pragmatist*, top left, has the discernment needed to determine when digital technology can add to or detract from their work. They do not typically suffer from learned helplessness around digital tools, but neither do they tend to seek out new opportunities to apply them. They place the work at the center, only pulling in new digital technologies when they realize that the tools they have at hand are insufficient.

At the top right is the *digital explorer*. Like the digital pragmatist, they have the discernment required to understand the benefits and problems of digital technology. Unlike the digital pragmatist, however, they actively seek out new digital technologies and tools that may make them more productive, or that may create new opportunities.

We should note that digital pragmatism and digital exploration are equally valuable, though different, ways to approach digital technology. Ideally, work groups would include a balance of pragmatists and explorers. Too many pragmatists, and new digital tools—and new opportunities to use digital tools—will tend to be ignored. Too many explorers, and the team may spend too much time chasing after new digital technologies or experimenting with digital tools that provide only a modest improvement at best.

## Productive and unproductive predilections

If we want digital pragmatists and explorers, and not digital naïfs or evangelists, in our workplace, it behooves us to understand how to increase workers' discernment so as to shift them toward these top two quadrants. How can an employer, educator, or community do this?

Cultivating discernment is not merely a matter of teaching a worker more about the work or the technology. Simply increasing a person's level of knowledge does not necessarily help them develop the sensitivity to problems, technologies, and contexts that will enable them to discern when and why a digital tool might be useful. Discernment also does not comfortably fit into the concept of *skill*, which might be defined as “the ability to do something well.”<sup>16</sup> Nor is it exactly a *competence*, “the application of a skill in a particular context.”<sup>17</sup> Knowledge, skills, and competencies are insufficient on their own.

A different, temporal view of discernment can clarify what else a worker needs to become more digitally sensitive. Consider the *Why remember what you can google?* example. Ideally, when faced with a problem that a search engine could help them solve, a person will draw upon a mental library of questions and strategies that they could deploy in their efforts to solve it. Obviously, in the present moment, they must *access* this library, when they discern that it is worthwhile and appropriate to tap into the potential questions and strategies the library contains. But equally, something must have occurred before the work to *build* their library of questions and search strategies (in addition to the time they spent learning the skills involved in using a search engine). And if the overall quality of questions and strategies in the library are to improve over time, then something must also occur after the work to *curate* the library.

It’s our view that a worker’s ability to build, access, and curate their personal mental libraries is becoming more important to their “digital readiness” relative to simply increasing their knowledge, skills, and competencies. If this is so, the question then becomes: What attributes does the worker need to be able to build, access, and curate a personal library of appropriate questions and strategies—before, during, and after the work?

Rather than focusing on knowledge and skills, our research has led us to focus on attitudes and behaviors.<sup>18</sup> If a worker is to do something before, during, or after the work, then they must value the outcome of their actions enough to invest the required time and effort (attitudes)—as well as actually take those actions (behaviors).

We can group together these two sets of concepts—*attitudes* and *behaviors* together with *building*, *discerning*, and *curating*—and call the resulting construct a *predilection*.<sup>19</sup> If we arrange the

concepts along the two dimensions of attitudes and behaviors vertically, and building, accessing, and curating horizontally, figure 3 is the result.

Predilections can be either productive or unproductive, depending on an individual’s attitudes and behaviors. As an example of a productive predilection, consider how a worker with a strong sense of digital agency would actualize the *Why remember what you can google?* concept (figure 4). Before any particular problem even arises, this worker must have valued investing time and effort—as well as actually have invested time and effort—in discovering new questions and strategies for search engine use. This can come in the form of simple behaviors: watching a TED talk over lunch, reading books or journals, chatting over dinner with colleagues, or even just asking a coworker to explain a search strategy they just used. It doesn’t much matter what behaviors the worker adopts as long as, collectively, they enable the worker to populate their personal library.

FIGURE 3

### A predilection describes attitudes and behaviors that can either help or hinder one’s ability to build, discern, and curate

**Predilection**

[A descriptive name]

	Building	Accessing	Curating
Attitudes	Does the worker value investing their time <i>before</i> the work to prepare?	Does the worker value investing time <i>while</i> they’re working to experiment with and evaluate alternative approaches?	Does the worker value investing time <i>after</i> the work to consider how effectively they used digital technology?
Behaviors	What actions, processes, and strategies does the worker use to prepare for the work?	What actions, processes, and strategies does the worker consider to best engage with the work?	What actions, processes, and strategies does the worker use to evaluate how effectively they used the digital technology?

Source: Deloitte analysis.



**PREDILECTION**

Attitudes and behaviors that influence an individual’s ability to build, access, and curate a library of strategies for solving a particular problem. Predilections can be either productive—helping the individual effectively and efficiently solve the problem—or unproductive—leading to ineffective or inefficient solutions, or even no solution at all.

Then, during the work, while the worker is figuring out how they will use a search engine to solve the problem at hand, they must have the attitude that it is worthwhile to consider new and different approaches to solving the problem. When strapped for time or unable to connect to the internet, they might merely make a note to search on a question that has come to mind, planning to do so when they have more time and better access to a search

engine. The next day, when they’re back at their desk and they have more time, they might execute that search. Again, it doesn’t matter exactly what they do as long as their behaviors are collectively productive.

Finally, after the work, the worker would ideally reflect (if only briefly) on what they did. For instance, they might decide to learn more about the topic to better prepare themselves for future problems in the domain. They may make note of their most successful search strategy (such as searching for the name of a digital tool coupled with a description of the problem), and plan to use that strategy first the next time a similar problem arises. Taking the time to reflect enables them to improve both the contents of their library and their ability to put the library to good use.

What might characterize an *unproductive* predilection? The clearest examples may come from the past. Consider, for instance, the transition

FIGURE 4

**A productive predilection for “Why remember what you can google?”**

**Predilection**

*Why remember what you can google?*

	Building	Accessing	Curating
<b>Attitudes</b>	I want to build a library of questions and strategies that will help me integrate search engines into my work.	A search engine can help me find insights into the problem I’m working on, and what parts of the problem would benefit from a different approach.	Reflecting on the queries and strategies I used helps me improve how I integrate a search engine into my work.
<b>Behaviors</b>	<ul style="list-style-type: none"> <li>• Watching TED talks over lunch</li> <li>• Attending conferences</li> <li>• Reading blogs and books</li> <li>• Open discussions with colleagues</li> <li>• Asking a friend what they did</li> </ul>	Varying the phrasing of a query and exploring how this changes the results provided by different search engines.	Taking notes on which search queries (and maybe even which search engines) yield the best results.

Source: Deloitte analysis.

from landlines to mobile phones. Historically, telephones have represented places, as landline technology tied them to particular locations. These telephones gave us the ability to easily communicate with distant people at specific locations, and our habits—our predilections—evolved to integrate them into our lives. We might call a friend at their home before attempting to visit them, for instance, to make sure they were there and available. We might also collect the numbers of our friends and others we might want to call, and write them down in a book we keep beside our own home phone, ready to be used.

Fast-forward to the present day, when near-ubiquitous mobile device use means that phone numbers often represent *people* rather than places. Sooner or later, we will come to realize that writing telephone numbers in a book that we keep beside our (landline) phone is no longer the most productive way to store this information. Instead, it's more useful to store the numbers on our mobile phone so that they are always available, no matter

where we are. How we go about collecting these numbers—through word of mouth, from printed business cards, or even from looking at our call history—doesn't matter, as long as we see the value in collecting them and execute the behaviors needed to do so.

The problem of learned helplessness emerges when an individual comfortable in one environment moves to another, such as when they move from a world of landlines to mobile phones (figure 5). If they still consider phone numbers tied to places rather than people, they may leave their mobile phone off, only turning it on when they want to place a call (and preventing their friends from calling them when they're on the go). Even then, they might not see the value of storing their friends' contact details in their mobile phone, continuing to rely on their old telephone book. The upshot is that they may, one day, find themselves stranded, mobile phone in hand but unable to call any family or friends for help, as they don't remember anyone's mobile numbers (as only home numbers

FIGURE 5

### An unproductive predilection for recording phone numbers

**Predilection**

Saving contacts' phone numbers			
	Building	Accessing	Curating
Attitudes	Phone numbers are tied to physical locations.	Phone calls are "supposed" to be placed to and from landline phones.	Any effort I put into making phone numbers easier to find assumes that I'll be looking them up while physically at my landline phone.
Behaviors	Write down people's telephone numbers in an address book.	Keep the address book next to my landline phone.	Put the phone numbers I use most often on a sticky note above my landline phone.

Source: Deloitte analysis.

are considered worth remembering) and they don't have their phone book with them (it's beside the home phone). They may, in fact, not even consider calling a friend or family member's mobile number, as they haven't made the association between mobile phones and people.

## The attributes of digital agency

Previously, we asserted that workers with learned helplessness lack *digital agency*. It's now time to weave together the concepts of learned helplessness, discernment and initiative, and productive and unproductive predilections to understand what "digital agency" actually means.

A productive, "digital-ready" worker—the digital pragmatist or digital explorer who neither suffers from learned helplessness nor uses digital technology in inappropriate ways—has several distinguishing attributes. Clearly, they must have a suitable set of productive digital predilections (the judicious combination of attitudes and behaviors), as these will determine how they integrate digital tools into their work habits. But productive predilections, in themselves, aren't all that's needed to be productive in a digital workplace. Two more elements are necessary.

For our worker to engage with digital tools at all, they must have a suitable set of digital *literacies*. In this context, digital literacy is analogous to literacy in the traditional sense of knowing a language and its major works (such as Spanish and *Don Quixote*).<sup>20</sup> The digital equivalent would be knowing how to use, say, a tablet or smartphone—the "language" we use to interact with a touch device—and the platforms that can be accessed (such as common Web applications) from this device. Without digital literacy, a worker may not even know that such things as search engines exist—and therefore be unable to develop either

the ability or the predilection to use them productively.

### DIGITAL LITERACY

A basic understanding of the digital media and major digital platforms relevant to a particular domain.

On top of this, our worker must have a suitable set of digital *abilities*—the knowledge and skills required to accomplish particular tasks with the relevant digital tools. The ability to find information using an internet search engine, for instance, relies on the ability to take a question or strategy and convert it into a search query.

Without this ability, a worker's online searches will come up empty no matter how strong their predilection to use search engines to find answers to workplace problems.

### DIGITAL ABILITY

The knowledge and skills to use digital tools applicable to a particular domain.

Listing these characteristics in a more natural order, we can describe the productive digital worker as having three essential attributes:

- 1. Digital literacies:** A basic understanding of the digital media and major digital platforms relevant to their domain.
- 2. Digital abilities:** The knowledge and skills to use digital tools applicable to their domain.
- 3. Productive digital predilections:** Attitudes and behaviors that allow them to appropriately apply their digital literacies and abilities to effectively solve work problems.



Possession of these three attributes is what ultimately gives an individual *digital agency*. If a worker's digital literacies are lacking, they will be unable to engage with the discourse of work. If they lack digital abilities, they will be unable to contribute to the work. And if they lack productive digital predilections, they will find themselves limited, lacking agency in a digital environment, and suffering from learned helplessness.

## The emerging digital workplace

Let's now broaden the discussion to what all this could mean for the many organizations that are desperately trying to build a "digital-ready" workforce.

Many commentators on technology's impact on the workforce frame the future in terms of a digital skills gap—the disparity between the skills employers demand and the skills workers actually have. According to this narrative, the introduction of new technology results in new tools, which in turn require new skills—skills that make existing skills (and the workers that hold them) redundant. Thanks to the inexorable advance of technology, the digital skills gap is perceived to be growing despite our best efforts. The proper response is assumed to be to focus on teaching students and workers more, and more relevant, digital skills. We elevate the importance of digital literacy and coding in student education and workforce training; we continuously add newly created (or newly important) skills to competency wheels, positioning these as key skills for the future; and we tout lifelong learning and reskilling, encouraging workers to periodically return to formal education to replace their old, outdated skills with new, shiny ones.

It's true, of course, that technology is inexorably advancing, and that new digital tools and techniques are constantly emerging to supplant those that workers currently use. But a relentless

focus on reskilling and retraining may not be the entire answer to this phenomenon. The reason is that changes to digital tools don't necessarily mean that a worker's old skills are no longer relevant. Often, it just means that the old skills need to be expressed differently, or applied in a new context. The graduate described at the start of this article, for instance, may well have had all the skills they needed to do what was asked, to set up a status page on their company's intranet wiki. Their problem likely wasn't that they didn't know how to use a tool like a wiki—which is, after all, primarily a collection of interlinked documents that anyone can edit. They may simply have been stymied by the unfamiliarity of the environment—the corporate intranet and its particular wiki—and been unable to navigate from what they knew how to do to what needed to be done. Another graduate, one with a stronger sense of digital agency, might have been able to make the leap.

Digital agency makes people much more likely to be able to adapt to a constantly evolving digital environment, using their existing skills to figure out new solutions with different tools in different contexts. What can we—as employers and as a society—do to help workers acquire it?

One obvious approach is to help workers eliminate their *unknown knowns*, helping them to make the connection between what they know from their last workplace and what seems unfamiliar in the new workplace. Simply acknowledging that one's level of digital agency drops with a change in workplace means that something can be done about it. For instance, a new hire in the finance function might discover that their new organization's invoicing solution, while similar in functionality to their previous employer's tool, has been customized in a way that makes it difficult for someone without local experience to navigate. Pairing the new hire with an experienced colleague for a few hours of training can help the new hire discover how to accomplish the same tasks with different tools. Better yet—from the perspective of encouraging



digital agency—the instruction could be integrated into the tool itself, helping the worker help themselves. This latter approach not only brings the learning to the worker at just the moment they need it, but also rewards the worker for exploring and experimenting with the tool on their own—which reinforces the desirable attitude that efforts to “help themselves” are likely to pay off.

More generally, employers should seek to foster in workers a productive set of predilections—attitudes and behaviors that will enable them to effectively integrate digital tools into their work habits. Organizations can provide workers with opportunities to engage with tasks in their *unknown known*, such as an unfamiliar invoicing tool, and encourage them to explore the environment around them, both digital and social, for possible solutions. The organization is then responsible for creating a supportive environment in which to do this. Digital agency depends on the workplace’s attributes as well as the worker’s, and organizations with complex and opaque work environments—where the pressure to be seen as competent prevents workers from admitting any confusion, or where digital tools lack any built-in guidance—can be fertile ground for learned helplessness. Rather, employers should encourage the attitude that it’s okay to not immediately understand how to do something as long as one is actively working toward it. Workers should feel empowered to reach out to more experienced colleagues to learn what they need when they need

it, and employers should tweak HR and management frameworks to create the space for these more experienced colleagues to respond.

Finally, from a broader societal perspective, employers can benefit by working with educators—both K–12 and postsecondary—to help develop an educational journey that leads to digital agency in the workplace. With individuals’ digital journeys beginning at an increasingly young age, educators have a duty to cultivate productive attitudes and behaviors toward digital technologies at key stages in the education journey. The extent to which our future workers possess digital agency will have profound impacts upon society’s development, making it increasingly important to inculcate the discernment needed to navigate the digital universe from a young age.

Attempting to deal with the reality of the evolving digital workplace by teaching workers more and more new skills is akin to running on a continuously accelerating treadmill. So many new skills will eventually be needed, and will need to be updated so often, that an organization risks being unable to keep up. Instead, as the digital workplace grows in complexity, so must our level of digital agency, with richer literacies, skills, and predilections. Only then will we be able to equip our workers—and our organizations—with the adaptability and abilities they need to thrive in a digital world. ●

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17. In machine learning parlance, “labels” are what statisticians call “outcome variables” or “target variables.” Labels are known quantities for cases in historical data set, but unknown for the future scenarios in which a predictive algorithm is intended to apply. For example, consider a database containing the heights of a million adult males along with the heights of each man’s parents. An algorithm can be created to predict the height of an adult male from the heights of his parents. In this scenario, the height of the child is the “label,” and it is an objectively measurable quantity. In other scenarios, the label is provided by humans using judgment. Examples include, labeling a bit of social media content as “offensive,” an employee’s performance as “acceptable,” or a tumor as “cancerous.” The term “human-in-the-loop machine learning” is often used to connote the latter types of scenarios.
  18. The hype and semantic confusion surrounding AI, as well as a tendency to overinterpret the “intelligence” of novel forms of AI, results in confusion even among experts. The prominent machine learning researcher Michael Jordan comments that the term “AI” is often used as an “intellectual wildcard, one that makes it difficult to reason about the scope and consequences of emerging technology ... This is not the classical case of the public not understanding the scientists—here the scientists are often as befuddled as the public.” Michael I. Jordan, “Artificial intelligence—the revolution hasn’t happened yet,” *Harvard Data Science Review* 1.1, June 23, 2019.
  19. Jordan discovered this when his wife’s ultrasound image resulted in a faulty diagnosis. Jordan, a trained statistician, investigated the situation and reported the differing ultrasounds to the attending geneticist, who replied, “That explains why we started seeing an uptick in Down syndrome diagnoses a few years ago. That’s when the new machine arrived.” As a result, Jordan’s wife avoided the risky amniocentesis procedure.
  20. For further discussion, see: David Danks and Alex John London, “Regulating autonomous systems: Beyond standards,” *IEEE Intelligent Systems* 32, no. 1 (2017): pp. 88–91.
  21. The *Economist* reports that some Chinese firms are adopting this strategy: “In the absence of driving software which can handle chaotic city streets, some Chinese firms are ... turning the streets themselves into something that software can handle. The approach involves installing sensors to guide cars, writing and enforcing rules about how humans move around, designing (or redesigning) urban landscapes to be AV-friendly and, critically, limiting AV firms’ legal liability in the event of inevitable accidents.” *Economist*, “Chinese firms are taking a different route to driverless cars,” October 12, 2019.
  22. Prominent examples of chatbots being gamed to spread inflammatory content come to mind, but controls for more mundane scenarios should also be considered. For example, some chatbots incorporate personally identifying information (PII) detectors that can either block the PII content or ask the user to confirm its appropriateness.
  23. Robert Hof, “Toyota: ‘Guardian angel’ cars will beat self-driving cars,” *Forbes*, April 8, 2016.
  24. For a discussion of human-computer symbiosis, see Guszczka, Lewis, and Evans-Greenwood, *Cognitive collaboration*. A recent exploration
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- of human-computer extended intelligence is Thomas Malone's book *Superminds*. For a summary, see: Jim Guszczka and Jeff Schwartz, "Superminds: How humans and machines can work together," *Deloitte Review* 24, January 28, 2019.
25. The prominent computer scientist Kris Hammond states: "Any program can be considered AI if it does something that we would normally think of as intelligent in humans ... How the program does it is not the issue, just that it is able to do it at all. That is, it is AI if it is smart, but it doesn't have to be smart like us." Kris Hammond, "What is artificial intelligence?," *Computerworld*, April 10, 2015.
  26. For example, on October 26, 2019, one of this article's authors used a popular app to translate the current headline "Elizabeth Warren is becoming Trump's greatest threat" from English into Burmese, and then from Burmese back into English. The app returned: "Becomes the biggest threat of Elizabeth Warren." When Spanish was substituted for Burmese, however, the translations were flawless. The success of the algorithm is a function of the size and adequacy of the available data, not the sort of understanding characteristic of human speakers.
  27. Gary Marcus and Ernest Davis, *Rebooting AI: Building Artificial Intelligence We Can Trust* (Pantheon, 2019).
  28. *Economist*, "Driverless cars are stuck in a jam," October 10, 2019; Christopher Mims, "Driverless hype collides with merciless reality," *Wall Street Journal*, September 13, 2018.
  29. For an engaging profile of the affective computing pioneers Rosalind Picard and Rana el Kaliouby, see Raffi Khatchadourian, "We know how you feel," *New Yorker*, January 12, 2015. Interestingly, the same affective computing technology is increasingly used for the types of semiautonomous vehicle driver assistance functionality mentioned in the previous section. Khari Johnson, "Affectiva launches emotion tracking AI for drivers in autonomous vehicles," *VentureBeat*, March 21, 2018.
  30. For many peer-reviewed examples, see Data Science for Social Good Summer Fellowship, "Publications from the Data Science for Social Good Fellowship program," accessed November 21, 2019.
  31. Simon Hoermann et al., "Application of synchronous text-based dialogue systems in mental health interventions: Systematic review," *Journal of Medical Internet Research* 19, no. 8: (2017).
  32. "Growth mindset" interventions—prompting the belief that success comes from effort and perseverance rather than fixed abilities or "gifts"—were pioneered by the respected psychologist Carol Dweck and are commonly used to improve children's educational outcomes. The social robot pioneer Cynthia Breazeal and her collaborators have built peer-like social robots designed to foster growth mindsets in children. Hae Won Park et al., "Growing growth mindset with a social robot peer," *Proc ACM SIGCHI*, (2017): pp. 137–145.
  33. For example, colleagues from Deloitte recently teamed with the Penn Medicine Nudge Unit to test such an intervention. Penn Medicine News, "Using a wearable device to exercise more? Add
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- competition to improve your results,” press release, September 9, 2019; also see Mitesh S. Patel et al., “Effectiveness of behaviorally designed gamification interventions with social incentives for increasing physical activity among overweight and obese adults across the United States,” *JAMA Internal Medicine*, September 9, 2019.
34. For example, the prominent behavioral economist Shlomo Benartzi, one of the creators of the celebrated “Save More Tomorrow” behavioral finance program, has worked on such apps. Benartzi coauthored the book *Save More Tomorrow* with his collaborator, Nobel Laureate Richard Thaler. Benartzi’s more recent book *The Smarter Screen* is about applying nudge principles in digital environments to reach larger populations (such as gig workers) and test interventions more rapidly.
35. A false positive is an error resulting from a test or algorithm indicating the presence of a condition (for instance, being a fraudster, having a rare disease, or being a terrorist) that does not in fact exist. If the overall population-level base rate is low, then even the most sophisticated algorithms often yield more false positives than true positives. This is known as the “false positives paradox.” To illustrate, suppose that each year a country faces only a small handful of commercial airline terrorists threats, and that the best available algorithm homes in on a few hundred suspects out of millions of passengers. Though tiny relative to the overall population, the great majority of people on this list will be innocent. Furthermore, because no algorithm is perfectly accurate, it is quite possible that this list won’t contain all of the actual terrorists, a type of error called a false negative. The tradeoff is that, expanding the list of suspects to reduce the likelihood of false negatives will increase the number of false positives—and therefore the risk of harming or treating unfairly still more innocent people. Analogous scenarios involve selecting algorithmic thresholds for deciding when to treat people at risk of a disease. There is generally a tradeoff between correctly identifying as many people with the disease as possible versus avoiding potentially risky treatments of healthy people. In such cases, applying the principles of beneficence and nonmaleficence requires cost-benefit judgments that might vary across individuals, organizations, and societies. Wikipedia, “Base rate fallacy,” accessed November 21, 2019.
36. For Pew Charitable Trusts’ discussion of this case study, see The Pew Charitable Trusts, “Behavioral analytics help save unemployment insurance funds: New Mexico uses data to identify misinformation, save money,” October 26, 2016. To see a short video describing the case study, see Deloitte US, “Nudging New Mexico: Kindling compliance among unemployment claimants,” YouTube video, 4:33, February 11, 2016.
37. For a related discussion, see: Chelsea Barabas et al., “Interventions over predictions: Reframing the ethical debate for actuarial risk assessment,” *Proceedings of Machine Learning Research* 81 (2018): pp. 1-15.
38. For an extended discussion, see Jim Guszczka, “The last-mile problem: How data science and behavioral science can work together,” *Deloitte Review* 16, January 27, 2015.
39. For an extended discussion of this theme in the context of behavioral data, see Jim Guszczka, David Schweidel, and Shantanu Dutta,
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- "The personalized and the personal: Socially responsible innovation through big data," *Deloitte Review* 14, January 18, 2014. For a discussion of human-centered AI, see: Fei-Fei Li, "How to make AI that's good for people," *New York Times*, March 7, 2018. For further perspectives on human-centered AI, see Jim Guszcza, "Smarter together: Why artificial intelligence needs human-centered design," *Deloitte Review* 22, January 22, 2018.
40. "Justice & Fairness" is the second-most frequently appearing concept in the corpus of declarations studied by the ETH Zurich team, appearing in 68 of the 84 declarations. This is second to "Transparency," which appeared in 73 of the declarations studied, and just ahead of "Non-maleficence," which appeared in 60. It is interesting that these top three categories roughly correspond to the three of the four core principles of bioethics. In this article, we discuss transparency as an aspect of the principle of *autonomy*.
  41. Stanford Encyclopedia of Philosophy, "Procedural versus substantive justice," June 26, 2017.
  42. Sigal Samuel, "Alexa, are you making me sexist?," *Vox*, June 12, 2019.
  43. Daniel Cossins, "Discriminating algorithms: 5 times AI showed prejudice," *New Scientist*, April 12, 2018.
  44. Jennifer Langston, "Who's a CEO? Google image results can shift gender biases," *UW News*, University of Washington, April 9, 2015.
  45. Tom Simonite, "The best algorithms struggle to recognize black faces equally," *Wired*, July 22, 2019.
  46. Sigal Samuel, "A new study finds a potential risk with self-driving cars: Failure to detect dark-skinned pedestrians," *Vox*, March 6, 2019.
  47. Jeff Green, Jordyn Holman, and Janet Paskin, "America's C-suites keep getting whiter (and more male, too)," *Bloomberg*, September 21, 2018.
  48. Julia Angwin et al., "Machine bias," *ProPublica*, May 23, 2016.
  49. A foundational paper is Jon Kleinberg, Sendhil Mullainathan, and Manish Raghavan, "Inherent trade-offs in the fair determination of risk scores," November 17, 2016; for an intuitive discussion, see Sam Corbett-Davies et al., "A computer program used for bail and sentencing decisions was labeled biased against blacks. It's actually not that clear.," *Washington Post*, October 17, 2016.
  50. *Chicago Booth Review*, "Sendhil Mullainathan says AI can counter human biases," August 7, 2019.
  51. Marianne Bertrand and Sendhil Mullainathan, "Are Emily and Greg more employable than Lakisha and Jamal? A field experiment on labor market discrimination," National Bureau of Economic Research, accessed November 21, 2019. Further discussion is provided in Jim Guszcza, Josh Bersin, and Jeff Schwartz, "HR for humans: How behavioral economics can reinvent HR," *Deloitte Review* 18, January 25, 2016.
  52. See Richard H. Thaler and Cass R. Sunstein, "Who's on first," University of Chicago Law School, September 1, 2003. See also Jim Guszcza, "The importance of misbehaving: A conversation with Richard Thaler," *Deloitte Review* 18, January 25, 2016. The ability of even simple algorithms to outperform unaided expert judgment gave rise to the decades-long "Actuarial versus clinical
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- judgment” initiative by Daniel Kahneman’s predecessor Paul Meehl. For a discussion of this phenomenon in the context of AI, see Guszczka, Lewis, and Evans-Greenwood, “Cognitive collaboration.”
53. For a discussion of the need for professionalizing a data science subprofession of algorithm auditors, see James Guszczka et al., “Why we need to audit algorithms,” *Harvard Business Review*, November 28, 2018.
54. Stanford Encyclopedia of Philosophy, “Autonomy in moral and political philosophy,” January 9, 2015.
55. Regarding privacy in particular, Frederike Kaltheuner from the civil rights organization Privacy International states: “People want to negotiate who they are and how they want to interact with the world around them. Privacy is about enabling all of this and empowering individuals to do this all. Framed like this, privacy isn’t the opposite of *connecting* and *sharing*—it’s fundamentally about human dignity and autonomy.” Privacy International, “It’s about human dignity and autonomy,” July 12, 2018.
56. Floridi and Cowls, “A unified framework of five principles for AI in society.” Though fundamental, autonomy appears in only four of the six declarations studied by the AI4People team, and 34 of the 84 declarations studied by the ETH Zurich team. Echoing Salganik’s point made above, this illustrates the benefit of starting with fundamental principles.
57. See, for example Vili Podgorelec, et al., “Decision trees: An overview and their use in medicine,” *Journal of Medical Systems* 26, no. 5 (2002): pp. 445–63.
58. Dr. Matt Turek, “Explainable artificial intelligence (XAI),” Defense Advanced Research Projects Agency, accessed November 21, 2019.
59. The philosopher David Danks is especially helpful on the concept of trust. For Danks, a starting point for trust involves the user having “a reasonable belief that the system (whether human or machine) will behave approximately as intended.” David Danks, “The value of trustworthy AI,” proceedings of the 2019 AAAI/ACM conference, January 27–28, 2019. In Deloitte’s 2020 *Tech Trends*, Danks states: “To me, trust is a willingness to make yourself vulnerable because you expect the broader system to act in ways that support your values and interests. That doesn’t mean that you expect the company will never make a mistake or experience an unintended outcome. Instead, what’s important is that if something goes wrong, you’re confident that the company will take care of it.” Deloitte, *Tech Trends 2020*, forthcoming. The ethical philosopher Onora O’Neill discusses the importance of linking trust to the inherent trustworthiness of the agent. She comments, “To place and refuse trust intelligently, we must link trust to trustworthiness, and must focus on evidence of honesty, competence, and reliability.” Onora O’Neill, “Linking trust to trustworthiness,” *International Journal of Philosophical Studies* 26, no. 2 (2018): pp. 293–300.
60. An Insurance Institute of Highway Safety article states that one such crash “demonstrates the operational limits of advanced driver assistance systems and the perils of trusting them to do all of the driving, even though they can’t.” Insurance Institute for Highway Safety (IIHS), “Fatal Tesla crash highlights risk of partial automation,” August 7, 2018.
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61. Daniel Kahneman, *Thinking, Fast and Slow* (Farrar, Straus and Giroux, 2013).
  62. Sunstein and Thaler state that when third parties are not at risk and the welfare of choosers is all that's involved, the central objective of nudging is to "influence choices in a way that will make choosers better off, as *judged by themselves*." Cass Sunstein, "The ethics of nudging," *Yale Journal on Regulation* 32, no. 2 (2015), pp. 413–50.
  63. Dirk Helbing et al., "Will democracy survive big data and artificial intelligence?," *Scientific American*, February 25, 2017.
  64. Acorns, "Home page," accessed November 18, 2019; Greg Schwartz, "STEP UP: When paired with gamification and a science-based engagement program, wearables can boost (and sustain) activity levels," Deloitte Life Sciences & Health Care blog, September 9, 2019; Katie Burke, "Read my lips: How AI enables safe driving," *Forbes*, June 27, 2018; Humu, "Make work better," accessed November 18, 2019.
  65. Cass R. Sunstein, "Choosing not to choose," *Duke Law Journal* 65, no. 1 (2014).
  2. Katherine Shaver, "Female dummy makes her mark on male-dominated crash tests," *Washington Post*, March 25, 2012.
  3. Ethan Zuckerman (director, MIT Center for Civic Media), phone interview with authors, August 28, 2019.
  4. Ray Kurzweil, "The law of accelerating returns," KurzweilAI.net, March 7, 2001.
  5. Catherine Bannister (US Development & Performance leader, Deloitte), phone interview with authors, July 12, 2019.
  6. Sabina Ewing (chief information officer, Pfizer Upjohn), phone interview with authors, July 2, 2019.
  7. Natasha Singer, "Tech's ethical 'dark side': Harvard, Stanford and others want to address it," *New York Times*, February 12, 2018.
  8. Judith Spitz (director, Women in Technology and Entrepreneurship in New York [WITNY]), phone interview with authors, June 21, 2019.
  9. Kasey M. Lobaugh, Jeff Simpson, and Bobby Stephens, *The consumer is changing, but perhaps not how you think*, Deloitte Insights, May 29, 2019.
  10. Mindy Simon (chief information officer, Conagra Brands), phone interview with authors, July 25, 2019.
  11. Nishita Henry (chief innovation officer, Deloitte Consulting), phone interview with authors, October 11, 2019.
  12. Sylvia Ann Hewlett, Melinda Marshall, and Laura Sherbin, "How diversity can drive innovation," *Harvard Business Review*, December 2013.

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  14. Deloitte, *Consumer 2020: Reading the signs*, 2011.
  15. Sheree Atcheson (head of Diversity and Inclusion, Monzo), phone interview with authors, July 10, 2019.
  16. Project Implicit, "About," accessed October 25, 2019.
  17. Angela Antony (chief executive officer and founder, Scoutible), phone interview with authors, June 17, 2019.
  6. World Economic Forum, Fourth Industrial Revolution, accessed December 3, 2019.
  7. Deloitte, *Digital Disruption Index*, accessed December 3, 2019.
  8. Eric Topol, *Preparing the healthcare workforce to deliver the digital future*, NHS, February 2019.
  9. William D. Eggers, David Schatsky, and Dr. Peter Viechnicki, *How artificial intelligence could transform government*, Deloitte University Press, April 26, 2017.
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  11. Deloitte, *Public sector talent: The views of public sector leaders*, October 2018.
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5. Public Services Leadership Taskforce, Better Public Services, Centre for Public Services Leadership, 2018.

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  4. Mary Morrison, "How John Hancock's CMO drives a customer-first focus," CMO Today, May 20, 2019.
  5. Blake Morgan, "When the CMO owns the customer experience: 10 top CMOs share their POV," *Forbes*, August 29, 2017.
  6. Dimple Agarwal et al., *The symphonic C-suite: Teams leading teams*, Deloitte Insights, March 28, 2018.
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## How are global shippers evolving to meet tomorrow's demand?

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  2. For additional information about this fast-changing sector and the technologies within it, see Transtech Lab, "Home page," accessed November 19, 2019.
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3. Ryan Kraudel, "What are biometric parameters and why do they matter?," Valencell, May 28, 2019.
  4. A16Z podcast, "16 minutes on the news #8: Apple camera, services; wearables—Where are we," accessed November 19, 2019.
  5. A behavioral trainer would likely involve pairing the device and data with external support, such as by creating an ongoing log of reactions and interactions that a user might choose to share with a therapist or counselor. One example of this combination of digital therapeutics and biometrics is Feel, which combines a wearable tracker with virtual cognitive behavioral therapy. Another form of behavior training, Pavlok, uses a wearable that uses aversive conditioning, delivering a small shock to associate negative stimuli with the behavior.
  6. One example of VR for mood is TRIPP. The company has developed an immersive meditation that helps users who aren't meditators quiet their minds and experience augmented visualization that can help them to achieve a more calm or focused state. Mursion and Oxford VR are two examples of offerings that use VR in ways that enhance performance through immersive practice and developing emotional awareness and regulation.
  7. The Halo headset is one example of this neurostimulation technology being directed at accelerating neuroplasticity.
  8. Much of the modern research on understanding the relationships between our nervous system and our physical and mental performance comes from work with specialized athletes, astronauts, and special forces. There are many sources for additional information; Steven Kotler's book *Stealing Fire* provides an accessible overview of the topic. For additional information about the implications for organizational and individual performance, see Deloitte, "Workplace burnout survey," accessed November 19, 2019; Human Performance Institute, "Home page," accessed November 19, 2019; Flow Research Collective, "Home page," accessed November 19, 2019.
  9. Erica Volini et al., *Leading the social enterprise: Reinvent with a human focus—2019 Global Human Capital Trends*, Deloitte Insights, 2019.
  10. Neuroscientist Andrew Huberman leads the Huberman Lab in Stanford School of Medicine's Department of Neurobiology. The author attended a talk given by Dr. Huberman at Deloitte University, Westlake TX, February 2, 2018. Related information can be heard in the podcast Unbeatable Mind: Dr. Andrew Huberman talks about the practical uses of neuroscience, October 3, 2018.
  11. *Economist*, "Digital Taylorism," September 10, 2015.
  12. Sarah Krouse, "The new ways your boss is spying on you," *Wall Street Journal*, July 19, 2019.
  13. Jim Guszczka, "The last-mile problem: How data science and behavioral science can work together," *Deloitte Review* 16, January 27, 2015.
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## The digital-ready worker

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1. This article is based on a collaborative research project between the Deloitte Australia Centre for the Edge and Geelong Grammar School. The project began in 2015 amid a groundswell of public opinion in Australia that “everyone should learn how to code.” However, the authors observed that different stakeholders seemed to read different meanings into the phrase “everyone should learn how to code.” The ensuing project (described in Peter Evans-Greenwood and Tim Patston’s *To code or not to code: From coding to competence*, Deloitte, 2019) sought to unpack the diverse meanings of “coding,” develop a framework to unify the meanings, and then construct a definition for a new phenomenon that, it was hoped, would address the common aspiration behind the catchphrase “everyone should learn how to code.”
2. The term “learned helplessness” is borrowed from the psychology literature, drawing upon the work of Martin Seligman and many others. See, for instance, Martin E. P. Seligman, “Learned helplessness,” *Annual Review of Medicine* 23, no. 1 (1972): pp. 407–12.
3. A “bricked” device is a digital device that is so broken that it cannot even power on, making it an expensive brick. A bricked device cannot be fixed through normal means.
4. Adapted from Lexico, “Learned helplessness,” accessed September 11, 2019.
5. As opposed to *known unknowns* or *unknown unknowns*.
6. In this article, we define *work* as any activity, paid or not, in pursuit of an outcome, where the desired outcome may be the journey rather than the destination; *worker* as an individual who undertakes work; and *workplace* as the physical and social context within which the work takes place. By using these terms, we are not implying a sole focus on paid employment or contractual arrangement. *Work*, *worker*, and *workplace* can refer to an architect using a virtual reality program to model a building; they can also apply to the same architect tending their garden on the weekend as a hobby, where the desired benefit is primarily relaxation.
7. Peter Evans-Greenwood, *Why remember what you can google?*, Deloitte Australia, February 28, 2019.
8. This brings us to the converse of “*Why remember what you can google?*”: the illusion of explanatory depth, where we feel that we understand complex phenomena with far greater precision, coherence, and depth than we actually do. For instance, we assume that we have a good understanding of something after we’ve googled it, incorporating what we found on the internet into our own understanding. More often not, this is not the case, and we are, in fact, overestimating our understanding; when pressed to explain our knowledge, we come up short. The phenomenon is much stronger for explanatory knowledge than other types of knowledge. See Leonid Rozenblit and Frank Keil, “The misunderstood limits of folk science: An illusion of explanatory depth,” *Cognitive Science* 26, no. 5 (2002): pp. 521–62.

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9. Nathaniel Scharping, "There are no digital natives," *Discover*, July 27, 2017.
  10. On the other hand, it can be hard to avoid some degree of existential angst if we rely on the internet too often to retrieve information. If we need to google something, we may wonder if we really understand it. So far from experiencing the illusion of explanatory depth, our natural impostor syndrome kicks in, and we question if our hard-won knowledge and skills are really our own.
  11. For a good discussion on the limits of technical solutions to voting, with a focus on blockchain, see Yael Grauer, "What really happened with West Virginia's blockchain voting experiment?," *Slate*, July 11, 2019.
  12. The recount of the 2000 United States presidential election involved debate over the validity of a punch-card vote where the punch failed to punch a hole completely through the card, leaving a "hanging chad." See Wikipedia, "2000 United States presidential election recount in Florida," accessed September 6, 2019.
  13. While old, a 2004 blog post by Bruce Schneier, a widely respected computer security expert, provides a good summary of the challenges of digital voting. Bruce Schneier, "The problem with electronic voting machines," *Schneier.com*, November 10, 2004.
  14. This 2x2 figure is based on the findings from workshops held in 2019 for the "Should everyone learn how to code?" research project described in endnote 1.
  15. Digital naïf is not a particularly pleasant term, but then, it's not a pleasant place to be.
  16. Paraphrased from "skill," Apple OSX dictionary.
  17. This definition synthesizes several definitions of "competence" in common use. A dictionary definition of "competence" is "the ability to do something successfully or efficiently ("competence," Apple OSX dictionary). The OECD's Learning Compass 2030 project defines "competency" as "a holistic concept that includes knowledge, skills, attitudes, and values," (OECD, "OECD Learning Compass 2030 frequently asked questions," accessed September 6, 2019).
  18. This approach is at least partly inspired by Bratman's planning theory of intention. See Michael E. Bratman, *Intention, Plans, and Practical Reason* (Cambridge, Massachusetts: Harvard University Press, 1987).
  19. The term "predilection" was chosen because it both suggests a bias toward particular attitudes and behaviors and also implies that these attitudes and behaviors can be acquired and modified (and can therefore be learned). That is, predilections are *not* some essential and unchangeable attribute of the individual.
  20. This contrasts with the way popular usage of the term "digital literacy" tends to gather together all manner of otherwise unrelated attributes to become a suitcase term that we pack with our anxieties about a digital future.
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Barry Downard



Andrew Bannecker



Lucie Rice and Kevin Weier



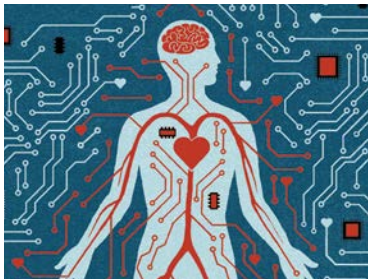
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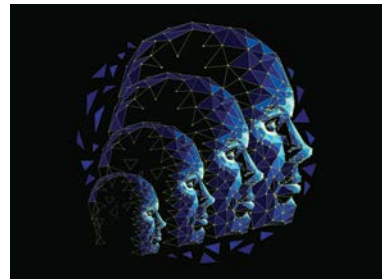
Alex Nabaum



James Steinberg



Kevin Weier



Daniel Hertzberg





Kevin Weier



Shotopop



Josie Portillo



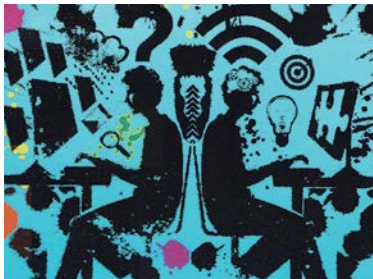
Traci Daberko



Neil Webb



Jon Krause



Katie Edwards

## THE END NOTE

### { What we said then }

*"In the field of life insurance, the electronic [business machine] has shown itself to be very much at home ... Here, the machine is in an ideal application utilizing its special abilities for processing large volumes of data ... The possibilities of money-saving and the potentials for obtaining valuable information not heretofore considered practicable might be implied."*

*Virgil F. Blank, principal, Haskins & Sells,  
Electronics—its possibilities and limitations, 1955*

### { What we think now }

“WRITING AT THE dawn of business computing, our colleague anticipated many of the opportunities that technology offered to the financial services industry—as well as some persistent challenges.

Blank’s observation that computers would allow companies to make better use of information has been overwhelmingly confirmed. Indeed, Blank likely could hardly have imagined what “large volumes of data” has turned into. Banks, insurers, investment firms, and others are today using massive amounts of both traditional and alternative data not just to record transactions, but to improve customer experience, manage risk, and streamline operations, among many other things.

On the other hand, though computing hardware has advanced far beyond the punch cards of Blank’s day, industry adoption doesn’t always keep up with the cutting edge. Many financial services firms are still

running mainframe-based, batch-oriented systems. As a result, many organizations are investing a great deal of time and money in addressing the technical debt still embedded in these systems—remediating cyber vulnerabilities, streamlining system architectures and interfaces, and improving data intake, organization, and analysis.

Blank also points out, elsewhere in his essay, the need to retrain workers who may be displaced by new technology. That need remains as urgent as ever. Today, new kinds of jobs are being created at the boundary between human and artificial intelligence, and workers will need—indeed, want—to be retrained to keep their careers on track.

Ultimately, our view back to more than 60 years ago shows how much the financial services industry still has to do to address its aging core technology infrastructure, while at the same time manage the huge volumes of data available today to acquire the kind of valuable knowledge Virgil Blank foresaw. ●



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\*Source: Environmental Paper Network, [papercalculator.org](http://papercalculator.org).



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