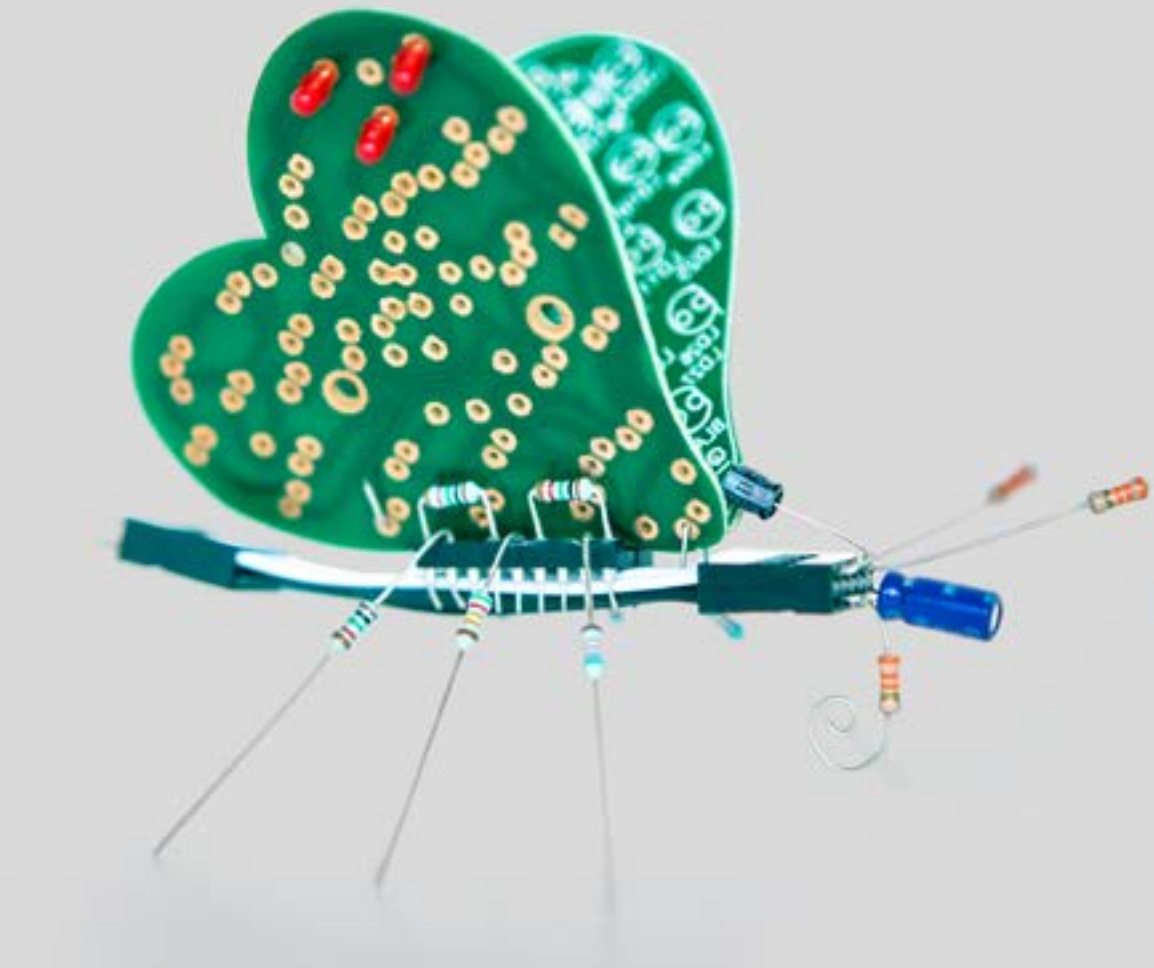
TECHNOLOGY

HEALTH WEALTH CAREER

LEADING THROUGH DISRUPTION

ANALYSIS BY SHEELA SUKUMARAN



WHAT'S DRIVING THE FUNDAMENTAL SHIFTS IN THE TECHNOLOGY INDUSTRY?

In the past decade, the technology industry has continued on its path of unprecedented global growth, primarily as a result of significant advancements in digitization of data, machine learning, network capacity and speed, cloud technology and improvements in digital hardware[1] – not to mention falling costs of technology. Technology organizations are now gripped with urgency to translate these incredible shifts into market advantage by transforming the way they work, manage and deliver value to their stakeholders.

This paper outlines how technology enterprises can lead through disruption by recognizing the key forces driving change and the transformations necessary to prepare for the future. The approach described in the paper was developed by Mercer technology industry experts who engaged in strategic conversations with business and HR leaders around the world. The experts examined industry data from our proprietary research, including benchmarks and global workforce forecasts; analyzed the latest business research in the technology industry; and vetted their observations with thought leaders in the industry. The three major transformation areas outlined in this paper are keys that will unlock the full potential of a technology organization. Failure to address them all together will limit both readiness and value realization of transformational investments in an organization and its people. Purpose-driven and technology-savvy business leaders will find in the trifecta a comprehensive roadmap to becoming the successful technology organization of tomorrow.

This paper is the first in a series of detailed briefs, each delving deeper into an area of transformation, respective levers, insights from expert analysis and a diagnostic toolset that can help organizations baseline their readiness to lead through disruption.

[1] Afee A, Brynjolfsson E. *Machine, Platform, Crowd* (New York: W.W. Norton & Company, Inc., 2017).

The technology industry is in the midst of disruptive change. Exponential technologies — many of them developed by technology companies — are blurring the lines between humans and machines, and between organizations and their stakeholders. Pervasive digitization has transformed the technology ecosystem; leveraged assets and network effects are the new drivers of value. Furthermore, with rapid industry expansion, technology firms are growing at an unprecedented pace to achieve global scale. The magnitude of these forces of disruption, combined with intense competitive pressures, is severely disrupting traditional views and measures of markets, competition and success.

These disruptions will have a fundamental impact on the way we live and work. Business models, the nature of work and employment, enterprise productivity and human performance are all poised to undergo significant shifts. Nearly half (47%) of industry executives surveyed as part of the World Economic Forum's recent *Future of Jobs* report said that an insufficient understanding of these disruptive changes is a barrier to planning, and 39% cited a lack of alignment between their workforce strategy and innovation strategy.[2] Technology employers face increased competition for a talent pool that is not growing, is distributed globally and has more work arrangement options than ever before.

To get ahead, organizations will need to coordinate efforts between business units, corporate functions and HR to adopt exponential technologies across the enterprise. By understanding the key performance levers of tomorrow and addressing them with the right investments today, companies can lead through disruption, make performance leaps and mitigate the risks inherent in new business models and new talent strategies.

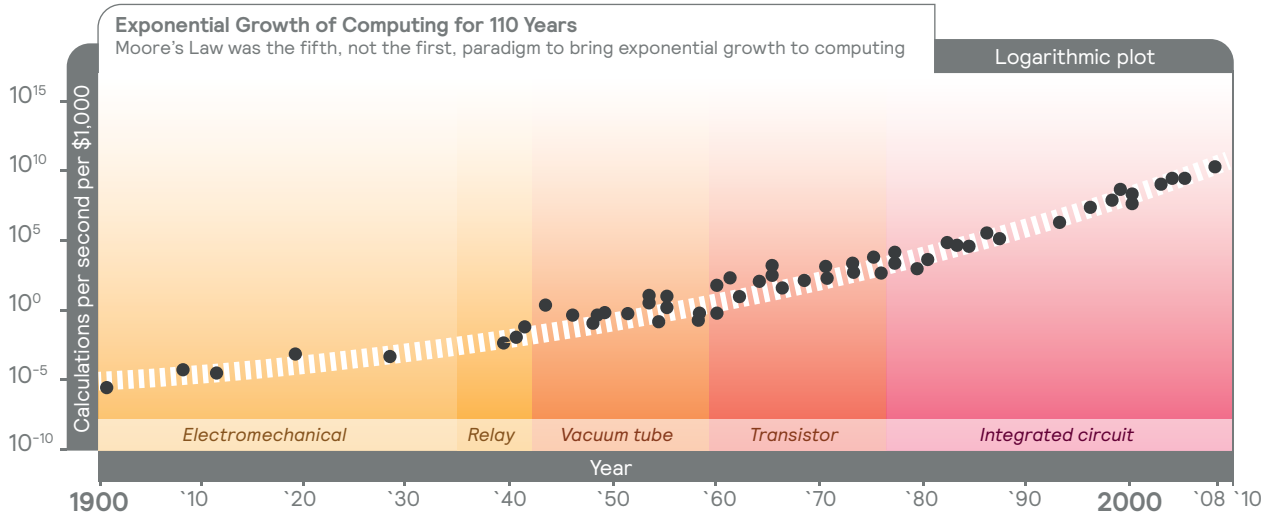
[2] World Economic Forum. *The Future of Jobs* (January 2016), pp. 6–7, available at www3.weforum.org/docs/WEF_FOJ_Executive_Summary_Jobs.pdf.

KEY DISRUPTORS OF THE TECHNOLOGY INDUSTRY

1. EXPONENTIAL TECHNOLOGIES

Exponential technologies include artificial intelligence (cognitive computing), robotics, 3D printing (additive manufacturing) and virtual reality, all of which are profoundly changing how value is created and work gets done, by enabling disruptive innovation and hyper productivity. Powered by improvements in computational capabilities, these technologies are accelerating the ability of machines to make judgments and perform tasks that previously only humans could undertake.

CHART 1. HOW TECHNOLOGY HAS ACCELERATED EXPONENTIALLY FOR THE PAST CENTURY[3]



Exponential growth in computing has been accelerating through the past century, showing no impact from global economic and political turbulence, including the two world wars in the twentieth century. Computing is expected to continue to grow at this pace, despite global disruptions.

A recent US government study reported that machines are already outstripping humans on certain tasks related to image recognition, which ultimately could have profound implications for jobs ranging from security guards and drivers to pathologists and astronomers.[4] Although robots have not yet matched the dexterity of humans, advancements in sensors, actuators and artificial intelligence (AI) are making it possible for robots to take on an increasing number of tasks as the cost of the technology continues to fall.[5] The number of industrial robots in use globally is estimated to grow from 1.2 million in 2013 to 2.3 million in 2018.[6]

[3] Kurzweil R. *The Singularity Is Near: When Humans Transcend Biology* (New York: Penguin, 2006).

[4] Executive Office of the President. *Artificial Intelligence, Automation, and the Economy* (Washington, DC: US government, 2016), p. 6.

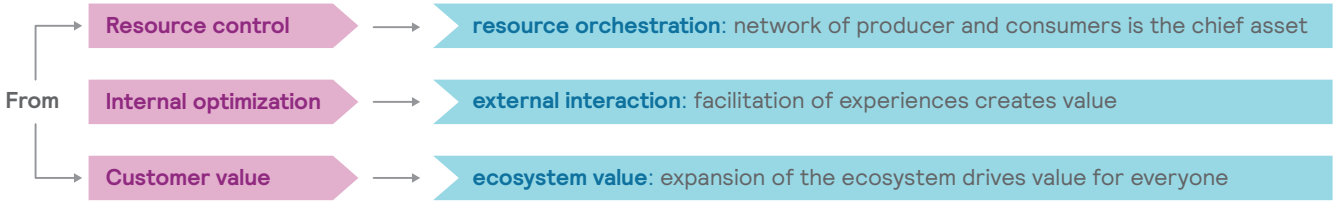
[5] West DM. *What Happens if Robots Take the Jobs?* (Washington, DC: Brookings Institution, 2016), available at www.brookings.edu/wp-content/uploads/2016/06/robotwork.pdf.

[6] Anandan TM. *The Business of Automation, Betting on Robots* (Robotic Industries Association, May 19, 2016), available at www.robotics.org/content-detail.cfm/Industrial-Robotics-Industry-Insights/The-Business-of-Automation-Betting-on-Robots/content_id/6076.

Many exponential technologies are originating in the technology industry, and their impacts are already evident in the operations of technology companies. An example is Cyborg, a smart system application at Facebook that continuously monitors tens of thousands of servers, detects problems and, in many cases, performs repairs autonomously, allowing a single human technician to manage as many as 20,000 computers.[7] Also noteworthy is Google's innovative application of machine learning to achieve a 40% reduction in the amount of energy used for cooling its data centers, using a system of neural networks trained on different operating scenarios and parameters within Google's data centers.[8] Tasks previously considered the mainstay of highly trained professionals in the industry are being increasingly executed in collaboration with machines and deployed at a far higher scale and complexity.

2. PERVASIVE DIGITIZATION

Through the rise of digital multisided platforms, like those developed by Airbnb and Uber, pervasive digitization is upending business models and reorganizing the relationship between producers, workers and consumers. In the digital marketplace, the competitive value has moved from tangible and intangible assets to virtual communities.



Although digital consumption is fueling spectacular growth, it is also creating new challenges and risks. The increasing digital connectedness has heightened privacy and business resiliency risks — and risks of reputational damage to providers of technology products and services.

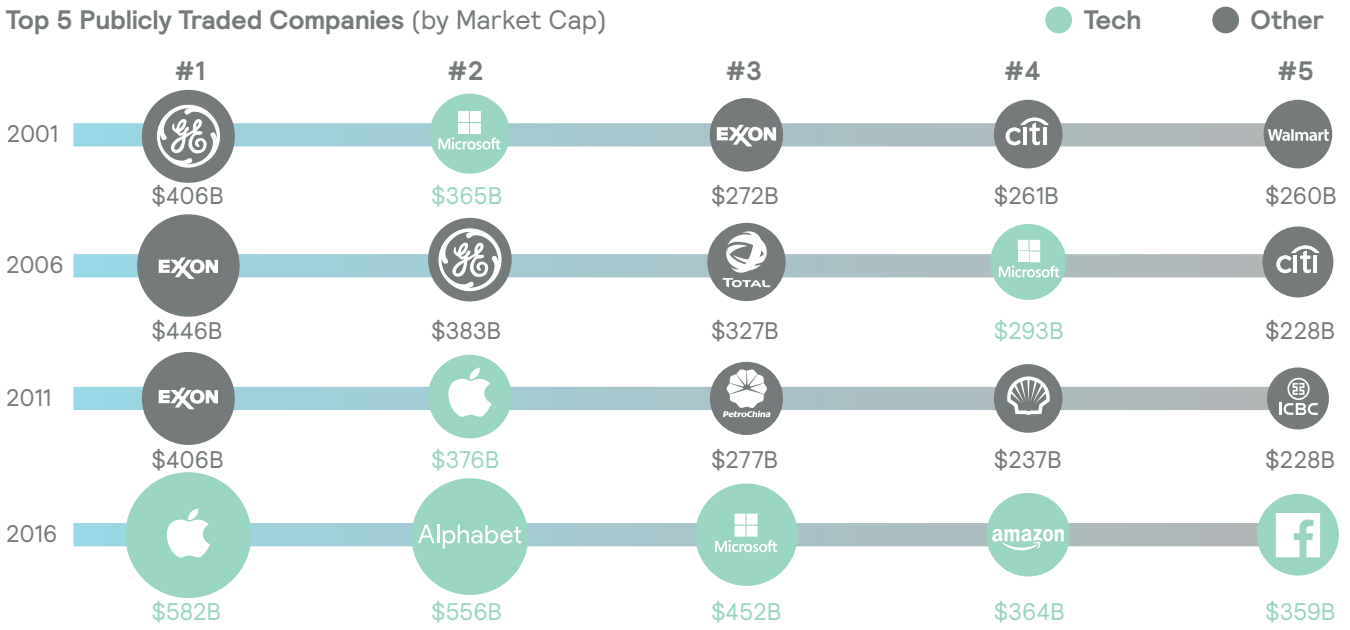
3. SPEED@SCALE

We recognize that technology companies are under tremendous pressure to deliver differentiated products and services along with improved customer experience. The thriving startup ecosystem in Silicon Valley and other global technology hubs generate innovative products and services to address customer needs in faster, better and cheaper ways. To meet investor expectations and market demands, these firms must stay innovative — while scaling rapidly. The rewards are huge: In the past five years, technology firms have become the largest companies in the world, by market capitalization.

[7] Ford M. *The Rise of Robots: Technology and the Threat of a Jobless Future* (Portland, OR: Basic Books, 2015), p.106.

[8] Evans R, Gao J. "DeepMind AI Reduces Google Data Centre Cooling Bill by 40%," *DeepMind* (July 20, 2016), available at https://deepmind.com/blog/deepmind-ai-reduces-google-data-centre-cooling-bill-40/.

CHART 2: THE DOMINANCE OF TECHNOLOGY COMPANIES IN MARKET CAPITALIZATION ACROSS INDUSTRIES[9]



Source: visualcapitalist.com

To be sure, the growth challenges faced by a technology company are driven by unique external and internal influences. For mature firms, the challenges are different; functioning optimally at the enterprise scale is hard — governance frameworks can slow organizational agility and streamlined business processes often create inflexibilities that hinder innovation and risk-taking. Organizational complexity, compounded by matrix structures, creates friction and encourages consensus-seeking over responsiveness and speed. On the other hand, fast-growing firms that seek to make the "scale leap" have the added challenge of evolving culturally and embracing greater formality in business operations and people practice as more clients, countries and headcount are brought on board.

Inorganic growth, including cross-industry partnerships designed to accelerate time to market for new products, is growing increasingly common. Collaborations make it possible to get products to market without building capabilities in-house, and bringing to bear complementary specializations to drive innovation. Examples include the Lyft-GM partnership to launch a fleet of self-driving cars onto the road next year[10] and the Intel-BMW partnership, which recently unveiled the first vehicle in a highly automated car test fleet that was created jointly.[11]

Accelerated scaling also requires the development of flexible operating models as companies enter new markets with diverse labor profiles and practices, different compliance requirements and varying consumer and data protection expectations. Well-known technology firms are under pressure from the European Union to change their business practices.[12]

[9] Desjardins J. "Chart of the Week: The Largest Companies by Market Cap Over 15 Years," *Visual Capitalist* (August 12, 2016), available at www.visualcapitalist.com/chart-largest-companies-market-cap-15-years.

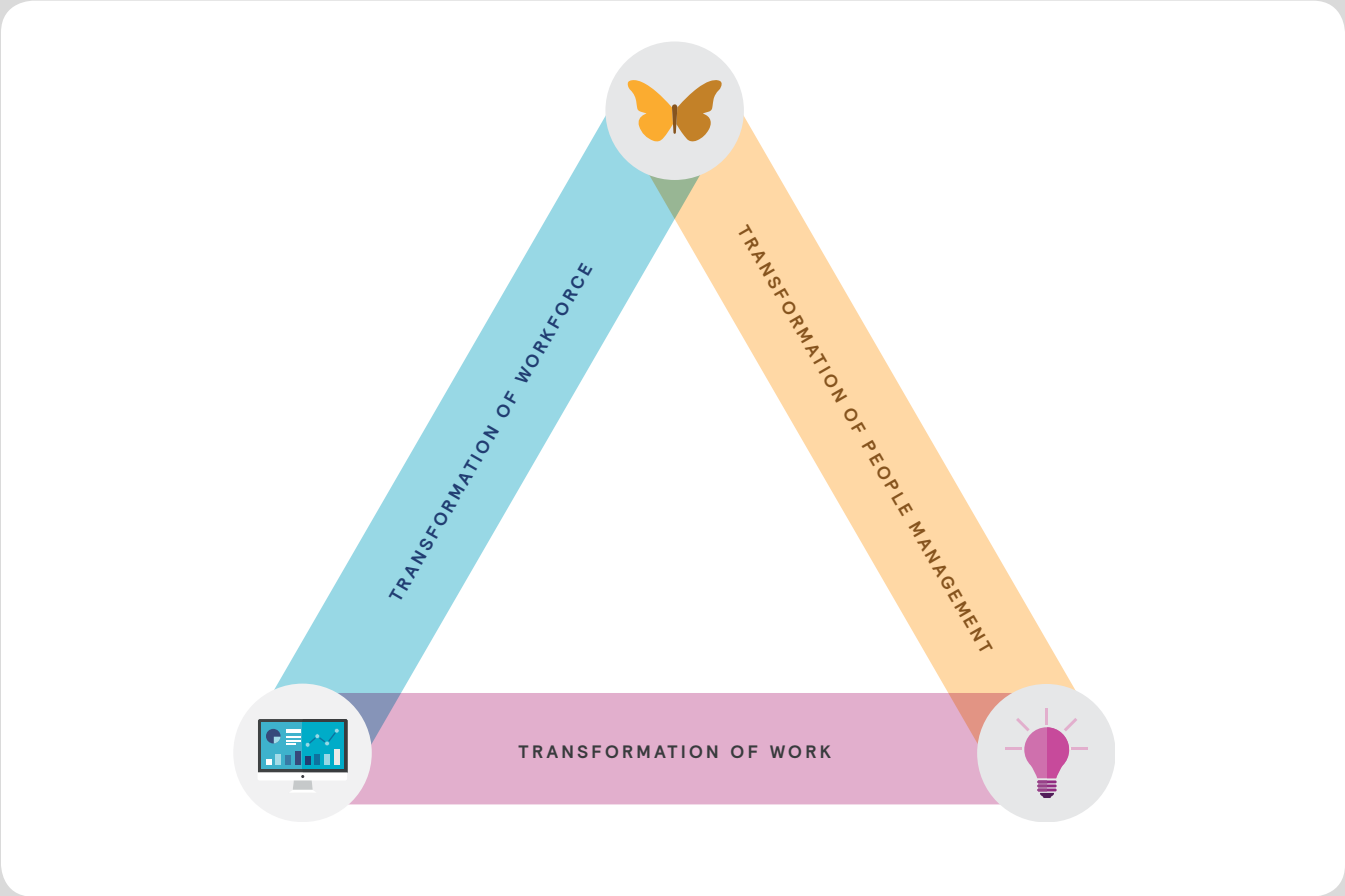
[10] Ohnsman A. "GM May Soon Have 'Thousands' of Self-Driving Electric Bolts in a Lyft Test Fleet," *Forbes* (February 17, 2017), available at www.forbes.com/sites/alanohnsman/2017/02/17/gm-may-soon-have-thousands-of-self-driving-electric-bolts-in-lyft-test-fleet/#3ce54a6de4f3.

[11] Baldwin R. "Intel and BMW's Highly-Automated Cars Hit the Road," *Engadget* (May 3, 2017), available at www.engadget.com/2017/05/03/intel-and-bmw-s-autonomous-cars-hit-the-road/.

[12] "Uber Defends 'Efficient' Ride-Sharing Business in Europe's Highest Court," *The Guardian/Reuters* (November 29, 2016), available at www.theguardian.com/technology/2016/nov/29/uber-europe-court-case-pollution.

THE VALUE SHIFT: UNDERSTANDING THE TRANSFORMATION AGENDA

All these disruptive forces are fundamentally transforming the nature of work, the composition of the workforce and the structure of jobs in the organization — creating an imperative for business and HR leaders to rethink organizational and people strategies for the future.



A. THE TRANSFORMATION OF WORK

The disruption unleashed by exponential technologies, digitization and the critical need for speed@scale has shifted business value in a fundamental way. This includes the nature of work, how it gets done and who does it. Addressing these shifts is key to leading through disruption.

The rapid advancement of artificial intelligence and digitization is already changing the nature of work. However, it is important to recognize that three primary scenarios will come to bear in the technology workplace.

WHAT'S CHANGING AT WORK	IMPLICATIONS
Augmentation of work 	The path to adopting exponential technologies involves working with humans rather than replacing them. By delegating or transferring specific tasks within jobs to machines, the human workforce will grow more productive and improve organizational performance. Although the tools make the job easier or faster, humans are still needed to control the machines or handle tasks that require human judgment, creativity or dexterity. For example, although machines are becoming increasingly adept at tasks that require visual cognition, such as detecting cancer from slides or scanning documents to find relevant content for legal briefs, doctors and lawyers must remain in the loop to make decisions, communicate with patients or clients, and carry out all of the related tasks that machines cannot.
Creation of new work 	Exponential technologies are giving rise to new jobs and increasing the demand for certain uniquely human capabilities, such as empathy. Investments need to be made to shore up technological skills of the existing workforce to carry out activities involving the design, operational supervision and maintenance of intelligent systems. The adoption of AI and machine learning systems in large companies has already triggered the creation of new jobs related to the design, training and supervision of AI systems; the need to explain the systems to others and troubleshoot problems; and the maintenance and modification of the systems as problems or new imperatives arise. There is a growing need for people with skills to facilitate the societal shifts likely to accompany technological innovation.[13]
Rise of autonomous work 	Cognitive automation will fully automate certain jobs. These include robots capable of working 24-hour warehouse shifts or carrying out dangerous work, such as defusing bombs or connecting drill pipes on an oil drillship, which is already reducing the need for humans in these roles. Recent advances that have made robots more compact and less costly are also speeding their adoption in other areas, including manufacturing and service jobs. Cloud technology, "big data" analytics and the Internet of Things are also making it possible to automate many tasks that used to require office and administrative workers — a job family that has so far seen the biggest employment decline, according to the World Economic Forum's *Future of Jobs* report.[14]

[13] Executive Office of the President. *Artificial Intelligence, Automation, and the Economy* (Washington, DC: US government), pp. 18–19

[14] World Economic Forum. *The Future of Jobs* (January 2016), pp. 1–3.

B. TRANSFORMATION OF THE WORKFORCE

New technologies and the digital business models they have enabled — along with the imperatives to get products to market and scale quickly — are not only fueling exponential growth in the technology industry but also significantly reshaping the make-up of the workforce and the skillsets required of that workforce.

1. RISE OF THE INTELLIGENT WORKFORCE

The workforce that will deliver tomorrow's work will be augmented by technology and, in some cases, no longer perform many activities that are undertaken today. Tomorrow's workforce will design and collaborate with intelligent systems powered by exponential technologies, providing complex inputs to maximize performance. Humans will be tasked with a greater proportion of problem identification and exception management activities as machines learn to function autonomously, resulting in significant skill shifts. According to one estimate, more than one-third of the skills needed in most occupations by 2020 are skills not considered crucial today.[15]

2. EXPANDING ON-DEMAND TALENT

The growth of digital platforms and the need to ramp up quickly have created much greater demand for contingent workers, fundamentally changing the relationship between companies and the talent on which they rely. According to a report from the government, over 40% of US workers held contingent jobs in 2010.[16] Meanwhile, half of the executives participating in a 2016 global survey reported plans to increase the use of contingent workers in the next three to five years.[17]

The implications for the future workforce are enormous. Although the use of on-demand talent is enabling companies to contain costs and scale quickly, it is also leaving them vulnerable. On-demand talent may feel little loyalty to an employer and is free to move quickly from one company to another. Without the benefits of a sustained talent management focus that helps set up the employee workforce for success, it is harder to optimize contingent worker performance and productivity. Furthermore, relying on a large contingent workforce to deliver the company's core business services to customers can create business risks.[18]

[15] Ibid.

[16] US Government Accountability Office. *Contingent Workforce: Size, Characteristics, Earnings, and Benefits* (Washington, DC: US government, April 20, 2015), p. 4.

[17] Schwartz J, Bohdal-Spiegelhoff U, Gretczko M, Sloan N. *The Gig Economy: Distraction or Disruption?* (Deloitte University Press, February 29, 2016), available at https://dupress.deloitte.com/dup-us-en/focus/human-capital-trends/2016/gig-economy-freelance-workforce.html.

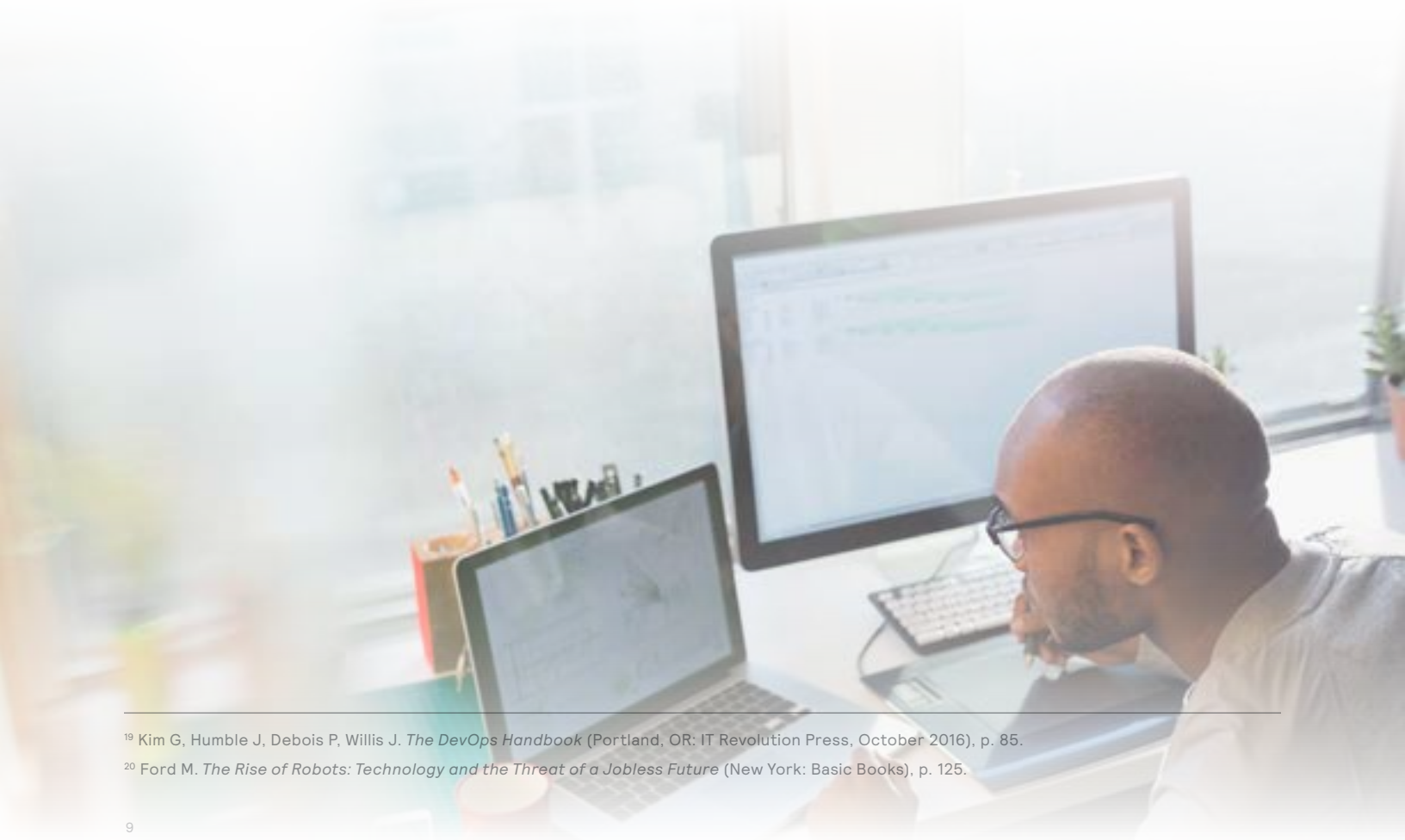
[18] Kendall M. "Lyft Off the Hook in Driver Case, 3 Years and $27 Million Later," *The Mercury News* (March 16, 2017), available at www.mercurynews.com/2017/03/16/lyft-off-the-hook-in-driver-case-3-years-and-27-million-later.

3. RE-SKILLING FOR THE FUTURE

Because we will rely on an ever-increasing number of technologies in the future, it is important for our workforce to represent a broader understanding and expertise instead of consisting of specialists who are "frozen in time," only understanding and able to contribute to one area.[19] As intelligent systems take over specialized tasks and activities, the demand for expert roles in the technology industry, such as network administrators and development engineers, is giving way to full-stack engineering capabilities that prioritize breadth over depth in expertise, through cross training and developing an ability to work across disciplines, and the ability to execute faster.

Successful, agile organizations in the technology industry have driven the shift from "I" shaped specialists to "E" (experience, expertise, exploration and execution) or "M" (multiple specialties) shaped experts. With changes in software architectures, team structures have also evolved, as smaller teams can now function autonomously without excessive communication and coordination.

Across the organization, stronger digital competencies are critical as workplaces grow more intelligent. Given ever-increasing cybersecurity threats, tomorrow's workforce must manage information securely, avoid security breaches and be able to react quickly when a breach does occur. Social skills that enable productive human interactions, such as listening, persuasion and teaching, will become more critical in many roles. Without a ready, re-skilled workforce — one that can function and thrive in the new environment — the promise of technological benefits will not be fully realized.[20]



[19] Kim G, Humble J, Debois P, Willis J. *The DevOps Handbook* (Portland, OR: IT Revolution Press, October 2016), p. 85.

[20] Ford M. *The Rise of Robots: Technology and the Threat of a Jobless Future* (New York: Basic Books), p. 125.

C. TRANSFORMATION OF PEOPLE MANAGEMENT

As the nature of work and the composition of the workforce changes, it is important to reexamine people management as we know it. Intelligent systems will increasingly take over the task monitoring, listening and activity tracking traditionally driven by managers and leaders, enabling greater enterprise-wide transparency around job loading, productivity, goal alignment and realization, and workforce engagement.

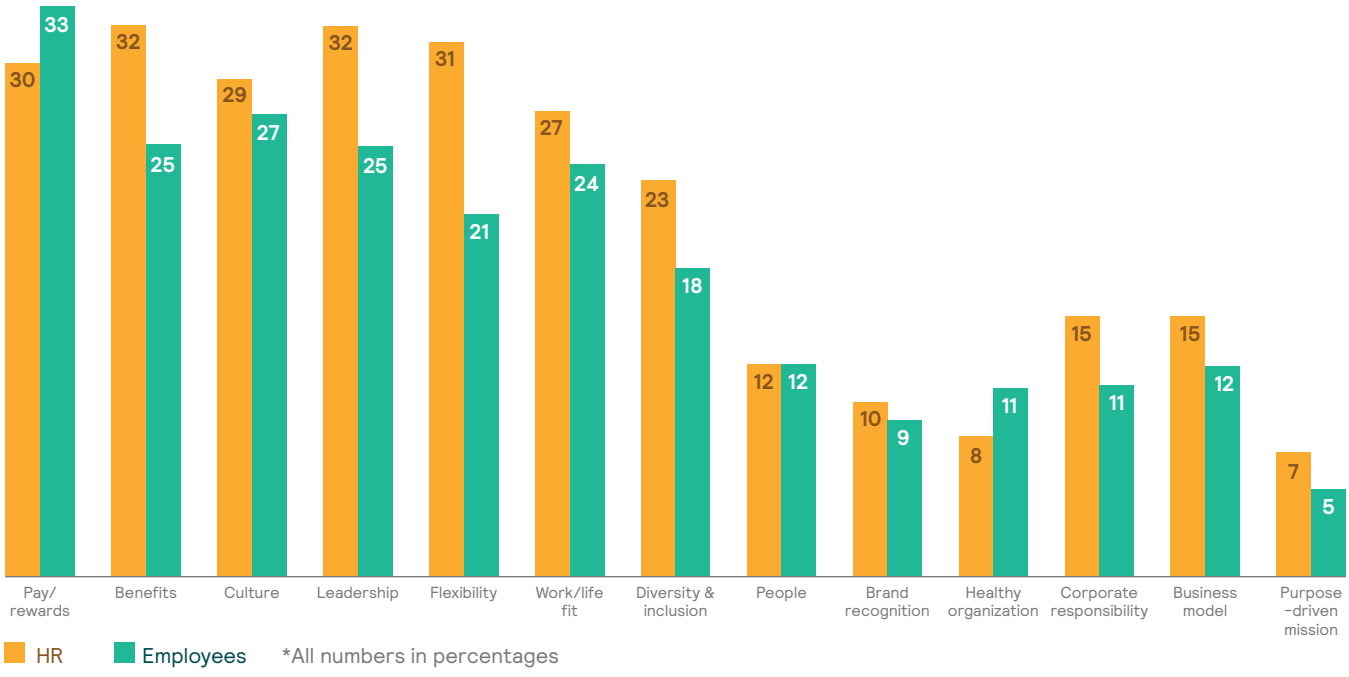
1. BUILDING TOMORROW'S PEOPLE MANAGERS

Tomorrow's managers will spend more time identifying problems that must be prioritized and solved. They will need to demonstrate the technical expertise and competencies necessary to manage intelligent systems and autonomous teams. They will coach team members more proactively and build team cultures that foster learning and risk-taking.

A shortage of technology skills, including numeracy, is another key factor. People managers are expected to focus — much more than before — on refreshing team member skills in the evolving job context to achieve performance outcomes.

Finally, people managers will play a key role in managing the employee experience, providing strong day-to-day leadership, developing cohesive cultures and enabling work/life balance, all of which differentiate the employee value proposition in the technology industry.[21]

CHART 3: HIGH TECH INDUSTRY: EMPLOYMENT VALUE PROPOSITION DIFFERENTIATORS



Source: *Global Talent Trends: High Tech* (2017)

[21] Duggan J, Sukumaran S, Shellenback K, Polovina S. *2017 Global Talent Trends: High Tech* (Mercer, 2017), p. 21.

2. TALENT STRATEGIES AND PRIORITIES

High growth rates and rapid scale in the technology sector are making it very challenging for companies to staff the right people in the right roles doing the right work. Developing new talent strategies to match employee expectations and innovative approaches to bridge skill shortfalls in the labor market is key.

CHART 4: EMPLOYEE PREFERENCES AND INDUSTRY FOCUS IN THE TECHNOLOGY SECTOR[22]

WHAT EMPLOYEES WANT		TECHNOLOGY INDUSTRY FOCUS
Clear performance ratings		34% strengthen goal cascade
Compare my performance to peers		37% enhance goal calibration across peer roles
Create team goals to promote collaboration		31% move from individual to team-based goals
Additional benefits for high performers		36% replace ratings with categories to describe an individual's contribution

Source: *Global Talent Trends: High Tech* (2017)

Leading technology firms have already launched innovative programs that focus on hiring for skills and building advanced expertise over hiring for credentials to address talent supply chain gaps in the economy. Notable examples include IBM's investments in the New Collar workforce,[23] Microsoft's "Skillful" initiative in partnership with Markle Foundation[24] and Google's "Grow with Google" program.[25]

Technology organizations will do well to rethink their talent strategies for the next two to three years, as the disruptive forces outlined in this paper mature and broaden their impact across the industry. It is the nature of exponential technologies to grow at a compounded pace; the current state of adoption will be altered swiftly, and overnight. Strategic workforce planning efforts need to bear this in mind and anticipate the future capability and capacity requirements in the context of each organization's growth trajectory and technology adoption journey.

[22] Ibid.

[23] Ladah S. "The Tech Industry Is Evolving, It's About Time Hiring Evolved With It," *IBM Think Policy* (August 2, 2017), available at www.ibm.com/blogs/policy/tech-industry-hiring-new-collar.

[24] "The Markle Foundation Will Team With Microsoft to Expand Skillful Employment," *Microsoft News Center* (June 28, 2017), available at www.markle.org/rework-america/skillful and news.microsoft.com/2017/06/27/the-markle-foundation-and-microsoft-partner-to-accelerate-a-skills-based-labor-market-for-the-digital-economy/#cwD1QRMLv3DLhGCk.97.

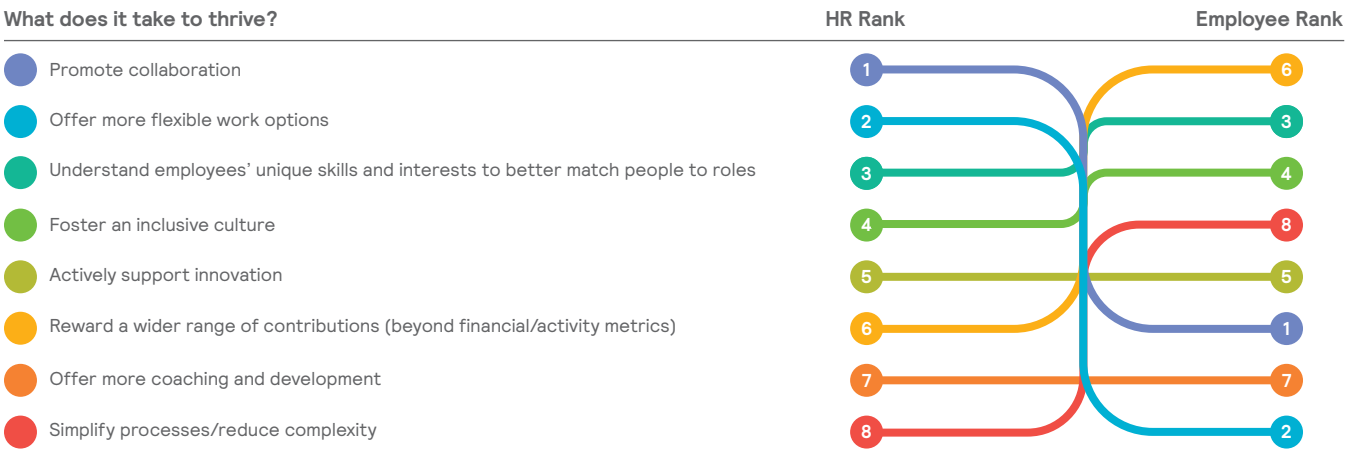
[25] Grow with Google: https://grow.google.

LEADING THROUGH DISRUPTION: THE HR AGENDA

How can HR lead organizations through disruption? It will depend in large part on how well HR understands the complexity of impacts of exponential technology, pervasive digitization and accelerated scale to the organization. Only 53% of chief HR officers participating in a recent World Economic Forum study said they were confident that their organizations have a future workforce strategy that will adequately prepare them for this industry disruption.[26]

It is important for HR functions to embrace disruption, by digitizing HR processes and operations, adopting advanced talent analytics and evolving HR architectures to support tomorrow's enterprise. There is much to do here; less than half of technology organizations surveyed in Mercer's 2017 *Talent Trends: High Tech* report leverage analytics to understand team dynamics and performance, engagement levers, retention priorities and cost management opportunities. Tellingly, HR leaders prioritize factors that help their employees thrive very differently from the employees themselves.[27]

CHART 5: EMPLOYEE AND HR RESPONSES TO THE QUESTION, "WHAT DOES IT TAKE TO THRIVE?"



From an enterprise standpoint, the initial impacts of disruption will be experienced on the edge, by business functions, where transformation of operating models and business processes will occur in step with technology adoption. To understand and address "edge shifts" in the workforce — and skills needed to deliver in the new environment — HR leaders will need to actively partner with their business peers to undertake the readiness journey and invest a greater proportion of their time directly supporting transformational initiatives underway in the organization.

Finally, it is critical for HR leaders to understand their internal and external labor markets and proactively address anticipated talent shortfalls by creating talent partnerships that facilitate easier flow of talent throughout the organization. With the rise of the on-demand workforce, mobility and evolving employee preferences about work/life balance, HR leaders have a unique opportunity to think ahead and create innovative strategies to capitalize on external trends and elevate enterprise performance globally.

[26] World Economic Forum. *The Future of Jobs* (January 2016), p. 6.

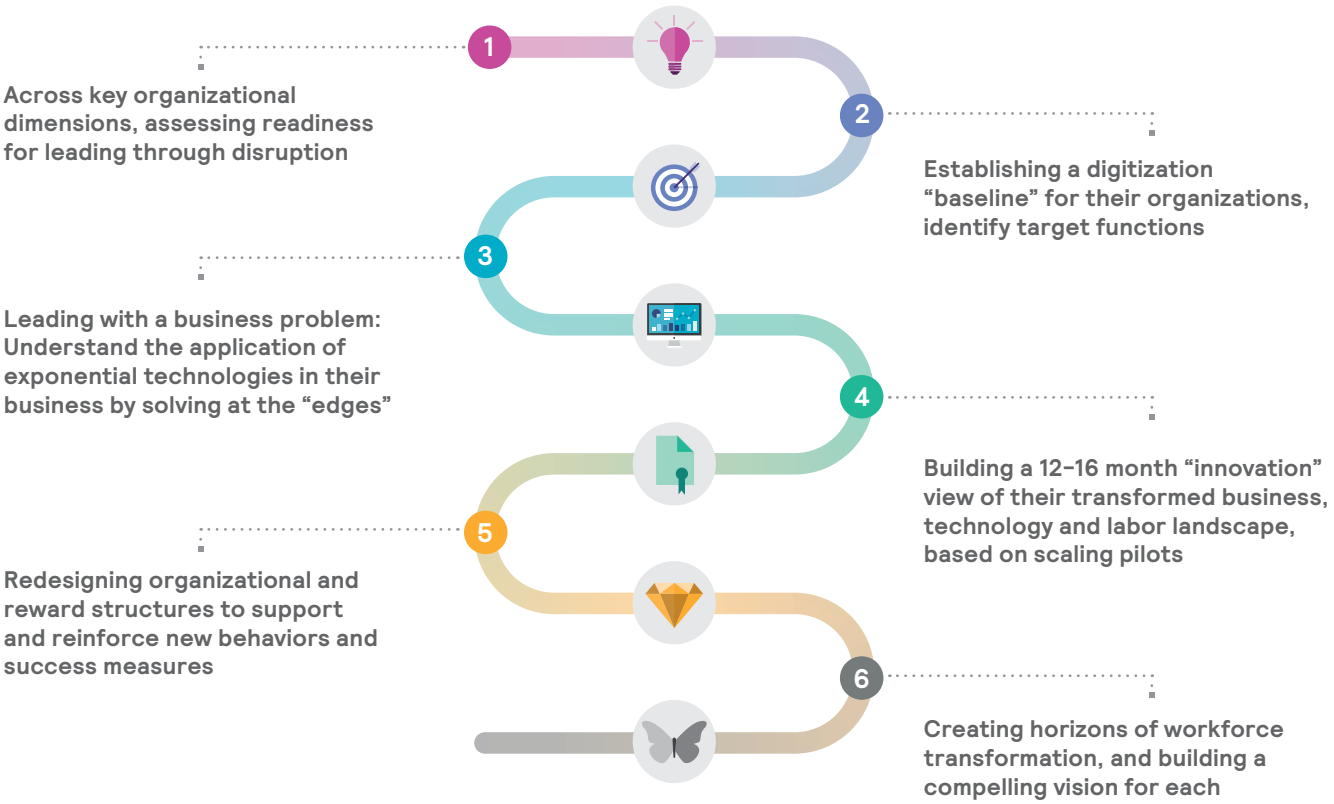
[27] Duggan J, Sukumaran S, Shellenback K, Polovina S. *2017 Global Talent Trends: High Tech* (Mercer, 2017), p. 29.

IMPLICATIONS FOR BUSINESS AND HR LEADERS

To lead through disruption — and thrive in times of exponential growth — business and HR leaders will need to reimagine their organizational and people strategies. Tomorrow's challenges will be dramatically different from today's priorities. Business processes, people policies, technology investments and organizational architectures need to be reoriented toward building tomorrow's technology workplace.

BUILDING TOMORROW'S TECHNOLOGY WORKPLACE

Leaders will need to reimagine their organization and people strategies.
Key steps in the journey include:



LET'S CONTINUE THE CONVERSATION

Would you like to share your thoughts or be a part of Mercer's Leading Through Disruption discussions? Do you have questions or insights to share? We'd like to hear from you. Please contact us at **mercertechnology@mercer.com.**

Sheela Sukumaran, a Partner with the firm, is the global leader for Mercer's Technology Vertical, which includes thousands of technology consultants serving 900+ technology clients worldwide. She can be reached at sheela.sukumaram@mercer.com.

Mercer's Technology Vertical partners our technology client leaders to anticipate and shape their unique people and organizational agenda in an exponential growth environment. We maintain constant observation and interpretation of global, regional and local dynamics impacting our clients today and tomorrow, as well as the disruptive forces transforming the workforce of the future. Using extensive data and benchmarks, deep project expertise of our 900+ technology consultants, and in-depth analysis and forecasting, we work with our clients to develop a strategic performance platform designed to create and maintain a thriving workforce and deliver long-term business success.

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