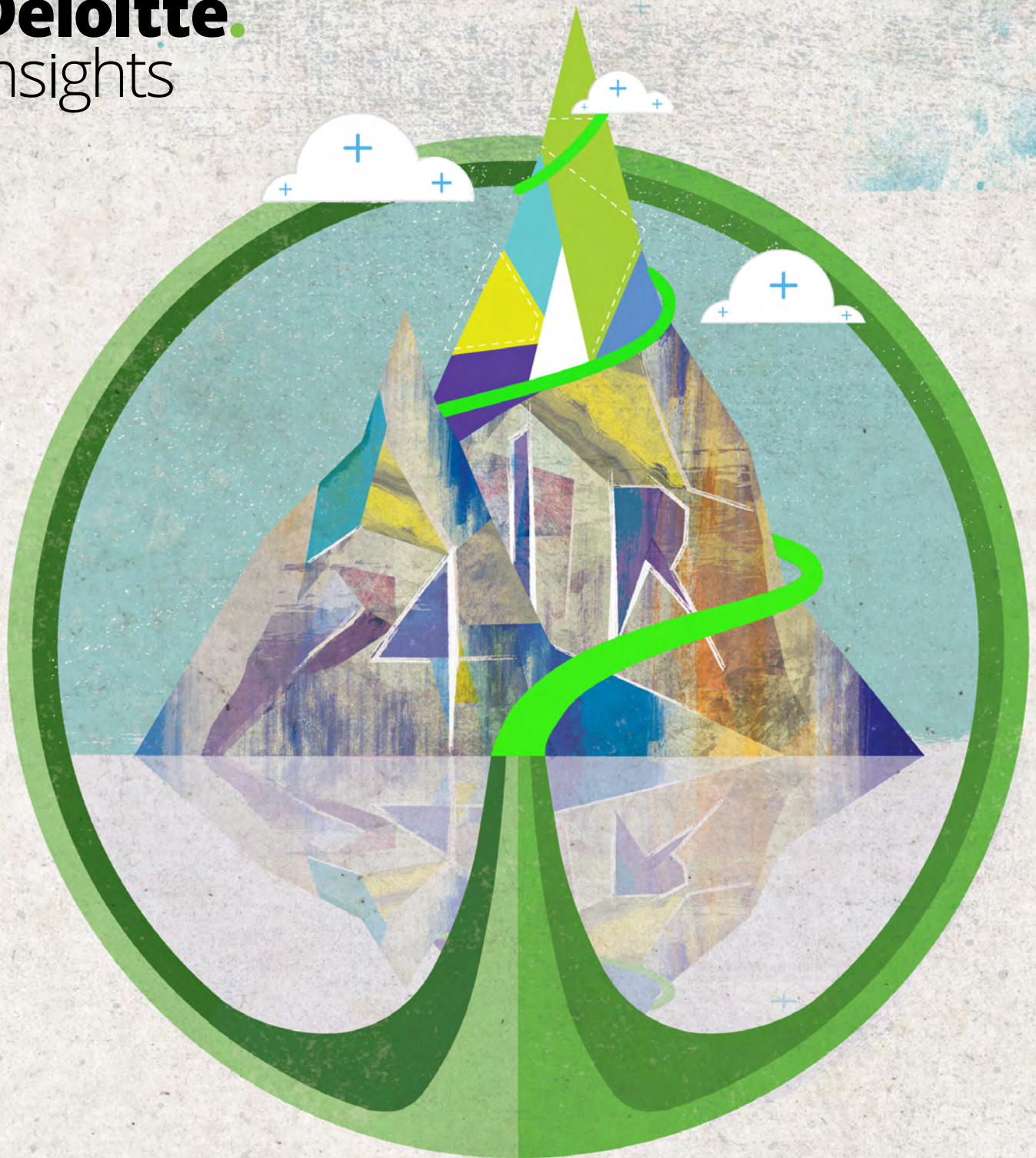


Deloitte.
Insights



The Fourth Industrial Revolution

At the intersection of readiness and responsibility

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Introduction: Great awakening

“Companies are starting to understand the massive impact of Industry 4.0 and the role of technology in disrupting business models and processes. The challenge is figuring out the intermediate steps they need to take and how to go from point A to point C. It’s about creating not just a technology road map, but also a business and investment road map for the long term.”

— Deepak Krishnamurthy, Chief Strategy and Transformation Officer, SAP

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.¹ 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.² That sentiment was echoed in [The Universal Purpose of a Company in the Fourth Industrial Revolution](#), a statement offered by World Economic Forum in December 2019.

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 concerns 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 more socially responsible ways, particularly in the area of environmental stewardship.

Seven in 10 C-suite executives believe that long-term business success requires the integration of Industry 4.0 technologies into their operations. But even more—nine in 10—expect climate change to have a negative impact on their organizations. That’s a reminder that the Fourth Industrial Revolution isn’t the only huge challenge weighing on the minds of the world’s business leaders—and those other looming concerns could radically alter how businesses adapt their strategies and activities going forward.

Executive summary

THE FOURTH INDUSTRIAL Revolution, also known as Industry 4.0, refers to the marriage of physical assets and advanced digital technologies—the internet of things (IoT), artificial intelligence (AI), robots, drones, autonomous vehicles, 3D printing, cloud computing, nanotechnology, and more—that communicate, analyze, and act upon information, enabling organizations, consumers, and society to be more flexible and responsive and make more intelligent, data-driven decisions.³

Some associate these advanced technologies mainly with efficiency, cost cutting, and profit maximizing. But the companies that are succeeding in this era are those that understand technology can help in all areas of their businesses, including overall business strategy, workforce and talent strategies, societal impact, and, of course, technological operations. We found that some companies, particularly those with comprehensive Industry 4.0 strategies, are performing well while others lag behind. This year's report highlights the following 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 report⁴—continue, to the disadvantage of many organizations. This year, two-thirds of CXOs said their companies either have no formal strategies or are taking ad-hoc approaches to Industry 4.0. Conversely, only 10 percent of leaders 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 executives are also more confident about leading in the Industry 4.0 era.

Recognition of business' 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 surveyed CXOs said they focus on societal issues because it's a priority of external stakeholders.

Almost 70 percent of those with comprehensive Industry 4.0 strategies have made a great deal of progress against their goals, 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; half cited tackling climate change as their generation's top priority. Business leaders are accepting a responsibility to act, and many are rolling out programs addressing resource scarcity and environmental sustainability. To that end, more than 90 percent of executives said their companies have sustainability initiatives in place or on the drawing board.

Commitment to training and development

Organizations continue to struggle to ensure their workforces possess the skills needed to succeed in an Industry 4.0 environment: Only a fifth of executives completely agree 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 those skills seems to have shifted. A growing number of leaders now accept responsibility for developing their workforces, with fewer executives than last year putting the onus on the individual. More than 80 percent of CXOs said they either have created or are creating a corporate culture of lifelong learning, with another 17 percent planning to do so, and training has become a top investment priority.

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.

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 identified making effective Industry 4.0 technology investments as an organizational priority, 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 of all executives 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 could 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 said 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 unsurprising 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 desired outcome.



Strategy: When strategy leads, success follows

“Technology is primarily a tool with no value if it doesn’t align with our strategy or improve our operations as a whole. The opportunities technology provides are overwhelming, and the pace in which they evolve makes it difficult to decide on timing and direction. The only way to see long-term and strategic benefits from tech is to anchor it in our strategy, which we do at all levels—from the operations of our business to inventing service solutions together with and for our customers.”

— Jeff Gravenhorst, CEO, ISS

“Short-termism” endures to the detriment of growth

In this era of constant change and disruption, it is critical for organizations to develop and implement effective, holistic strategies that take advantage of Industry 4.0 technologies across their organizations.⁵ By broadly leveraging these technologies throughout their operations, organizations can avoid the trap of focusing on short-term gains at the expense of longer-term growth opportunities.

But leaders have a long way to go: In this year’s survey, only 10 percent said their organizations have comprehensive Industry 4.0 strategies. Conversely, two-thirds of CXOs said their companies either have no formal Industry 4.0 strategies or are taking ad-hoc approaches to implementation.

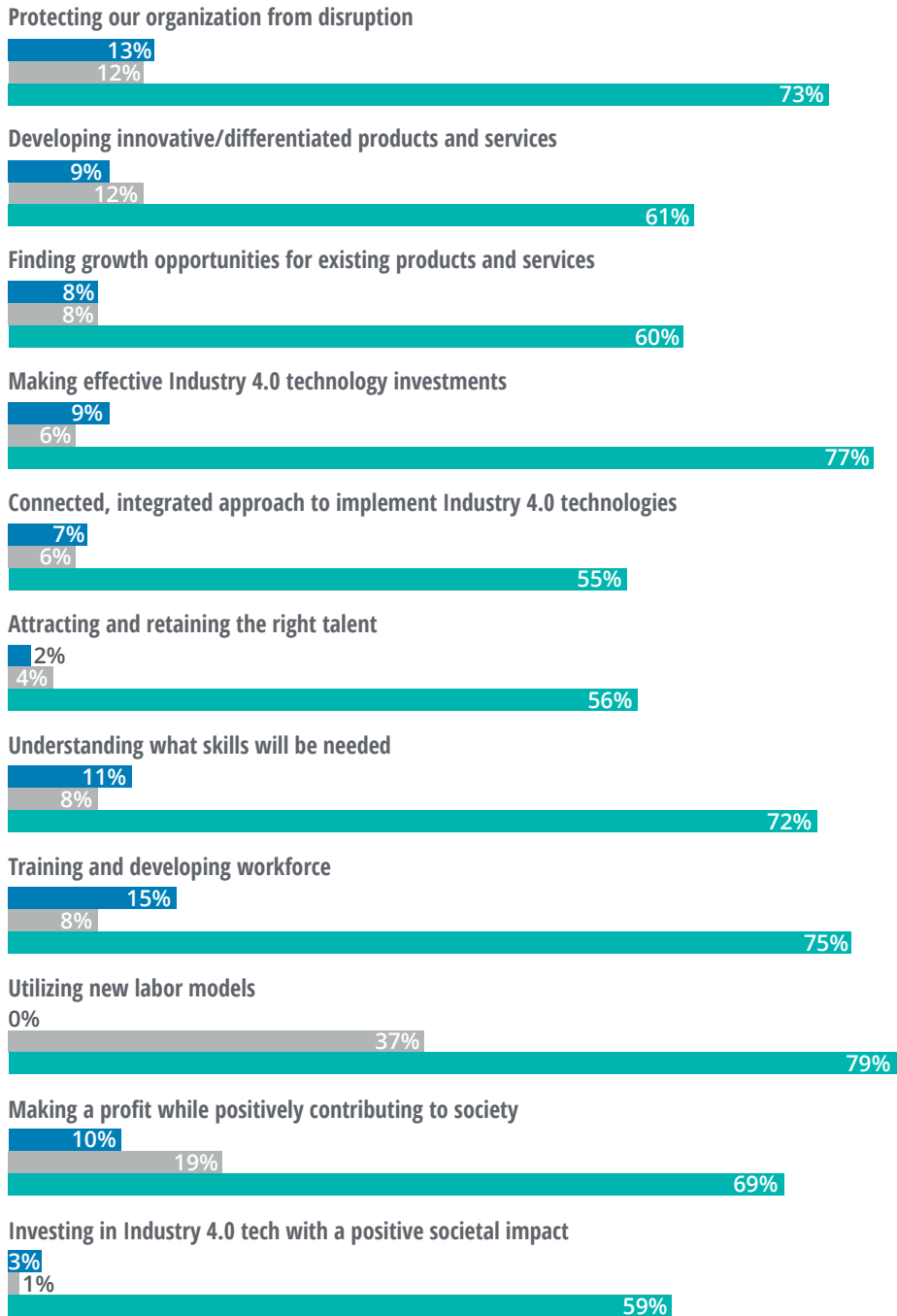
This approach to strategy—or lack of one—suggests that some leaders may not yet appreciate the implications of Industry 4.0 or its potential benefits, at least for their own businesses. Nearly a third of executives said integrating Industry 4.0 technologies into their operations was “not that important”; only 4 percent felt it was “very important.”

The data indicates that companies with comprehensive strategies to take advantage of Industry 4.0 technologies are generating success across multiple areas of the business, from product innovation to workforce readiness to societal impact. This is consistent with last year’s research, which found that those who said they follow a disciplined approach to setting strategies were doing better in several Industry 4.0 areas.

FIGURE 1

Industry 4.0 priorities on which organizations have made progress

■ No formal strategy at this time
 ■ We are taking an ad-hoc approach in specific areas as needed
 ■ We have a comprehensive, holistic strategy that goes across our organization



Organizations that have comprehensive and holistic Industry 4.0 strategies are also growing more financially, and making more progress investing in technologies that have a positive societal impact. Approximately 90 percent of those with comprehensive strategies generated at least 5 percent annual revenue growth in the most recent year; in comparison, only 72 percent of organizations who had ad-hoc or no strategies, or were just beginning to develop broader strategies, could claim at least 5 percent growth.

Moreover, those with comprehensive strategies are more confident about their abilities and their futures. Nearly three quarters of CXOs who said they have holistic strategies for integrating Industry 4.0 technologies also said they feel ready to lead their organizations in capitalizing on the opportunities associated with Industry 4.0. Only 27 percent of those with ad-hoc or no strategies expressed the same confidence.

Connection between strategy and Industry 4.0 technologies

Unsurprisingly, there's a clear correlation between having Industry 4.0 woven throughout one's strategy and the belief that IoT, AI, cloud, and big data/analytics will ultimately have a profound impact on the organization.

Research has shown that many of those organizations that are implementing an Industry 4.0-driven strategy tend to turn to technologies such as IoT, AI, cloud, and analytics as the foundations to connect their organizations and start generating data to analyze, act upon, and begin to learn from to better anticipate future scenarios and shifts.⁶

For example, ISS uses IoT technology to help its customers make better decisions regarding waste management and environmental sustainability.

This includes providing customers with better insights on how to optimize space, make more eco-friendly decisions, reduce food waste, and predict maintenance and service needs.

“We place sensors on things like a bathroom door to understand how many times people are going in and out and when our cleaners may need to change the soap dispensers,” says ISS CEO Jeff Gravenhorst. “Over time, this gives us trends to better predict when we need to resupply. We also use sensors to determine how much a certain generator is rattling, for example. So if it's rattling more than normal, then you get a message and can check on it before it actually breaks down. That we can track system performance at all times saves customers a lot of money on preventive maintenance.”

Pursuit of revenue drives investment strategy

There is no mistaking that the drive for higher revenue informs organizations' Industry 4.0 investment strategies above all else. Overall, 59 percent of executives ranked it as a top outcome (first or second from 10 choices) they hope to achieve with Industry 4.0 investments, twice as many as the next-highest outcomes of reducing operational costs and improving customer engagement.

Of course, the aim of increasing revenue and decreasing costs doesn't necessarily indicate short-term thinking in the same way as not having an Industry 4.0 strategy does. After all, companies need to be profitable to invest in people, technology, and societal impact pursuits. But it seems to confirm last year's finding that leaders are more focused on using Industry 4.0 technology and making investments to maximize profit and reduce costs than they are in truly making long-term transformational change.

Societal impact: Recognition of business' social responsibility

“The companies that will excel long-term are the ones that know it’s not just about shareholder value. It’s also about focusing on the customer and employee experience, and how those, in turn, contribute to society. How you fuel this whole ecosystem is critical to success across all industries.”

— Sarah Kennedy, VP of global marketing, Adobe Digital Experience

WHILE PROFIT AND revenue continue to be the main drivers of organizations’ strategies and investments, many business leaders—as evidenced by the Business Roundtable’s [August 2019 statement](#)⁷—are starting to adhere to a broader sense of purpose beyond just making money.

Our survey echoes this growing understanding and commitment to society. Two years ago, just 35 percent of CXOs believed that the leading organizations of the future needed to spend more time preparing for the eventual impact that new technological solutions may have on society. In this year’s survey, close to six in 10 CXOs said increasing their companies’ positive impact on society was among their top-five desired outcomes of their Industry 4.0 investments—an indication that executives are starting to understand that business has an important role to play in shaping how these technologies might affect society.

Finding balance between profit and purpose

Many leaders see no inherent tension between making money and doing good. “One of the reasons we do business is to make a positive

contribution to society,” says Shunsuke Okada, Vice President, ICT Solutions division, Toshiba Digital Solutions. “In our company, making profit is commensurate to our ability to positively contribute to society.” Eight in 10 CXOs claim to have developed products or services in the past year that make a positive impact on society or the environment, and 88 percent said those efforts are generating revenue, compared with 73 and 53 percent, respectively, last year.

And technology is playing a leading role: 62 percent of CXOs indicated that making a profit while positively contributing to society was an Industry 4.0 investment priority for their organizations—the second-most-cited priority after training and developing talent. Of those CXOs, 24 percent suggested they’re making a great deal of progress against this goal, the same percentage who believe their organizations are ahead of their competitors in doing so.

It’s perhaps telling that of those claiming to make great progress, 69 percent have a comprehensive Industry 4.0 strategy. Having a definitive strategy will also help outpace competitors: 60 percent “with strategy” claim to be ahead of the competition, while only 13 percent “without strategy” make this same contention.

Rise of employee and customer advocacy

When asked why their companies choose to focus on societal issues, 42 percent of CXOs cited the opportunity to generate revenue (see figure 2), which suggests that profit and revenue continue to drive organizations’ strategies and motivations. However, it’s important to point out that a close second (and statistical equal) was motivation from external stakeholders (customers, investors, etc.); third was employee pressure.

FIGURE 2

Top reasons that leaders choose to focus on societal issues



“If you look at our key stakeholders, purpose is critical,” says Roger Dassen, CFO of ASML. “Our employees and our customers are heavily interested in social purpose, including our carbon footprint, carbon emissions, and consumption. We’re also working on eliminating waste and advancing the reuse of materials for our customers, which addresses both an economic and ecologic purpose.” Dassen thinks pressure from

stakeholders will become even more intense going forward, “which is why we’re looking at this from the design phase of the machines, so that more of what we’re using can be recuperated.”

Similarly, ISS’s Gravenhorst notes: “Employees want a bigger purpose for why they go to work every day. Our purpose is to make a positive difference in the lives of the millions of people we serve every day. This overall purpose motivates a stronger customer engagement, and leads to lower employee churn and higher margins.”

These voices cannot be discounted, particularly as consumers increasingly make decisions with their wallets. According to Deloitte’s Global 2019 Millennial Survey, 38 percent of millennials and Gen Zs choose to stop patronizing companies based on their products’ negative impact on society or the environment.⁸

Furthermore, many millennials wish to work for companies that have a purpose beyond just making money.⁹ In fact, there have been a number of recent examples of employees taking to the streets and picket lines to protest their employers’ practices. Organizations that don’t espouse broader societal commitments could start seeing it affect their recruitment, retention, and overall bottom lines.

Climate change seen as a business threat

Issues that seem to have skyrocketed in importance for executives are climate change and environmental sustainability. Two years ago, only 10 percent of CXOs said their companies could influence environmental sustainability to a significant degree. This year, 48 percent see tackling climate change as a top responsibility; 38 percent put encouraging sustainability at the same priority level.

With an increasing number of catastrophic, climate-related events affecting populations and geographies, CXOs are beginning to feel, or at least understand, the business imperative of climate change. Nearly half of CXOs (48 percent) completely agree that the effects of climate change will negatively affect their organizations, and almost 90 percent completely or somewhat agree.

Accordingly, companies are beginning to act. Fifty-nine percent claim they have initiatives in place to positively affect sustainability—such as reducing travel and eliminating plastics—in their companies, and another third are planning to do so. The fact that more than 90 percent of CXOs said they have sustainability initiatives in place or on the drawing board suggests their thinking about sustainability has evolved significantly.

At Adobe, for example, “We’ve set a goal to run on 100 percent renewable energy by 2035,” says global marketing VP Sarah Kennedy. “We’re expanding our global headquarters in San Jose, and the new building is going to be totally running on clean, renewable energy.”

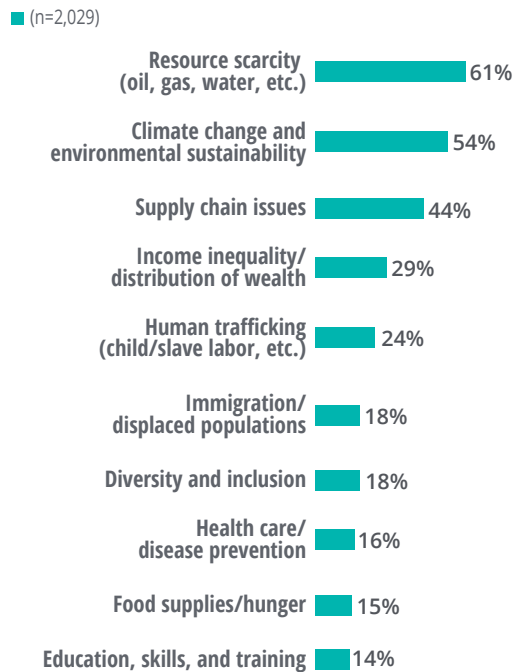
Likewise, at the Kawasaki Smart Community Center, Toshiba Group’s business base, Toshiba has installed 35,000 sensors to control lighting, air conditioning, and elevator operations based on the movement of people, helping Toshiba reduce CO2 emissions by 50 percent.

Because CXOs see environmental issues as threats to their business operations, it’s unsurprising that they’re also investing in initiatives and solutions

aimed at mitigating the potential effects of climate change. For instance, six in 10 business leaders said they are focused on and/or have programs to address resource scarcity, with climate change and environmental sustainability close behind at 54 percent (see figure 3).

FIGURE 3

On which societal issues are leaders focused?



As ISS’s Gravenhorst says, “It is no longer just about earnings—it’s also about what kind of planet we are leaving behind. Business and climate go hand in hand.”

Talent: A new investment priority for business

“We used to leverage experience and high technical skill sets that reside with the master workers, engineers, and technicians. But they are aging and retiring. Our biggest challenge is how to pass on their expertise and knowledge to the next generations.”

— Shunsuke Okada, vice president of Toshiba Digital Systems (ICT Solutions division)

Commitment to training and development

One of the aspects of Industry 4.0 most speculated about has been the potential effect of cognitive technologies on the human workforce. While artificial intelligence and automation have certainly caused much angst among workers worldwide, leaders have begun to embrace talent development and lifelong learning since our first survey in 2017. A growing number of leaders are also accepting some responsibility for preparing their workforces for potential changes to help them succeed in the future.

Two years ago, CXOs suggested there wasn't much they could do to ready their people for the skills required in the Industry 4.0 era; only 12 percent of executives said their organizations could influence education, training, and lifelong learning “to a significant degree.” And last year, surveyed leaders were more likely to assign employees responsibility—through self-education, continuing education, and ongoing professional development—to skill-up for Industry 4.0; only 43 percent of executives said they planned to extensively train their current workforces.

This year, however, three-quarters of executives said training and developing their workforces is one of the Industry 4.0 priorities in which they'll be investing the most. It ranked highest of the investment choices surveyed, significantly outdistancing their anticipated investment in attracting and retaining the right talent. (See figure 4.)

Further, more than 80 percent of CXOs said they either have created or are creating a corporate culture of lifelong learning, with another 17 percent planning to do so—a far cry from the hands-off approach of years past.

Adobe is one example of a company that has invested in lifelong learning. The company offers employees a yearly learning fund of up to US\$1,000 to continue learning and develop skills in areas of interest—from attending a conference to taking an online coding class. The Adobe Learning Fund also covers up to US\$10,000 per year for tuition and continuing education for employees.

Acknowledging the difficulty in finding enough people to hire with the necessary skills, SAP offers a bootcamp to train its people in machine learning, AI, IoT, and blockchain, among other technologies.

FIGURE 4

In which Industry 4.0 priorities will organizations be investing?

Training and developing workforce	74%	Developing innovative/ differentiated products and services	40%
Making a profit while positively contributing to society	62%	Attracting and retaining the right talent	28%
Understanding what skills will be needed	59%	Disrupting competition	26%
Protecting our organization from disruption	56%	Investing in Industry 4.0 tech with positive societal impact	22%
Growth opportunities for existing products and services	53%	Utilizing new labor models	18%
Connected, integrated approach to implement Industry 4.0 techniques	47%	Effective Industry 4.0 technology investments	17%

In fact, SAP’s Chief Strategy & Transformation Officer, Deepak Krishnamurthy, argues that having an adaptive workforce is preferable to hiring for a specific skill set, considering that the skills employees learn today may be obsolete within five years.

The skills struggle

Organizations continue to contend with ensuring that their workforces possess the skills needed to succeed in an Industry 4.0 environment; only a fifth of executives completely agree that their organizations are currently ready, a drop of about five points from two years ago. Concerns about workforce readiness for Industry 4.0 are

exceptionally acute in Asia and the Americas, where only 4 percent and 9 percent, respectively, agreed they had the skills needed.

Despite CXOs who cite “commitment to training” as a priority, many are struggling to develop their people, with only 21 percent making a great deal of progress in training and developing workforces for the future. Pierre Naudé, CEO of nCino, a software company that provides cloud solutions to financial institutions, believes that part of the problem is CXOs sometimes don’t understand who should be trained in the technology. “Because we are implementing a technology solution, senior executives often look to IT to take the lead,” Naudé says. “What they can miss is that change management inside the bank belongs to the entire

business. There's both a cultural element and a technical element that needs to be addressed. We work with banks not just on the technology, but also to ensure they have the right processes in place to transform the institution and then the right talent to continue their transformation and ensure long-term success."

Another element that might be hindering training progress is understanding exactly what skills will be needed in the future. Some companies, such as ASML, have strategies that give them confidence. "We can fairly well predict what we're going to do in the next 10 years in terms of R&D, and therefore we can also fairly well predict what kind of talent we need," says Dassen. But ASML is atypical.

Last year, 46 percent of executives said they lacked knowledge of what skills will be needed for the age of Industry 4.0. Twelve months later, only 10 percent of CXOs said they have made a great deal of progress in understanding what skills will be needed in the future. The good news is that leaders admit they recognize the challenge—and they're determined to learn what they don't know. Nearly six in 10 said that understanding what skills will be needed to succeed is a top Industry 4.0 investment priority for their organizations.

The search for mindset over skills

When it comes to attaining the right talent, many organizations agree that there should be a balance between training their current workforces and hiring from outside. "On the one hand, we focus on talent development and training to help our current talent prepare to respond to the speed of change and new requirements, and to develop new skills," says Toshiba Digital Solutions' Okada. "On the other hand, of course, we are always looking to hire talent with new experiences and skill sets to bring to our company."

With respect to attracting qualified talent from the outside, 79 percent of executives who prioritize this issue said they are making either some or a great deal of progress.

Given the rapid pace of Industry 4.0, hiring for "mindset" rather than skills may be the key to longer-term talent success, given those people with open and flexible mindsets can be trained on an ongoing basis to adapt to the organization's changing needs.¹⁰

This is the tactic of Adobe Digital Experience, which prefers to hire people with more versatile skills and a desire to learn. "While proficiency in certain skills like financial and data literacy are important, we're more focused on hiring for certain attitudes rather than specific skill sets that check the box," says Kennedy. "We're looking for people who are motivated, naturally curious, and hungry to constantly learn. In this ever-changing environment, it's important to bring in people who have a constant mindset around education in order to stay ahead."

Naudé agrees. "I think the best way we can serve our organizations and our people is to create a company culture that actually trains and equips people to be flexible, self-reliant, and empowered," he says. "And they should feel that they can use their own brain power and experience to actually mold their jobs as we go forward, to adapt at the pace of change."

Industry 4.0 technologies and the workforce

While many focus on the potentially negative effects that Industry 4.0 technology may have on the workforce, these technologies also have the potential to make workers' jobs easier and more interesting. As Kennedy notes, successful implementation of Industry 4.0 technology can benefit the workforce; that has been her goal

within Adobe’s marketing function. “We want our people to spend less time doing things that should be programmatic and automated,” she says. “We want to give them the ability to spend time talking to customers and have real human interactions

that can drive meaningful relationships. This helps us get insight that we can’t get anywhere else and make decisions that provide the most value to our customers.”

THE GIG ECONOMY

Given that a growing number of skilled, high-tech people work on a contractual basis, business leaders anticipate using more gig workers in the future. In our previous report, only 28 percent of CXOs said they planned to use gig work to access necessary talent; now a little more than half of leaders suggested they may significantly increase the number of gig workers they use in the next five years. Further, some Industry 4.0 projects are short sprints that require revolving sets of skills. Some individual’s technology skills—such as those in AI and robotics—are in such demand that they may choose to be gig workers where they can command higher rates.

Technology: Leaders continue to retreat from disruption

“Many of today’s leaders were brought up on the old systems and the mindset that things will last. The rate of change and amount of data today can be overwhelming in comparison. In this environment, leaders today must lead with courage, let their old ways go, allow younger generations to step up, and get comfortable with change.”

— Jeff Gravenhorst, CEO, ISS

Profit and protection remain priorities

The opportunities for business made available by the advanced technologies that comprise Industry 4.0—robotics, analytics, AI and cognitive technologies, nanotechnology, quantum computing, wearables, IoT, additive manufacturing, and advanced materials, to name a few—are endless. And new changes and opportunities are emerging every day.¹¹

Consistent with previous surveys and as noted earlier in this report, CXOs primarily hope their investments in Industry 4.0 technologies yield greater revenues and cost reductions. When it comes to using Industry 4.0 technologies to cause disruption among their industries or within their own organizations, leaders are much more reluctant. Only 17 percent of CXOs said making effective Industry 4.0 technology investments is a priority for their organizations, ranking lowest among 12 investment priorities. Likewise, just under half of CXOs seem to understand the merits of taking a connected, integrated approach to implementing Industry 4.0 technologies, with only

11 percent of this group indicating significant progress with respect to this area.

And when it comes to disrupting the competition, leaders are much more focused on investing in technology to protect their businesses or “keep up.” The ratio of those who selected protection this year as a priority over disrupting competition is about two-to-one, showing no change from last year.

Further, when presented with 10 possible outcomes they hope to achieve with their future Industry 4.0 investments—and asked to rank their top five—only 3 percent mentioned disrupting their industries (versus 91 percent who said “drive greater revenue”).

Perhaps this is, in part, because many organizations are choosing to collaborate within and beyond their industries rather than tackle Industry 4.0 challenges and opportunities alone. “We very much foster a culture of open innovation with our suppliers and customers to make sure that we are sharing technology and innovation,” says ASML’s Dassen. “It’s no longer relevant just to talk to our customers; we also need to talk to our customers’ customers. We need to talk to the app

developers and the tech companies to really understand what's on their minds, what they want to create, and what they want to have available to consumers by 2025. That will then help us establish and determine what technology we need to develop and facilitate, and the investments that we should make as all this happens.”

SAP takes a similar open innovation approach. “Technology can also be disruptive for companies like SAP, so we are constantly looking for the next big innovation in the industry,” Krishnamurthy says. “Our Innovation Center Networks focus on co-innovating with our customers on new areas like machine learning and blockchain. We are partnering with premier academic institutions in the United States, Europe and China. SAP.iO Fund and Foundry is investing in startups to help us understand the latest innovations and we currently have eight startup accelerators globally focused on various cutting-edge technologies. So we're constantly tapping into the ecosystem around us to understand how technology is evolving.”

The untapped potential to benefit society

Given organizations' increased focus on making a positive impact on society, it might follow that executives would explore how Industry 4.0 technologies might help propel societal good forward. But most 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 said they are prioritizing investing in advanced technologies that have a positive societal impact.

Yet studies have found that Industry 4.0 technologies can have a transformational impact on social impact initiatives if correctly applied.¹² A 2019 report issued by Deloitte and the Global Enabling Sustainability Initiative identified and quantified how digital technologies (such as IoT,

blockchain, and digital reality) can help governments, businesses, and philanthropic organizations accelerate their efforts to achieve each of the United Nations' 17 sustainable development goals. According to the report, these technologies, if deployed with positive societal impact in mind, could help accelerate progress toward the development goals by 22 percent and mitigate downward trends by 23 percent on average.¹³

Given that resource scarcity was cited by the executives as the challenge they are most focused on, it's also interesting to note how technology can be used to combat this issue. In the US, drones are being used to transform traditional inspection methods of oil and gas pipelines to enable early detection of leaks in difficult-to-access locations, like offshore drilling sites. Drones have also been equipped with thermal imaging systems to help identify possible vulnerabilities across the US's many miles of pipelines.¹⁴

In terms of agriculture and food scarcity, technologies such as IoT can be used to deploy “precision farming” to increase productivity, monitor various farming metrics (including soil moisture and weather conditions), and lead to better decision making.¹⁵

Through its Corporate Garage—and innovation incubator—ISS is partnering on an AI-powered solution to help detect and reduce food waste for customers. By using automated data to identify different food items that routinely go to waste, ISS provides a more accurate and less labor-intensive solution to the previous process of separating food waste and weighing manually. The technology also provides predictive insights and data to better manage food production and provides recommendations on new ways to reduce waste. ISS CEO Gravenhorst says the solution has currently scaled to customers across eight countries and more than 94 sites, and ISS has pledged to further reduce food waste across all

ISS-managed sites by 25 percent by the end of 2020 and 50 percent by the end of 2025.

There seems to be no limit on the breakthroughs and advancements technology can make, so it's critical for organizations to harness and capitalize on these technologies to help meet their responsibilities to society.

INDUSTRY 4.0 TECHNOLOGIES TRANSFORMING THE WORLD

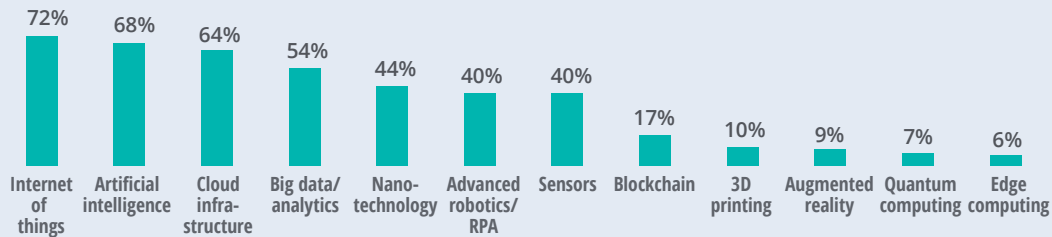
This year’s survey took a closer look at which technologies business leaders anticipate will have the greatest impact on their organizations. Overall, the internet of things—which connects the digital and physical worlds by collecting, measuring, and analyzing data to predict and automate business processes—is viewed as the technology expected to have the most profound impact on organizations (cited by 72 percent of CXOs). Artificial intelligence technologies (cited by 68 percent of CXOs)—which perform and/or augment tasks that have traditionally required human intelligence—and cloud (cited by 64 percent of CXOs) were close behind, followed by big data/analytics (see figure 5). It’s perhaps no surprise that these “big four” technologies were the top technologies selected. These bedrock technologies all work together to connect organizations, generate data, and drive more intelligent operations.

“There is a strong correlation and dependencies between several Industry 4.0 technologies,” says SAP’s CSTO Krishnamurthy. “IoT sensors will generate a ton of data that will be relevant for machine learning-based automation. Most of these technologies will be delivered and consumed in the cloud even as we see the emergence of edge computing. Next-gen robotics will see the convergence of IoT, machine learning, and cloud computing as robots start getting better all the time through cloud-based machine learning from data from IoT sensors in the robot.”

FIGURE 5

Which Industry 4.0 technologies are expected to have the most profound impact on your organization?

■ (n=2,029)

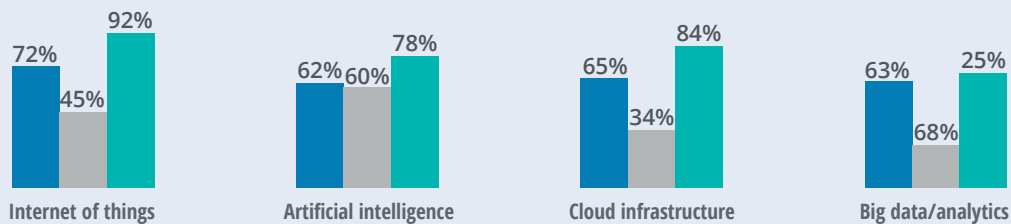


The degree to which CXOs believe technology will have a profound impact on their organizations varies by region. EMEA is by far the most bullish of all the regions, while APAC is the most skeptical of the “big four” technologies’ impact. The Americas net out around the average of all global participants.

FIGURE 6

Industry 4.0 technologies’ expected impact, by region

■ AMER ■ APAC ■ EMEA



Summary: Time to accelerate

OUR SURVEY'S EXAMINATION of the intersection between readiness and responsibility in the Industry 4.0 era shines a light on how traditional business objectives, transformational technologies, evolving skills, and growing obligations to the greater good both come together and cut across one another. Some responses, such as those showing an embrace of employee development and societal concerns, indicate progress. Others, like leaders' continuing focus on short-termism and reluctance to fully leverage the potential of Industry 4.0 technologies across their organizations, feel like missed opportunities.

In this rapidly changing world, understanding, developing, and executing on integrated strategies that leverage Industry 4.0 technologies should be a priority for all organizations. The same technologies that can improve business also can benefit society—and should be used for both. Industry 4.0 can not only increase profits, it can also help companies profit from doing good *and* make a positive global impact, a necessity for many stakeholders.

To drive financial and operational value for the business, the two-thirds of CXOs who either lack formal strategies to take advantage of Industry 4.0 technologies or rely on ad-hoc approaches—as well as the 23 percent who are starting to develop holistic plans—should consider:

- Conducting audits to assess gaps and opportunities for Industry 4.0 technologies. That's a key starting point for any strategy, but

48 percent of respondents said they have not pursued this type of evaluation.

- Creating leadership roles focused on Industry 4.0. Only 20 percent of organizations have done this, but among CXOs who reported growth last year of 20 percent or greater, almost 40 percent said these roles exist in their organizations. Empower these leaders to be able to influence Industry 4.0 investments and changes that cut across the organization.
- Updating business models to prepare for Industry 4.0. Only 9 percent have done this, and not one respondent chose it as a top priority for Industry 4.0 investment. But almost 30 percent of leaders in companies growing in excess of 20 percent said they've done this.
- Establishing dedicated teams focused on innovation. More than 80 percent of high-growth organizations have such teams.
- Providing incentives for suppliers and partners to adopt Industry 4.0 technologies. Just 13 percent of CXOs said their organizations have this condition, but again, the fastest-growing companies are ahead of the curve.

As organizations more effectively capitalize on the opportunities afforded by Industry 4.0 technologies, CXOs should consider the below key steps to leverage their growing capabilities to positively affect the triple bottom line of people, profit, and planet:

- Explore how to leverage Industry 4.0 technologies to advance societal and environmental initiatives so their businesses can successfully profit from doing good.
- Establish a culture of lifelong learning that focuses on training and developing workforces to take full advantage of Industry 4.0 technologies.
- Develop or update products and services to have a positive impact on society.

- Put programs and initiatives in place aimed at positively affecting environmental sustainability.

This survey illustrates tangible progress in business' journey to find balance between profit and purpose. A sharper focus on strategy and broader adoption of transformational technologies that benefit both business and society will help CXOs get there faster.

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Methodology

This research is based on a survey of 2,029 global executives and public sector leaders conducted by K&R Inc., in July–September 2019. Survey respondents represented 19 countries from the Americas, Asia Pacific, and Europe/South Africa and came from all major industry sectors. Survey respondents were C-level executives and senior public-sector leaders, including CEOs/presidents, COOs, CFOs, CMOs, CIOs, and CTOs.

Private-sector executives represented organizations with revenue of US\$500 million or more, with more than half (52 percent) coming from organizations with greater than US\$5 billion in revenue. More than a third (37 percent) of those organizations realized growth rates of 10 percent or more in the past year. Seventy-six percent of public-sector leaders represented organizations and agencies with budgets of US\$1 billion or more.

Forty-four percent of respondents were between the ages of 45 and 54, the largest segment represented. Forty-one percent were from Europe/South Africa, 30 percent from the Americas, and 29 percent from Asia Pacific.

Additionally, K&R and Deloitte conducted select one-on-one interviews with global industry leaders.

Acknowledgments

The authors would like to thank Roger Dassen, CFO of ASML; Jeff Gravenhorst, CEO of ISS; Deepak Krishnamurthy, chief strategy and transformation officer of SAP; Sarah Kennedy, vice president of marketing at Adobe Digital Experience; Pierre Naudé, CEO of nCino; Shunsuke Okada, vice president of Toshiba Digital Systems (ICT Solutions division); and Natasha Buckley, Tim Murphy, and Brenna Sniderman of the Deloitte Center for Integrated Research.

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