



IOCI

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Leading in the Era of AI: What Organizational Leaders Must Know to Thrive

The future of business management is already here. Whenever you instruct Siri on your iPhone to place a call for you, or tell Alexa in your home-automation system to play your favorite music, you're getting a tiny taste of the future of management.

It's not that leaders of the future will be spending their time playing music or fiddling with smart apps that program office lighting. The point is that leaders will be-and indeed, already are-using advanced information technology to serve as assistants and coaches in their jobs. Some workforces will shrink, and remaining jobs will change, as computers assume many routine and rote tasks now done by both line workers and supervisors.

Marialane Schultz, CEO of IOCI, has studied the impacts of artificial intelligence (AI) on business, which she has compiled here as a resource for clients. When asked why these insights are important, Marialane shares, "Now more than ever, there is a growing strategic imperative for senior leaders to begin assessing how work will change, what capabilities will be needed and how organizations must prepare to lead an AI-augmented workforce. AI advances are accelerating and those who prepare are likely to remain relevant and perhaps even enjoy a competitive advantage over those who don't."

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The task of organizational leadership will change as AI disrupts traditional leadership principles, approaches and organizational mindsets on how workers and managers approach the work and deliver what their clients want. "Organizational leaders must anticipate now what AI will mean, both in opportunities and competitive threats", says Marialane. "They must prepare their people and create an organizational mindset that is focused on how the work will change, how to build the right talent, how to adjust and align capabilities in a way that sustains their relevance as leaders, employees and organizations."

This is all part of sweeping economic and sociological changes the World Economic Forum labeled in 2016 as the Fourth Industrial Revolution. The previous industrial revolutions used water and steam power, electricity and computers to reshape worldwide industry, while the fourth is being built on "a fusion of technologies that is blurring the lines between the physical, digital and biological spheres" (World Economic Forum, 2016). Just as the previous industrial revolutions did, this new revolution will upend whole industries and create new ones. Both leaders and employees will need to navigate these shifts by carefully considering how they might prepare and what struggles they might encounter.

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It's the next industrial revolution

This new industrial revolution, and the new forms of management that it will generate, are fueled by multiple new technologies now coming online. Three of the most important and pervasive are artificial intelligence, quantum computing and 3-D printing. Each technology is reshaping how companies manipulate and use digital data—and as a result what workers need to do and how they will do it.

Artificial intelligence uses computer hardware and software to mimic how humans perceive, reason and judge. Computer scientists have been working diligently at artificial intelligence projects for years. At first, many projects were focused on designing computer programs and circuits to copy specific decision rules and processes followed by humans, in hopes that the resulting system would operate like a human. They did–sometimes–but less effectively than many hoped. In recent years, the main focus has been on an approach called machine learning, in which researchers instead try to develop a system that isn't hardwired with knowledge but instead simulates how brain cells interact with one another and learn from data. The finished system is taught how to make the desired decisions; once it is sufficiently knowledgeable, it can be let loose to make decisions on its own. This process has shown remarkable promise in developing systems that can mimic human judgment.

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Machine learning usually works in two phases. In the training stage, training data is created–such as a set of credit reports along with the decisions by a human underwriter regarding whether each applicant should be granted or denied credit. The AI system processes the training data to look for patterns that are associated with the human decisions and, from those patterns, it formulates rules to use in its own future decision-making. In the application phase, it applies those past patterns as it analyzes new data and makes decisions on its own. Most machine learning systems work under the supervision of humans, although the number of unsupervised machine-learning systems that will work autonomously is destined to grow.

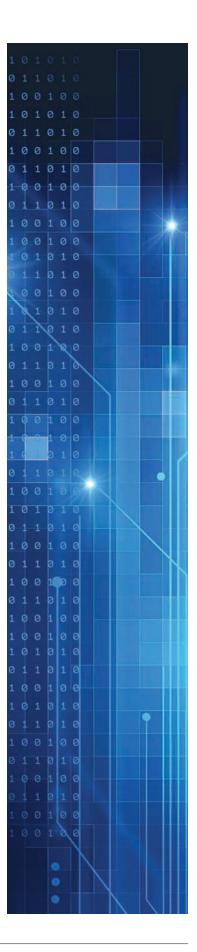
The results from machine learning can be astounding. One Harley-Davidson dealership in New York City increased its sales leads by 2,930 percent after switching to an AI system to sift through potential customers to identify likely buyers (Power, 2017). Another success story is chatbots, or AI systems that engage with customers using conversational English. These systems can resolve many problems that in the past would have required staff intervention; they reduce personnel costs and allow remaining employees to focus on resolving complex problems beyond the ken of the AI system (Dickson, 2017). Machine-learning systems even are learning to decode human emotions: One system monitors employee e-mail looking for signs of emotional distress or that an employee may be ready to switch to a different employer (Greenwald, 2017).

Many people's impressions of the enormous power of AI have been strongly influenced by Watson, an AI system developed by IBM, which roundly defeated two expert humans on the TV quiz show "Jeopardy!" in 2011. Since then, IBM has turned Watson to more serious applications such as issues in medical diagnosis and biotechnology.



Three factors are driving Al growth

Three factors explain the recent prominent growth of artificial intelligence systems, according to MIT researchers Erik Brynjolfsson and Andrew McAfee. An explosion of digital data–such as digital photos and data from sensors–provides much more fodder for AI systems. Computer scientists also have made major strides in improving the artificial-intelligence technology, relying in part on those troves of data. Third, improvements in computer hardware–in particular, the development of a new component called the graphic processing unit–has enabled systems to crunch larger amounts of data faster than before (Brynjolfsson & McAfee, 2017).



"Today, machine learning algorithms are actually as good as or better than humans at many things that we think of as being uniquely human capabilities," says Jeremy Howard, a research scientist at the University of San Francisco. Here's one example: "People whose job is to take boxes of legal documents and figure out which ones are discoverable—that job is rapidly disappearing because computers are much faster and better than people at it" (Kirkland, 2014).

Even so, the growth in the amount of available digital data swamps the capacity of computers to crunch it. That's where quantum computing is coming in. Classical computers use binary bits—the strings of zeros and ones that sometimes are used to depict what's inside a computer. Quantum computers, by contrast, manipulate subatomic phenomena from quantum physics to represent numbers and mathematical operations, an approach that allows a quantum computer to handle larger amounts of data in a fraction of the time. Although the technology is in its infancy, quantum computers theoretically would be able to tackle problems that would not be practical for even the beefiest conventional computer. Google, for example, predicts that by the end of 2017 it will produce a quantum computer that will be able to beat the performance of any conventional computer, and others predict that quantum computers will host machine learning systems not long down the road (Nott, 2017; Simonite, 2017).

The third computer technology that is revolutionizing business is 3-D printing. A conventional printer forms a two-dimensional image—a photo or letters, for example—by depositing ink on a flat sheet of paper. A 3-D printer deposits material bit by bit in a three-dimensional space, enabling it to fashion objects. An oddity just a few years ago, 3-D printers have become commonplace and already are making inroads in business, with companies using the printers to manufacture items as different as automotive parts and drug pills.

One of the underlying concepts for 3-D printing was patented in 1980, and engineers have made rapid advances since then in bringing the technology into reality. In recent decades, much manufacturing has shifted to Asia because of low labor costs there, but 3-D printing is expected to upend these global economic relationships. Inexpensive 3-D printing will make it economical to manufacture goods much closer to those who buy the products, even factoring in higher labor costs in the West. "The great transfer of wealth and jobs to the East over the past two decades may have seemed a decisive tipping point. But this new technology will change again how the world leans," predicts Richard D'Aveni (2013), a professor of strategy at Dartmouth University's Tuck School of Business.

As a result, manufacturing processes will change. "Whereas today a lot of manual effort and time is spent on planning, managing and executing non-productive tasks such as scheduling, changeovers, maintenance and loading of parts, in the future, large-scale production environments may manage themselves via digital models, simulations, robots, sensors, condition-based systems and artificial intelligence" (Lakner & Van den Bossche, 2014, p. 1). But 3-D manufacturing also offers significant challenges for employees. Manufacturing workers likely will need to upgrade their skills to work in a 3-D environment. And that typifies a key worry that many have about working and managing in the new technological order: What skills will be prized, who will need to be trained and who will miss out?

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Al and the introduction of 'judgment work'

A key phrase among those mulling the future of AI in the workplace is "judgment work." This phrase is used to describe those tasks that require decision-making based on incomplete information and patterns that can be inferred from the information that is available. Observers consistently conclude that one of the biggest changes that AI will create in the workplace will be to place a greater premium on human judgment work as humans and AI systems collaborate more and more deeply. "This application of experience and expertise to critical business decisions and practices represents the real value of human judgment," Accenture recently reported (Kolbjørnsrud, Amico & Thomas, 2016, p. 11).

Judgment work often requires collaborative skills as well. "Collective judgment requires specific interpersonal skills; namely, social networking, people development and coaching and collaboration," Accenture found. But at the moment, such social skills are valued by few managers, suggesting that many of them are not immediately equipped for the AI era and need to retool their skill sets (Kolbjørnsrud et al., 2016, p. 13).

"People who display good judgment will become more valuable, not less," predict Ajay Agrawal, Joshua Gans and Avi Goldfarb, professors of business at the University of Toronto's Rotman School of Management (Agrawal, Gans & Goldfarb, 2017, p. 2). As an example, they cite the task of identifying potentially fraudulent credit card transactions. A credit card company wants to minimize the number of fraudulent transactions, but not at the cost of aggravating customers by denying legitimate transactions. Even if an Al system is going to make decisions about each of the transactions that pour through the company each day, human judgment—and therefore human employees—will be required to program an Al system so that it will appropriately balance those two considerations for the company.



Redefining what it means to be 'smart'

"What is needed is a new definition of being smart, one that promotes higher levels of human thinking and emotional engagement," writes Ed Hess, a professor at the University of Virginia's Darden Graduate School of Business. "The new smart will be determined not by what or how you know but by the quality of your thinking, listening, relating, collaborating and learning. Quantity is replaced by quality" (Hess, 2017, p. 3).

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Humans will still be needed to monitor and quality control the AI systems. One common misconception about machine learning is that it will yield decisions that are perfect and unchallengeable. Like the cerebral Mr. Spock of "Star Trek" fame, computer systems are envisioned as yielding conclusions that are wholly logical and untainted by bias. At least for today's machine-learning systems, this is not necessarily true, because these AI systems are programmed by human programmers and learn from human experts. Thus, any biases—conscious or unconscious—that those humans carry with them may transfer into the machine-learning systems they influence. For example, when Microsoft developed an AI system to learn from and communicate with Twitter users, the system quickly developed the same rude habits exhibited by the worst Twitter users (Maurer, 2017).

"Artificial intelligence is only as good as the information it has been given to learn," says Elaine Orler, CEO of the research consultancy Talent Function. For example, she says, an AI system is unlikely to be able to reach key personnel decisions on its own. "Without conscious thought involved to ensure we're not perpetuating bad behavior, there will still be a need for humans to make final hiring or promotion decisions" (Zielinksi, 2017).

Legal minefields abound. Rep. Emanuel Cleaver II, a Democrat from Missouri, in June 2017 launched an investigation into five online lending companies to see whether the computerized systems they use for loan-making decisions follow discriminatory practices. "People tend to develop things from their own way of thinking and their own world," Cleaver said. "We would be wise to make certain that they don't build into their systems exclusionary practices" (Clozel, 2017, p. 9).

45000

Al's impact on employment figures

Inevitably, these shifts created by AI mean that some will lose their jobs, particularly jobs that are predictable and repetitive–characteristics that make them prime fodder for being taken over by artificial intelligence and robotic systems. In 2013, McKinsey predicted that AI systems could replace the equivalent of 140 million full-time workers (Manyika et al., 2013). A federal report stated in late 2016, "Some jobs may be automated away, while for others, AI-driven automation will make many workers more productive and increase demand for certain skills" (Executive Office of the President, 2016, p. 2). For example, the report predicted increased demand for workers qualified "for jobs in generating, collecting and managing relevant data to feed into AI training processes." But the new industrial revolution could also increase demands for philosophers capable of assessing the ethical implications of the technology and sociologists able to measure its impact on society, the federal report added.

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"The widespread disappearance of jobs would usher in a social transformation unlike anything we've ever experienced or imagined. The issue won't be saving jobs, it will be saving or recasting the concept of work," predicts Ray Williams (2016), an online columnist for Psychology Today. Although blue-collar jobs will be most affected, middle management jobs will be lost, and even senior executive positions will be reshaped by AI, he writes. "Those executives will have to emphasize their creative abilities, their leadership skills and their strategic thinking to a much greater extent."

Even consultants are likely to be supplanted by AI as well. Much of what consultants do is crunching numbers to find patterns and make recommendations—exactly AI's forte. "The processing power of four smart consultants with Excel spreadsheets is minuscule in comparison to a single smart computer using AI running for an hour, based on continuous, non-stop machine learning," observe analysts Barry Libert and Megan Beck (2017, p. 3).

But in most cases AI will coexist with, rather than replace, human jobs. "Machine learning systems hardly ever replace the entire job, process or business model," say MIT's Brynjolfsson and McAfee. "Most often they complement human activities, which can make their work ever more valuable" (Brynjoljsson & McAfee, 2017, p. 9).

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Five ways augmentation can help

In their 2016 book *Only Humans Need Apply*, Thomas H. Davenport and Julia Kirby describe five possible ways workers can respond to AI through augmentation:

- 1. Develop the ability to make decisions that are beyond the computer's abilities.
- 2. Shift to a type of work that computers do poorly, such as sales.
- 3. Collaborate with the computer.
- 4. Focus on a niche specialty that lacks an AI system, perhaps because it's too small or arcane an area for AI to be affordable to develop.
- 5. Embrace AI by helping to develop new systems.

As a result, "augmentation" is another word one hears frequently in the dialogue about AI and workers. The word refers to the potential synergy, rather than competition, that AI and human workers may have—the notion that AI can help workers and managers do more work, more efficiently and creatively, than the human employees could do on their own.

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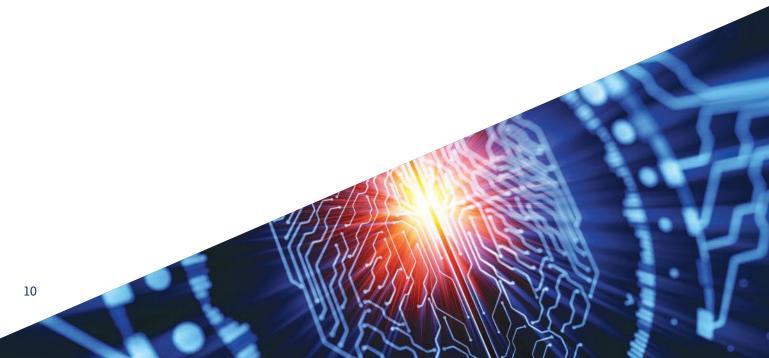
"Augmentation spots the human weakness or limitation and makes up for it without pain to the worker," authors Thomas H. Davenport and Julia Kirby wrote in their recent book *Only Humans Need Apply*. "If you are a motivated knowledge worker trying to do your best, augmentation has your back. And even beyond that aim to shore up your weakness, augmentation spots your relative strength and works to amplify it, to build on it or simply to allow you to run with it" (2016, p. 62).

Facebook has embraced the augmentation approach. By using computer systems to automate management of its army of computer servers, Facebook's human employees can focus their energy and talent on new developments for the company. And the intellectual challenge of that work engages and interests the Facebook employees, making them less likely to be hired away by another company (Davenport & Kirby, 2016).

Accenture endorses the augmentation approach. "Augmentation-putting people first and amplifying what they can achieve-holds the greatest potential for value creation in organizations. Automation of routine management work will certainly remain important, but mostly in terms of freeing up managers' and employees' time to focus on more value-creating activities such as those related to judgment work" (Kolbjørnsrud et al., 2016, p. 15). Accenture has distinguished three different augmentation roles that Al may assume in the workplace. As an assistant, Al will support a manager and team perhaps through scheduling or through providing basic customer-service functions. As an adviser, an Al system would aid humans in problem-solving and decision-making, while as an actor, an Al system would make decisions on its own (Kolbjørnsrud et al., 2016).

The financial giant Morgan Stanley is focusing on the adviser role, using machine learning systems to supplement its army of 16,000 human financial advisers who develop and maintain strong relationships with the firm's clients. The human advisers can be overwhelmed in a financial emergency, so Morgan Stanley is developing a system that would present the financial advisers with investment options for clients. The system also would generate text alerts that the financial adviser can send to a client and would inform the adviser about client's live events. "That live-event content isn't found in other machine adviser systems and has the potential to help create a trusting and value-added relationship between clients and financial advisers" (Davenport & Bean, 2017, p. 3).

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Although AI and other digital technologies are replacing many routine work-place tasks, other functions that only humans can perform are more important than ever before. Indeed, 77 percent of companies surveyed by Deloitte (2017) predicted that they will maintain their human staffs despite the availability of AI systems, retaining employees or redesigning jobs. Only 20 percent predicted that AI and other digital technologies will lead to a reduction in the number of employees.

But will employees be willing to follow instructions issued by a computer? Trust is the key to that problem, according to Kurt Gray, an associate professor of psychology and neuroscience at the University of North Carolina at Chapel Hill. Gray says that trust within a human team rests on three essential ingredients: Each team member knows that other team members have their well-being in mind, team members share a mutual sense of vulnerability and trusting team members have faith in each other's competence. Al generally scores high with humans on the third requirement: Humans place great stock in computers' ability to process reams of information quickly and accurately. But humans rate Al poorly on the first two foundations because they don't see computers as having the same "skin in the game" that human team members do. For example, a computer program experiences no obligation to protect the humans that consult it, and the program is not subject to being fired or laid off if a team project fails (Gray, 2017).

And attitudes toward AI vary throughout levels of management. Accenture found that C-suite executives were more optimistic about AI than were mid-level managers, and mid-level managers in turn were more optimistic than front-line supervisors. For example, 46 percent of top managers agreed with the statement, "I would trust the advice of intelligent systems in making business decisions in the future," while only 24 percent of middle managers and 14 percent of front-line managers agreed with that statement. Younger managers also tended to be more optimistic than older ones, while managers in developing nations are more receptive than managers in developed nations (Kolbjørnsrud et al., 2016, p. 9).

77%

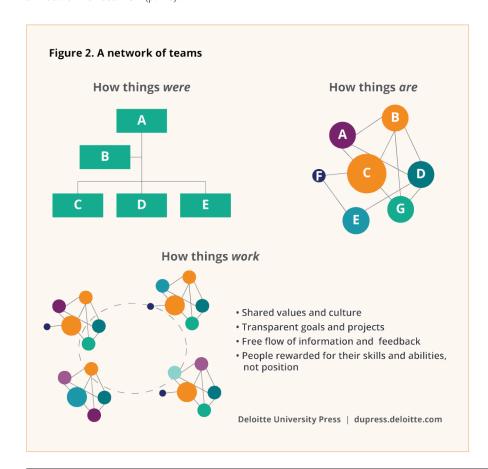
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We're on the bleeding edge of Al

Al is only beginning to widely penetrate companies. Deloitte (2017) found that 41 percent of companies have deployed Al technologies in the companies, while another 34 percent were running pilot programs. But only 17 percent reported that they were fully ready to manage the technologies. Still, Al is increasing its footprint in business all the time. "One or more of your organization's competitors probably has a project under way," Davenport and Kirby (2016, p. 203) warn.

And a company should lay the groundwork for AI carefully before leaping in. For example, because so many AI systems focus on analyzing data, a company looking to move to AI should first be sure to develop a cadre of employees able to understand data analytics in order to be positioned to take advantage of the powerful insights from an AI system, according to business experts Nick Harrison and Deborah O'Neill. "Like it or not, you can't afford to skip the basics," they write (Harrison & O'Neill, 2017, p. 4). Companies seeking to add data analysts to their staffs will find much competition for them in the labor marketplace, making their salaries unaffordable if they can be hired at all.

The shift to AI also is happening in the context of other changes in business, particularly a move away from strongly hierarchical approaches to organization. Instead, companies are embracing flexible, team-oriented organization. "Whatever a hierarchical organization chart says, real, day-to-day work gets done in networks," Deloitte (2017) has found. "This is why the organization of the future is a 'network of teams'" (p. 20).



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At the same time, as the "gig economy" grows overall, companies are increasing their reliance on part-time workers, contractors and other non-employees. "Managing a mix of humans, people enhanced by intelligent automation and autonomous systems will require a more strategic mindset as to how to fit the assets together to optimize their effectiveness," predicts Roy Altman, an HR manager at Memorial Sloan Kettering Cancer Center (Altman, 2017, p).

What AI means for leaders

New approaches to leadership also are required because of the way that Al changes relationships in the workplace. "One of machine learning's greatest legacies may well be the creation of a new generation of business leaders," say MIT's Brynjolfsson and McAfee. Managers who develop their creative skills will be more successful in coping with the revolution and will enjoy a competitive edge in the marketplace. "Leaders of networked teams in agile organizations require skills such as negotiation, resilience and systems thinking," Deloitte recently concluded. "In some cases, the most experienced leaders and business unit heads may be the wrong people to take charge of digital, agile, networked teams" (2017 Deloitte Global Human Capital Trends, p.22).

Indeed, organizational leaders must keep in mind that–despite the increasing number of AI systems–their organizations will remain populated with vast numbers of flesh-and-blood humans who will need leadership and vision to be effective. "This new type of leader must understand how to build and lead teams; keep people connected and engaged; and drive a culture of innovation, learning and continuous improvement" (2017 Deloitte Global Human Capital Trends, p.22). Paradoxically, soft skills such as emotional intelligence will become even more valuable in a business culture that depends on computerized systems for guidance and support, Deloitte concludes. "Skills such as empathy, communication, persuasion, personal service, problem-solving and strategic decision-making are more valuable than ever" (p. 120).

Talent development will be key

Although employees may worry that Al will undermine their value to their employer, just the opposite may be true in some cases. In a world where manufacturing a new product is as easy as plugging a digital template into a 3-D printer, talent—the ability to create that 3-D template, for example—will be more valuable than capital. As a result, companies will need to invest in employee talent development. "As organizations become more digital, they face a growing imperative to redesign themselves to move faster, adapt more quickly, facilitate rapid learning and embrace the dynamic career demands of their people" (2017 *Deloitte Global Human Capital Trends*, p.19).

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Companies will need to support workers through career development and other means because a company's employees often will be its key differentiation from its competition. As machine learning and AI systems become more and more commonly available in the marketplace, the advantages offered by these automated systems will also become commonplace. A company's competitors are likely to have access to the same, or comparable, AI systems. Where an individual company will stand out will be in the judgment work done by human workers in alliance with the AI systems.

"Managers will increasingly understand that the key to their firms' competitiveness is not the efficiency that automation provides but the distinctiveness that augmentation allows," Davenport and Kirby (2016, p. 224) maintain. "For that, they will see, they will have to attract highly capable people, engage them and retain them."

New vistas for innovation, growth

Thanks to the Fourth Industrial Revolution, businesses and business employees around the world will never be the same. They will accomplish new and exciting things, aided by computerized systems that were barely imagined a few decades ago. True, the changes will create dislocations and inequities—but also enormous new vistas for innovation and growth. By being aware of what is coming, and taking time now to prepare, organizational leaders and employees both can be positioned to ride the challenging wave of change and enjoy it, rather than being swamped by it.

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Using Al to augment your workers

In their book *Only Humans Need Apply*, Thomas H. Davenport and Julia Kirby (2016) describe seven key steps for managers who wish to use artificial intelligence systems to augment the abilities and skills of their workers:

- 1. Know your highest impact decisions and knowledge bottlenecks. Use this information to determine the highest priority issues at the company on which AI and human employees might collaborate.
- **2. Track technology developments**, so you can select a technology approach for solving your designated issue.
- **3.** Consider the constraints placed on machine autonomy, such as laws and regulations.
- **4. Build your augmentation solution.** Often, a company will have to choose from an overarching "moon shot" approach and a more incremental solution.

- 5. Manage the change, while both educating employees and communicating with them.
- **6. Embark on a project, but envision a platform.** Often a company decides to start with a pilot project, but it should keep the ultimate vision in mind.
- **7. Put someone in charge.** An individual must have responsibility and accountability for the project's success.

How should leaders and employees prepare for success in an Al augmented organization?

Organizations will have to confront the potential reality that their **senior leaders** may not be well-positioned or even the right ones to lead in the era of AI where they must manage digital, agile, networked teams as Deloitte predicts. Based on the research summarized here, leaders will need to focus on the following areas of development to prepare to lead in the future:

- 1. Leaders will have to reduce their emphasis on their administrative skills and instead focus on developing stronger strategic abilities to learn how to blend humans, people augmented by intelligent automation and autonomous systems.
- 2. Leaders should deeply understand their business processes so they can distinguish between those that are well-suited to AI and those that are better performed by employees.
- 3. Leaders will need to adapt to a flexible team-oriented approach to drive business outcomes though networks of teams versus traditional reliance on hierarchal approaches.
- 4. To lead networked teams, leaders will need to enhance their negotiation, resilience and systems thinking skills.
- 5. Leaders must enhance their creative skills to adapt to leading in the era of AI and to be more competitive. Leaders must develop their own and their employees' data analytics skills so they can effectively and successfully use AI.
- 6. Finally, to lead successfully in an Al-augmented future, leaders must rely more than ever on their emotional intelligence skills which must be strongly expressed in their ability to show empathy.



To thrive in an Al-augmented business world, **employees** should develop their abilities to effectively use Al tools to serve their company's customers. Employees should understand the technology and how to work with it so they can identify ways in which the technology can help them add to the company's performance—and at the same time, identify gaps in the Al's contribution so that the employee can help fill them with his or her unique capabilities. Employees must:

- Develop quantitative skills. The AI will crunch the numbers for you, but you need the numeracy to understand what the system is telling you. Develop your ability to pose questions and form hypotheses that can be addressed through AI-assisted analysis.
- 2. Become a subject-matter expert in a niche topic important to your business.
- 3. Develop the ability to interpret data to formulate a compelling story based on the numbers generated by an AI system.
- 4. Engage in Al pilot projects in your organization to understand the technology and position yourself as a leader in it.
- 5. Adopt an adaptive mindset being flexible, agile and open to tackling new business challenges will require you to create new approaches and formulate strategies using a combination of your own critical thinking and AI analytics.

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About IOCI

We help our clients build leadership readiness and solid business capabilities that position them for sustained relevance and success. We believe in Spirited Business® as an enabling force behind all we do. We aim to help our clients build spirited cultures by cultivating empowering, passionate and purposeful environments. If you are ready to position your organization for impact and to create spirited cultures, contact us!



Autho

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Marialane Schultz is the founder and CEO of Innovative Outcomes Consulting Inc. and brings more than 25 years of successful leadership and employee development experience to the company. As a respected business executive, she has been responsible for major business operations, strategy and policy in Fortune 100 and defense organizations. As a key leader in these organizations, she has a track record of success in delivering results and leading employees through complex changes.





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