Harvard Business Review
ANALYTIC SERVICES

Pulse Survey

FUTURIZING WORK AROUND PEOPLE WITH THE HELP OF INTELLIGENT TECHNOLOGIES

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Advanced technologies will have a profound impact on the way people work, where they work, and how they connect with customers and colleagues. With artificial intelligence (AI) and machine learning, augmented and virtual reality (AR/VR), and the internet of things (IoT), the line between the physical and virtual work environment is blurring, and the workplace is becoming more virtual.

Sixty-three percent of the 319 executives recently surveyed by Harvard Business Review Analytic Services say that increasing productivity is the strategic goal that informs which technologies get chosen at their organizations. FIGURE 1 To realize this productivity wave, organizations are transforming their structures and workflows to mirror the distributed nature of work, an effort, in turn, made possible by new technologies. Intelligent technologies such as AI, AR/VR, and the sensor technologies behind the IoT are changing business models, organizational structures, and, above all, the way workers collaborate and make decisions.

But organizations face a number of challenges, including the siloing of data and the failure to properly integrate the growing diversity of intelligent technologies. The workforce itself presents executives with an odd dilemma—how do organizations accommodate the various workstyles of the five generations that now comprise the labor pool? The nature of work is morphing, too. People want to roam, whether it's switching jobs often or striking out on their own as part of the gig economy. Organizations find themselves having to cater to both structured and unstructured environments.

As a result, navigating the road ahead means marshaling intelligent technologies and integrating them so that they work together to help executives increase employee productivity, acquire talent, and optimize for the future of work, whether it's in a physical workplace or done remotely. The process not only depends on technological execution but also instilling a culture of engagement when it comes to workers and customers within the organization. In other words, workers must not just adopt technology but embrace it and grow with it.

"I truly believe the next generation of technologies will have a big impact on workers," says Karim R. Lakhani, professor of business administration at the Harvard Business School and co-author of *Competing in the Age of AI: Strategy and Leadership When Algorithms and Networks Run the World*. "AI is changing the way firms create, capture, and deliver value. Many of these technologies are

HIGHLIGHTS

65%
OF SURVEY RESPONDENTS SAY THAT BUSINESS PROCESS AUTOMATION USING INTELLIGENT TECHNOLOGIES WILL HAVE THE GREATEST IMPACT ON PRODUCTIVITY OVER THE NEXT THREE YEARS.

54%
SAY IMPROVED INTEGRATION ACROSS KEY SYSTEMS AND WORKFLOWS WILL HELP TEAMS COLLABORATE BETTER.

52%
SAY AUTOMATING MUNDANE TASKS WITH INTELLIGENT TECHNOLOGIES WILL HELP THEM BECOME MORE EFFICIENT.

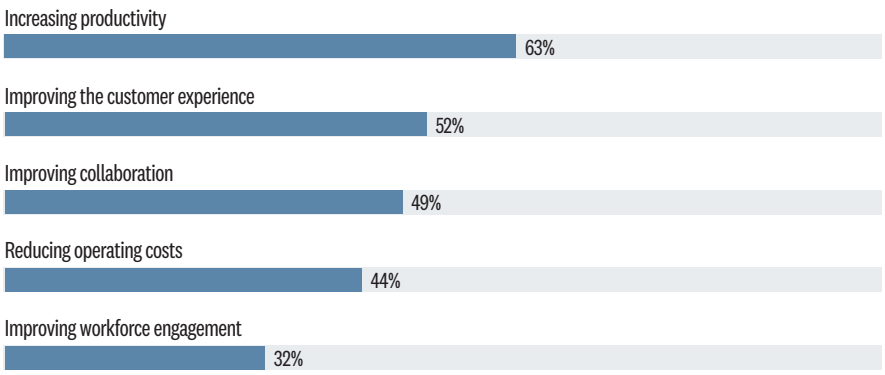
51%
SAY THEY CURRENTLY USE OR WANT TO USE ARTIFICIAL INTELLIGENCE TO CREATE AN INTELLIGENT OFFICE ENVIRONMENT AND DRIVE WORKSPACE EFFICIENCIES.

FIGURE 1

TOP TECHNOLOGY-INFORMED STRATEGY GOALS

A top reason organizations want to deploy technology is to increase worker productivity

Organizations want to deploy technology to increase worker productivity the most



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, JANUARY 2020

now available off the shelf and can be deployed at enterprise scale. The challenge is to put people first, to really think through the architectural elements—both physical and digital."

The Future of Work Is Happening Now

The workforce is changing. There are as many as five different generations in the workforce—from the Silent Generation to Generation Z—and organizations must accommodate all the different workstyles they bring with them. Workstyles now track personal and generational preferences, from those who value face time to those who will go out of their way to avoid a phone call or meeting, and from those who embrace new technologies to those who will remain skeptical until they can see a tangible benefit. This is a challenge for anyone responsible for workplace technology and workflows.

At the same time, the nature of work is transforming. Gig work is growing, and people spend less time in one job. According to technology research firm Gartner, by 2024 teams will rapidly form and disband, putting a premium on workforce agility and fluidity.

This progression is particularly true for creative work, says Robert T. Monroe, teaching professor of business technologies at the Tepper School of Business at Carnegie Mellon University. "Typically, you're going to have a whole lot of ad hoc connections and informal interaction—small groups that need to be pulled together for an afternoon to solve a problem," he says.

In the war for talent, flexibility is key. Work-life demands mean organizations must provide increased flexibility. Technological mobility makes such flexibility harder to deny. Surveyed executives say that the top three features most conducive to attracting and retaining talent are the ability to work anywhere and anytime, with technology that works well and integrates seamlessly, and the ability to offer employees choice and flexibility when it comes to workstyle.

To meet the challenges of diverse workstyles, the growing need for flexibility, and the changing nature of work, organizations are turning to intelligent technologies.

Intelligent Technologies Are Influencing the Future of Work

There is no question that AI will be a driving force shaping the workplace of the future. Just over half of respondents say they currently use or want to use AI to create an intelligent office environment and drive workspace efficiencies. Many more are already using AI in some other capacity, even if they are not aware of it. Any system that can respond to a voice command, for example, is powered by some form of AI.

AI is not one but many different technologies that can be combined to perform cognitive functions such as perceiving, reasoning, learning, and problem solving. AI capabilities include machine learning, computer vision, and natural language understanding and generation—the ability of a machine to see, hear, understand, learn, and, in some cases, to perform physical tasks, such as autonomous driving or manufacturing work.

One of the most exciting forms of AI—and the one that has captured the imagination of any student of the future of work—is deep learning, which is a type of machine learning that seeks to imitate the workings of the human brain to create patterns for use in decision making. McKinsey Global Institute estimates that deep learning will add between $3.5 trillion and $5.8 trillion of incremental value annually.[1]

Task automation and analytics-driven accounting and IT could add a similar amount of value each. AI-driven enhancements will have a wide-ranging financial effect across the value chain, reshaping not only the way work is done but also the way that people interact with the enterprise, their work environment, and one another.

Feeding the enthusiasm about AI's impact on work are sensor technologies that funnel information to a machine-learning system designed to optimize for a specific task or outcome, such as turning out the lights when no one is in the room or automatically recognizing known participants in a meeting. Sensors have the potential to predict and adjust for something simple, such as noise suppression in an open office, to something more complex and personalized, such as understanding voice commands on a device that connects to the enterprise.

AI and sensors make possible a growing array of intelligent applications that will impact productivity and workforce engagement in the very near future, including business process automation, virtual assistants, natural language understanding, and AR/VR. In fact, 65% of survey respondents believe intelligent business process automation, which brings together AI and automation, will be the primary driver of productivity over the next three years. FIGURE 2

As McKinsey describes it, intelligent process automation, in essence, "takes the robot out of the human."[2] Process automation has already transformed many back-office functions, such as accounting. Now intelligent automation is becoming an integral part of more creative fields, such as research and development, as well as streamlining compliance, improving accuracy, and synchronizing global supply chains. Intelligent automation is crossing the digital-physical barrier in many industrial settings as well, changing the way factories, transportation, and offices will be designed in the future.

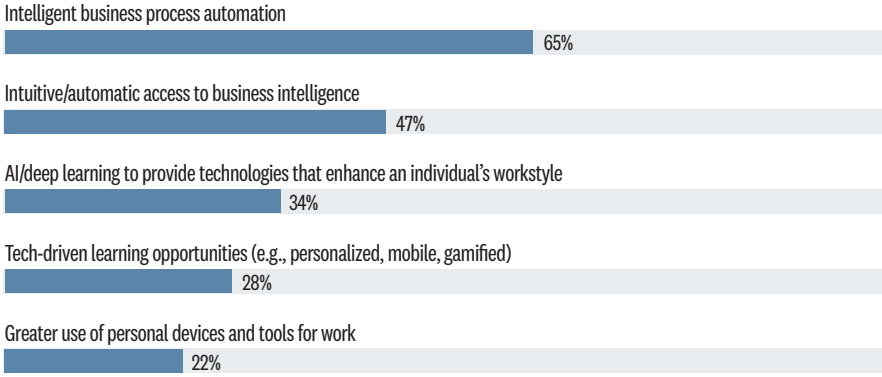
Intelligent virtual assistants, meanwhile, are already a popular consumer technology. Now many large organizations are taking advantage of advances in natural language understanding, natural language generation, and machine learning to design intelligent chatbots to unlock and share knowledge more efficiently.[3] In areas where safety and skill matter most, such as health care or aviation, creating easier access to knowledge and experience can save lives. In many other fields, it can save time and frustration by putting more useful information within easier reach of the people who need it most.

Another application of natural language understanding includes a range of speech-to-text functions provided by real-time meeting notes, transcription, and translation that

FIGURE 2

TECH FOR FUTURE PRODUCTIVITY

Intelligent business process automation will impact productivity most over the next three years



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, JANUARY 2020

MCKINSEY GLOBAL INSTITUTE ESTIMATES THAT DEEP LEARNING WILL ADD BETWEEN $3.5 TRILLION AND $5.8 TRILLION OF INCREMENTAL VALUE ANNUALLY.[1]

Smart meeting technology can identify who is speaking, **create an automatic transcription, and even translate** from one language to another.

can enable collaboration between workers, no matter where they are. Smart meeting technology can identify who is speaking, create an automatic transcription, and even translate from one language to another. These systems, which are advancing rapidly, are designed for business and can automatically generate notes, mark action items, and share them after a meeting.

Then there's VR and AR, which have great potential in engineering, manufacturing, and product development and maintenance—particularly in situations that would be too dangerous, too costly, or impossible to access in person. Utilities, oil and gas companies, and the military are all early adopters, but with advances in the technologies underlying AR/VR, many other use cases are now possible—from spatial planning to training and education to customer engagement. Manufacturers can use mixed reality to model new production facilities, technicians can use it to diagnose a repair, and companies can use it to demonstrate products. Immersive technologies are already familiar to anyone who grew up playing video games—many of whom would prefer to put on a VR headset than consult a manual.

SILOS PREVENT ORGANIZATIONS FROM REALIZING THE FULL POTENTIAL OF ENTERPRISE-SCALE ADVANCED ANALYTICS AND AI.

The Lack of Integration of Intelligent Technologies

Much is at stake when it comes to how organizations use technologies, such as those just mentioned, to improve the employee experience. Many of the most promising intelligent technologies are already available, but creating workspaces that take full advantage of new ways to work requires planning, training, and thoughtful implementation to overcome major obstacles, such as data silos, and to meet future workforce needs.

Technologies that are not integrated thoughtfully can interfere with business processes and make workers feel disconnected, disengaged, frustrated, or overwhelmed.

The greatest impediments to improving workflows and productivity are the silos that exist between departments and lines of business and the related problem of a lack of interoperability between different applications and platforms. Silos prevent organizations from realizing the full potential of enterprise-scale advanced analytics and AI. They are also the number one obstacle to innovation and collaboration, say 51% of respondents. FIGURE 3 At the same time, too many tools create confusion and complexity, according to the survey findings.

"Collaborate Smarter, Not Harder," a study coauthored by Thomas Davenport, the president's distinguished professor in management and information technology at Babson College, finds that innovation is inherently a social process, grounded in the creative friction that occurs when people with different experiences pull one another in unexpected directions and arrive at something entirely new. Understanding those dynamics is not something that should be left to chance. "Collaboration analytics can uncover silos across capabilities that—if better integrated—could spur innovation," the study finds.[4]

Technology overload can also drain time and energy from productive and creative work. Any time spent switching between different systems or duplicating work because of silos is time wasted. The problem of too many tools is particularly evident when it comes to collaboration. "Sometimes overload is created through excessively inclusive decision processes," according to the study coauthored by Davenport. "As

employees spend more of their time in meetings, on phone calls, and on email, collaboration analytics can play a powerful role in identifying where excessive connectivity is draining time, slowing speed to market, or hurting employee morale."

The executives surveyed say that improved integration across key systems and workflows, greater automation of repetitive and administrative tasks, and upgraded collaboration tools will be most helpful to improving workflows and collaboration. FIGURE 3

Creating a Workplace for the Future

When organizations remove silos, adopt the right technology, and integrate that technology, they become better prepared to face the future of work. Their activism can't stop there, either. Business leaders should transform their culture to embrace these intelligent technologies, create smart workspaces, and reimagine workflows across business processes to reap big business benefits, including increased employee flexibility, collaboration, engagement, and productivity, as well as improved talent retention and customer experience.

TRANSFORMING CULTURE TO ADOPT NEW TECHNOLOGIES

Besides needing to rethink how physical workspaces can accommodate the future of work, organizations also need to anticipate and model the transformational changes that advanced technologies will bring to organizational culture.

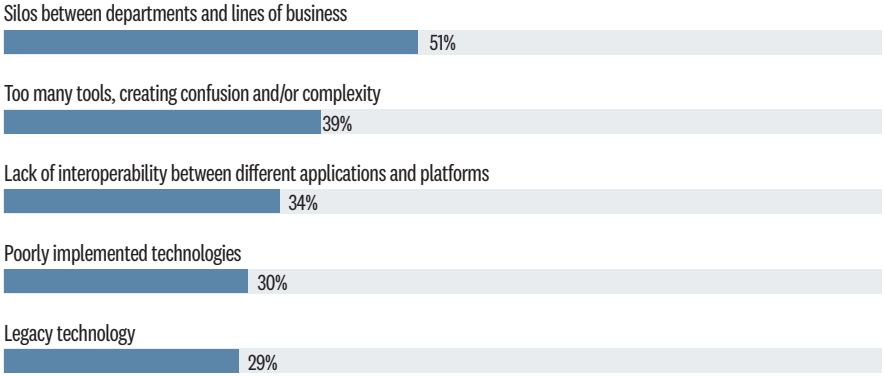
Alas, culture is often taken for granted. When it comes to choosing and implementing new technologies, most organizations fall into a common trap, says Harvard's Lakhani. "The technology comes first, and the people come second. Then there is a crazy learning curve and a lot of frustration and anger about these changes."

Organizations can and should do more to prepare their workforce for the future, says Babson's Davenport in an interview. "There is this general

FIGURE 3

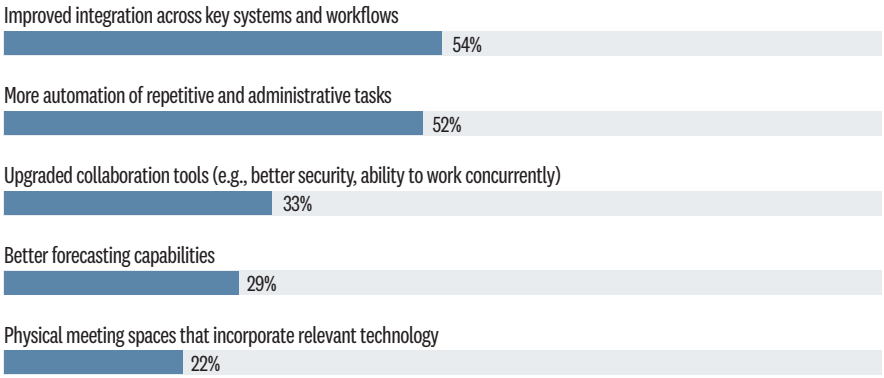
OBSTACLES THAT DERAIL TEAMWORK ...

Collaboration and workflows suffer when applications don't work well together



... AND CAPABILITIES THAT HELP TEAMS COLLABORATE BETTER

Integration and automation are key to improving collaboration and workflow



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, JANUARY 2020

WHEN ORGANIZATIONS REMOVE SILOS, ADOPT THE RIGHT TECHNOLOGY, AND INTEGRATE THAT TECHNOLOGY, THEY BECOME BETTER PREPARED TO FACE THE FUTURE OF WORK.

Fifty-eight percent of respondents are either already using, planning to test, or **say they should be using AI to provide insights and analytics** into how people work.

47% OF SURVEY RESPONDENTS PREDICT THAT PERSONALIZED, MOBILE, AND GAMIFIED LEARNING APPLICATIONS WILL HAVE THE GREATEST IMPACT ON WORKFORCE ENGAGEMENT OVER THE NEXT THREE YEARS.

feeling with new technology that if you build it, they will come," he explains. "But people don't feel like they're being very well prepared for using new technologies; they're not being told what their job is going to look like or what kind of skills they need to acquire to be successful." In addition to developing new competencies, workers need to be motivated to embrace some of the profound changes to process that many new technologies bring.

To help their workforce meet the challenges of mastering new technologies, organizations are turning to tech-driven learning opportunities. In fact, 47% of survey respondents predict that personalized, mobile, and gamified learning applications will have the greatest impact on workforce engagement over the next three years.

With new technology, Lakhani recommends an internal design-thinking approach to ensure that the user experience for workers comes first, and the technology is designed around that experience.

CREATING SMART WORKSPACES

Such a strategy becomes even more necessary given the greater role technology will play in how physical workspace is used. Leveraging usage of the actual workplace is another area where businesses could see greater returns on investment.

There are a number of innovations that cross the physical-digital divide that can benefit productivity, optimize real estate, and improve engagement—smart conference rooms, for example, that can incorporate intelligent technologies such as automatic transcription and note-taking as well as automatic translation. Fifty-eight percent are either already using, planning to test, or say they should be using AI to provide insights and analytics into how people work, and 51% say the same about using AI to drive cost efficiencies of their physical workspace.

Understanding more about how and where people work could answer age-old questions about the pros and cons of an open office plan, or the relative efficiencies of working remotely. Meanwhile, the technologies that create an intelligent workspace—both digital and physical—have the ability to transform the work experience beyond these debates to help answer the question: what should the workplace look like in the future and how should it function?

Technology-provided mobility, for example, means that not everyone needs their own office or even their own desk anymore. But people still need a quiet space to get work done. "We want collaborative workspaces, where data and expertise are shared easily, but we also need to provide workers with the ability to focus and get things done," says Lakhani. "That is a technology solution and also a work-practices solution. How does the physical architecture both enable collaboration but also allow for creative, focused work?" In other words, people need space to concentrate and learn, as well as space to collaborate and socialize.

REIMAGINING WORKFLOWS ACROSS BUSINESS PROCESSES

New technologies can disrupt existing workflows and processes. Whenever a worker has to switch from one system to another to complete a task, time is wasted and focus is

disrupted. A University of California study discovered that the typical office worker switches tasks every three minutes, while studies in live-office settings have found that it can take from one minute to 23 minutes to refocus on a primary task after an interruption.[5] People tend to compensate by working faster, one such study found, adding to physical stress levels and a feeling of overwork and loss of control.[6]

Most people are not looking for new tools. They want tools that fit their workstyle and help them get their work done. Work systems—collaboration and workflow tools, for example—that integrate seamlessly without the need to switch environments can eliminate time spent shifting from one system to another—and the increased stress that creates. They can also make it easier for teams to focus on shared outcomes, rather than simply completing individual tasks. At the same time, systems that work well together can eliminate another productivity killer: repeated work.

Every worker can name some aspect of their job that takes more time than it's worth—or some task that no longer serves whatever purpose it once did. New technologies—particularly intelligent automation—bring an opportunity to examine all workflows and processes and eliminate outdated and repetitive work. Digital assistants can help people prioritize work and minimize unnecessary disruptions (by screening emails, for example), increasing productivity and minimizing stress. One study found that a task-oriented bot helped workers feel more productive and engaged while they were at work and workers were more likely to detach and recharge after hours.[7] They were also better able to jump back in to work more quickly the next day.

BENEFITS OF DEVELOPING THE WORKPLACE OF THE FUTURE

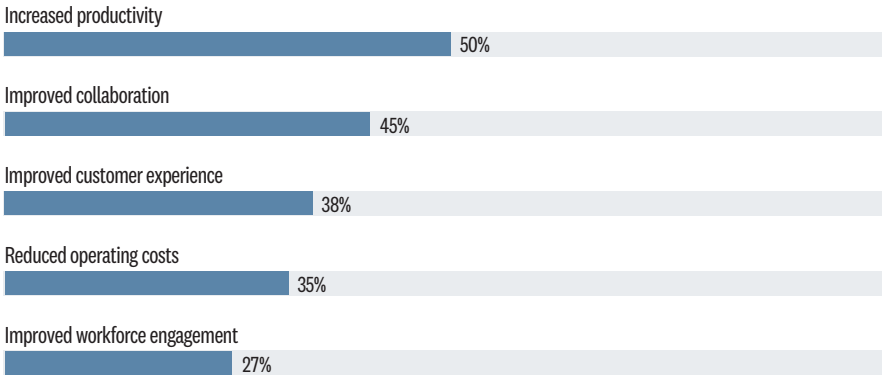
By transforming culture, creating smarter workspaces, and reimagining workflows, the workplace of the future will make the ability to work anywhere, anytime a reality. Flexible work has a direct benefit of helping to attract and retain talent, say 57% of executives in the survey. At the same time, 52% say automating mundane tasks with the help of intelligent technologies will be a major boost to workflows and collaboration.

Of course, productivity remains both the main goal and the main benefit of workplace technology. But the workplace of the future will also improve collaboration, the customer experience, and workforce engagement. The key will be to integrate technologies in a seamless, secure, and open way that allows the benefits to flow to every part of the organizations. FIGURE 4

FIGURE 4

PRODUCTIVITY IS PARAMOUNT

Benefits from tech investment are also focused on collaboration and customer experience



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, JANUARY 2020

Redefining Work with Intelligent Technologies

Intelligent technologies have tremendous potential to redefine the day-to-day work experience for many people. To realize that potential, organizations should aim for technology that helps its workers be as efficient, organized, and interconnected as possible. New technology will change the future of work, helping employees to be more engaged and productive, enabling organizations to become more agile and attract and retain talent.

"The consumer side of technology already tells us what the future workspace will look like, which is awareness of the topics that people are concerned about, making connections between topics and people, making connections between people and people, and suggesting the next action," explains Lakhani. "In a similar way, enterprise systems will curate for me the information I need for my work, suggest how I can be most effective in that work and most useful to my colleagues, based on my actions and the actions of my colleagues," he says. This seems revolutionary now, but in the very near future, these capabilities will be taken for granted—and everyone will expect them in the workplace.

Endnotes

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3 Dragon1 Enterprise Architecture Channel, "Chatbot Reference Architecture," January 2019, https://www.dragon1.com/watch/470340/chatbot-reference-architecture.

4 Rob Cross, Thomas H. Davenport, and Peter Gray, "Collaborate Smarter, Not Harder," *MIT Sloan Management Review*, September 10, 2019, https://sloanreview.mit.edu/article/collaborate-smarter-not-harder/.

5 Gloria Mark, Victor M. Gonzalez, and Justin Harris, "No Task Left Behind? Examining the Nature of Fragmented Work," Proceedings of the 2005 Conference on Human Factors in Computing Systems, April 2005, https://www.ics.uci.edu/~gmark/CHI2005.pdf.

6 Ibid.

7 Alex C. Williams, Harmanpreet Kaur, Gloria Mark, et al., "Supporting Workplace Detachment and Reattachment with Conversational Intelligence," Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems, April 2018, https://dl.acm.org/doi/10.1145/3173574.3173662.

METHODOLOGY AND PARTICIPANT PROFILE

A total of 319 respondents drawn from the HBR audience of readers (magazine/ enewsletter readers, customers, HBR.org users) completed the survey.

SIZE OF ORGANIZATION

21% 10,000 OR MORE EMPLOYEES

28% 1,000 – 9,999 EMPLOYEES

25% 100 – 999 EMPLOYEES

26% FEWER THAN 100 EMPLOYEES

SENIORITY

24% EXECUTIVE MANAGEMENT/ BOARD MEMBERS

34% SENIOR MANAGEMENT

30% MIDDLE MANAGEMENT

12% OTHER GRADES

KEY INDUSTRY SECTORS

14% BUSINESS/ PROFESSIONAL SERVICES

13% TECHNOLOGY

11% GOVERNMENT/ NOT-FOR-PROFIT

9% MANUFACTURING

9% FINANCIAL SERVICES

9% EDUCATION

ALL OTHER SECTORS LESS THAN 8% EACH

JOB FUNCTION

21% GENERAL/ EXECUTIVE MANAGEMENT

12% CONSULTING

9% IT

7% HR/TRAINING

7% R&D/INNOVATION/ PRODUCT DEVELOPMENT

ALL OTHER FUNCTIONS LESS THAN 7% EACH

REGIONS

42% NORTH AMERICA

22% EUROPE

23% ASIA/PACIFIC

7% MIDDLE EAST/ AFRICA

6% LATIN AMERICA

Figures may not add up to 100% due to rounding.

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CONTACT US

hbranalyticservices@hbr.org