Accenture Technology Vision 2015

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TREND 5: WORKFORCE REIMAGINED

TREND 5

Workforce Reimagined: Collaboration at the intersection of humans and machines

The push to go digital is amplifying the need for humans and machines to do more, together. Advances in natural interfaces, wearable devices, and smart machines will present new opportunities for companies to empower their workers through technology. This will also surface new challenges in managing a collaborative workforce composed of both people and machines. Successful businesses will recognize the benefits of human talent and intelligent technology working side by side in collaboration—and they will embrace them both as critical members of the reimagined workforce.

Say hello to technology, the newest employee in your workforce. It's smarter than ever and quick, too, but technology still needs training and teammates; it can't work alone—nor should it. According to 77 percent of the executives we surveyed, within three years, companies will need to focus on training their machines as much as they do on training their people (e.g., using intelligent software, algorithms, and machine learning). When people and machines work together, they have the potential to produce better outputs than either could separately. Businesses must recognize that technology is no longer just a set of tools—it is now a partner in a new collaborative workforce.

In fact, collaborative technology is already making everyday lives easier. Consider the semi-autonomous cars from manufacturers like Audi, Infiniti, Mercedes-Benz, General Motors, and Toyota. Each has announced self-driving navigation features that will enhance their cars and assist drivers, making their experiences better, easier, and safer all around.

WHY NOW?

Maturing technology: Advances in natural language processing (NLP) are making it much easier for humans to interact naturally with technology and machines. NLP is expected to grow rapidly to a $10 billion market by 2018.[1] Advances in wearable computing are allowing workers to integrate more technology seamlessly into their workflows.

Human-like interactions: Baidu chief scientist Andrew Ng predicts that voice and image searches on Baidu will surpass text queries within five years—an indication of growing expectations for more human-like interactions with intelligent software.[2]

Fast ROI: Gartner predicts that "by 2018, the total cost of ownership for business operations will be 30 percent lower than today because of the wider use of smart machines and industrialized services."[3]

Improved efficiency: Gartner forecasts that in 2017, savings in the field service industry will increase $1 billion due to smartglasses.[4]

Important use cases such as worker safety: Most of the resources that are easily accessible from the earth (oil & gas, minerals, energy) have been extracted. Resource companies are sending humans to more and more dangerous missions in more and more remote regions of the Earth. The need for robots to work together with humans in such situations is becoming more pronounced.

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If navigating in heavy urban traffic, for instance, Mercedes-Benz S-Class drivers in Europe can press a button on the car's steering wheel to activate Intelligent Drive, enabling the system to temporarily take over braking, steering, and acceleration up to 37 miles per hour.[5] Of course, this feature doesn't offer anything new that a human driver can't already do, but it takes advantage of the machine's unique capabilities to avoid becoming fatigued or distracted—thus increasing vehicle safety while easing the burden of driving in traffic.

But in the enterprise, human and machine collaboration goes beyond just eliminating fatigue or making experiences more pleasant—it provides organizations with the opportunity to tackle even greater challenges. For example, the US space agency NASA is teaming astronauts and robots together to face the difficult and dangerous task of cleaning up derelict satellites. Outfitted with advanced analytics algorithms and stereoscopic cameras, robot spheres are analyzing space junk to quickly map each piece's spin, velocity, trajectory, and center of mass— allowing astronauts to capture it safely.[6]

These examples demonstrate just how effective people and machines can be when they work together—and more and more companies are realizing this every day. It is now possible to use advances in speech recognition, natural language processing, wearable technology, and machines to access the power of intelligent software throughout the decision-making process [see *The Intelligent Enterprise*], enabling humans to leverage technology to produce better business outputs. The companies that are successfully embracing the reimagined workforce—in which people and machines effectively work as a collaborative team—are obtaining a competitive edge in this new digital world.

Look again at the scenarios from NASA and Mercedes-Benz. Most focus on the advanced software and robotics that drive these machines to act intelligently on their own. However, of equal note are the advancements in how people interact with technology.

77%

Believe that within the next three years, companies will need to focus equally on training their people and their machines.

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In the journalism field, for instance, reporters at the Los Angeles Times are now working with intelligent software to write articles. QuakeBot is one such program that writes first drafts of reports when an earthquake hits.[7] It extracts earthquake data from a United States Geological Survey report and plugs it into a pre-written template. From there, the article is turned over to a human editor who verifies that the information is correct, makes any edits, and immediately publishes it. In addition to making the reporting process much easier for the writer, this teamwork greatly improves the speed between earthquake occurrence and article publication. In one instance, QuakeBot enabled an article to be posted within three minutes—making the Los Angeles Times the first media outlet to report on the earthquake.[8]

The next generation of businesses will be composed of people and technology working side by side to achieve better results and tackle bigger challenges.

To best embrace this shift, companies will have to train their employees to collaborate effectively with technology—and, in some cases, teach and guide the technology as if it were an apprentice. Smart machines now have the ability to interact with, train, and learn from humans, and this enables them to perform better over time. By creating a positive cycle of collaboration between humans and machines, enterprises can drastically improve the outputs of both and embrace the digital age with a reimagined workforce.

The augmented workforce

The development of more natural interfaces for interacting with technology is making it more acceptable to turn to machines for assistance today. But it doesn't have to be a robot that augments your workforce efficiency. By bringing the digital into the physical world, even wearables are transforming people into "better versions" of themselves.

And it doesn't stop there. Humans are using machines to take on more challenging physical tasks while achieving greater operational efficiency. These new capabilities are allowing companies to create new experiences where humans and machines are accomplishing more together than either could have on their own. The result? Companies are providing capabilities that enable their employees to collaborate productively with technology, and technology is starting to act as a real member of the workforce.

Newer and more natural interfaces

It seems straightforward, but you can't work with machines if you can't communicate with them. The developments in how people interface with machines are a driving force behind the new wave of human-computer collaboration seen in the enterprise. Advances in natural language processing (NLP) and speech recognition are making it much easier for humans to interact naturally with technology and machines—and companies are starting to recognize this value. The market for NLP is expected to grow from $3.8 billion in 2013 to $9.9 billion in 2018, a compounded annual growth rate of 21.1 percent over that period.[9]

Voice searches on mobile phones that use Apple's Siri or Google Now are increasing in popularity. That's because speech recognition is more reliable than ever. By making unstructured conversations, written or spoken, searchable in real-time, NLP is acting as the enabler behind speech recognition. Additionally, as users grant these mobile intelligent assistants access to contextual data, they receive more relevant suggestions. Take Google Now, which makes inferences based upon voice and written searches and confirmation messages sent to Gmail. By analyzing contextual clues and incorporating user feedback—for relevancy and accuracy—tools like Google Now learn what is useful and, for example, notify users of flight times for itineraries found in email. Immediate user feedback not only enables Google Now to evolve as an improved assistant, but also grants Google the ability to act as a trusted mobile advisor to every user.

40%

Are considering using sensors to gather intelligence and equip their workforce with more insights.

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Expect Labs' MindMeld is another application using NLP with the potential to change how huge segments of the workforce operate. The "anticipatory computing" app listens to voice conversations and surfaces relevant information for its users in real-time. Expect Labs has already released the MindMeld API to the public, enabling other apps to build in this functionality.[10] Consider the advantage this could create for customer service agents: MindMeld technology could provide support by suggesting effective responses for the agent, even as a customer is still explaining the issue. Not only does this human-machine collaboration enhance the customer experience, a pain point for many, but it can also reduce call time, make the agent more effective, and improve overall efficiency for the call center by allowing the customer service agent to focus on activities only humans can do.

The power of wearables

But the interfaces between people and machines are evolving in many more ways than just how both sides communicate. Physical enhancements provided by smart devices are helping to bridge the digital and physical worlds. Wearable technology is now collecting more data via sensors, communicating more information via displays, and truly augmenting a person's physical capabilities. Leveraging wearable devices that augment action allows companies to equip their employees with the technology they need to do better work, while improving operational efficiency and safety.

Physical sensors are being built into wearable systems to collect information on their surroundings—which can potentially save lives in hazardous situations. Forty percent of organizations in our survey are considering using sensors to augment their workforce for this intelligence gathering purpose. For instance, Accenture's Life Safety Solution outfits workers in oil and gas refineries or chemical plants with a lapel-based wireless four-gas detector, in addition to a

panic button and a motion sensor.[11] By continuously monitoring the environment, companies can mitigate risks and improve worker safety. In a similar vein, Caterpillar's telematics solutions use video analytics to detect when heavy machinery operators are drowsy.[12] In both cases, these sensors are monitoring employees and their environments in order to alert them to unsafe conditions.

Wearable technology can provide further value by displaying critical information in unobtrusive ways. To illustrate, last year Accenture and Philips demonstrated how a doctor wearing Google Glass in an operating room could use the display to monitor a patient's vital signs while performing surgical procedures, all without turning away from the patient.[13] And surgeons at Indiana University Health Methodist Hospital have used Google Glass assistance during the removal of abdominal tumors.[14] Surgeons were able to look directly at their patients and keep their hands on critical tasks, all while maintaining a constant view of vital patient data as well. In these cases, augmented devices have provided doctors

with additional degrees of freedom, portability, and unprecedented contextual information. Taking this one step further, some hospitals are making plans to improve training by using cameras to stream and record live surgeries, as seen through the eyes—and smart glasses—of a surgeon.

Companies may also opt to use wearable technology in order to magnify a person's physical capabilities and increase worker productivity. In fact, the US military is already in advanced tests with so-called exoskeletons—robotic frameworks that people wear to augment their own physical strength. To assist with the construction and maintenance of its ships, the US Navy purchased two Lockheed exoskeletons—intelligent machines that can support heavy assembly machinery and handle loads of up to 36 pounds. Early tests show that the exoskeleton has increased productivity from two to 27 times, depending on the task.[15] Now, these adaptable machines are reaching manufacturing floors, as well, optimizing company savings on production costs.

1 out of 3

Are considering using robotics to automate business and industrial processes.

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Human and machine, side by side

As the field of robotics continues to advance, more machines are becoming capable of not just communicating and augmenting human employees, but also physically working side by side with them. Many enterprises have learned that, while machines excel at precision, scale, and consistency, humans are better suited for creativity, contextual understanding, and complex communications. Now, companies can have a division of labor that caters to the strengths of each—and appropriately distributes tasks to maximize the impact of both.

Already, there are many compelling examples of humans and machines working together to boost process productivity. Close to one-third of organizations in our survey are considering robotics to automate business and industrial processes. In an auto manufacturing trial, a human-robot team was able to assemble the frame of a car 10 times faster than a team of three professionals. How? For simple welds, a robot with a video projector would show a human where to place a specific part; then the robot would make perfect welds in five seconds per weld. For more difficult welds, however, the robot would defer to its human partner to perform better.[16]

By specializing tasks, process improvements are just the beginning of how enterprises will improve their workforce. Machine learning means managers can now entrust robots with whole workflows, not just simple tasks. Amazon's Kiva robots, working alongside warehouse employees, not only improve operational efficiency as they retrieve items, but also enable dynamic warehouse operations. These robots can reduce the average time it takes to grab an item from a shelf to 15 minutes, down from an hour and a half, and their dynamic and adaptive algorithms suggest inventory sorting.[17] For example, they know that certain seldom-ordered products are better stored in a more remote area.

These advances in technology mean that humans now have the opportunity to multiply their efficiency. A blended human and machine workforce is giving companies the ability to automate tasks, improve processes, and contribute to a positive feedback loop—driving increased intelligence, performance, and productivity across the enterprise.

Building your new workforce

From newer and more natural user interfaces to smarter physical devices and machines, improvements in intelligent technology are enabling teams of humans and machines to collaborate more easily and effectively than ever before—and empowering them to do more together than they ever could alone.

Just what will it take to realize the full potential of humans and machines working together? Companies must prioritize the training of the blended workforce, helping their human talent grow the skills needed to complement machine capabilities.

Furthermore, companies must start making technology more approachable and usable to a broader set of employees. Gartner predicts that "by 2018, the total cost of ownership for business operations will be 30 percent lower than today because of the wider use of smart machines and industrialized services across the enterprise."[18]

Training

Advances in technology are empowering people to learn in new ways—and technology is getting smarter, too, thanks to human feedback. Together, these improvements result in greater employee engagement.

Massive open online courses (MOOCs) are gaining traction as a legitimate way to receive quality training. Ninety percent of our survey respondents report they expect to use MOOCs within the next three years as a way to better train their workforce.

90%

Expect to use MOOCs within the next three years as a way to better train their workforce.

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Coursera's Signature Track program, for instance, is enabling companies such as Yahoo to develop their own signature training programs, which can be completed remotely and at a person's own pace. Researchers at Stanford University are using MOOCs to realize big gains in efficiency. By incorporating machine learning techniques into their Machine Learning MOOCs, they are able to provide near-real-time feedback to approximately 25 percent of students in a 100,000-student course. To do this, the university only needs about half of the effort that would normally go into providing feedback for code submissions provided by a traditional group of 400 students.[19]

But in a workforce of humans and machines, it's not just people that need training to keep their skills up to date. Enterprises also have to invest in their machines to ensure that employee–technology collaboration is optimized.

In experiments at Massachusetts Institute of Technology (MIT), researchers have shown that an industrial robot can be trained by essentially observing and adapting to the habits of an individual worker. In this specific manufacturing experiment, humans inserted objects into prepared drill holes in whatever sequence they preferred. Robots then made the workers more efficient by observing and then predicting their sequence of object placement, and then filling holes with glue just before the workers inserted objects into the holes.[20] Errors, such as glue drying before an object was inserted, were reduced without having to change or adapt the humans' work styles.

Advances in robotics technology mean that training some machines, such as Rethink Robotics' Baxter, is as simple as moving their robotic limbs so that they can learn what to do.[21] Over time, that may lead to real-time collaborative learning by both the human and the machine as they learn to optimize the completion of predictable tasks.

Democratization of skills

Another way to improve interactions between people and machines is to "democratize" technology—find ways to categorize and shift skill sets so that employees can approach tasks that were previously reserved for specialists. For example, new developments in higher-level programming languages, such as Apple's Swift and Google's Go, are making it easier for business users to create their own applications. While software development used to require specific coding skills, syntax knowledge, and architecture topologies, today's more accessible programming languages require far fewer specialized development skills—putting them within reach of non-IT professionals.

Similarly, drag-and-drop visual interfaces make it easier for tasks such as data prep to be simplified by software. Trifacta is one such company that supports agile data exploration, essentially bringing visual analysis to everyone. Now, non-IT employees can make insightful decisions with less intense data prep and fewer analytical skills. By developing people with greater learning agility, companies can shift the emphasis away from specific expertise in favor of industry knowledge.

Immersive wearable displays are also helping to level up skills and improve employee engagement. In Japan, Mitsubishi Electric is experimenting with software from the augmented reality software company Metaio on Epson's Moverio smart glasses to assist air conditioner technicians on their service calls. The glasses let the technicians view three-dimensional overlays on the physical objects they're repairing so that they can see how to remove or replace parts.[22]

Volkswagen has also created a display system for its XL1 hybrid, which makes it easier for mechanics to quickly repair the vehicle's complex power train design. Using a tablet that shows an on-screen digital overlay, mechanics can review the context-dependent steps that they must take.[23] This reduces repair times, supports rapid and complex product design changes, and enables dynamic learning—technicians no longer have to pause to refer to a service manual or call the home office for additional instruction.

Better workforce, better business

This reimagined workforce—one that will enable more work to be done better—will raise many new issues as well. Which jobs should be assigned to humans and which to humans working with machines?

What governance systems are in place to help us decide? How do we deliberately and strategically decentralize decision-making so that machines can carry more of the load—sometimes literally? How can the human workforce be trained for this new blended work environment? How do we rethink the skills for hiring human talent—should we emphasize more or less specialized knowledge? Researchers are continuing to probe into these kinds of questions.

For business and IT leaders, however, the biggest question may be how to recognize and then respond to the fact that business processes—indeed, the entire value chain of business operations—are starting to shift from a *labor-driven* and *technology-enabled* paradigm to a *digital-driven* and *human-enabled* model.[24]

Leading companies are already beginning to voice these kinds of questions. They are starting to think about the combinations of intelligent technology and training that can enable and optimize human-machine efforts, accomplishing more than either could on their own. They are looking anew at core business activities to identify those tasks that can be better suited to involving machines. And they are beginning to give thought to what type of people they should be hiring in the future.

Human and machine, each on its own, won't be enough to drive business in the decades to come. Tomorrow's leading enterprises will be those that reimagine their workforce and effectively blend humans and technology as partners. Get ready for your new digital workforce.

YOUR 100-DAY PLAN

Take 100 days to learn about the variety of options that contribute to the reimagined workforce. Decide how you can harness them moving forward.

- Appoint a cross-functional team to uncover opportunities for integrating technology to augment your workforce's operational efficiency and workplace safety—include members from the human resources, business, and technology areas.

- Identify what competitors and companies in other industries are doing in blended workforces. Based on the benchmark results, prioritize the range of opportunities, timelines, and risk-return criteria.

- Establish criteria to identify use cases for investment in further human-machine collaboration. Based on your company's criteria, find the segment with the most practitioners in your company and identify which tasks rely more on precision, scale, and consistency versus creativity and contextual decision-making.

- Take a close look at positions that remain open. Pilot filling these positions with new methods of people and machine interaction.

- Ensure an understanding of where your workforce needs augmentation technologies, and perform a gap analysis on the skills that will be required of future employees.

- Evaluate if technology can be used to address some of the worker safety issues in remote and challenging environments.

- Test scenarios where wearable computing technologies improve the seamless integration of workers and business processes.

- Pilot the use of new training technology to deliver more options for a distributed workforce—consider massive open online course (MOOC) certification programs, virtualized training, and job swapping.

YOUR 1-YEAR PLAN

By this time next year, your business should have an understanding of the types of workplace tasks that employees can let machines complete. Begin building a blended workforce in stages.

- Pilot prioritized solutions by dividing and distributing tasks that play to your workforce's strengths: machines for precision, scale, and consistency and humans for creativity, contextual decisions, and complex communication.

- Determine industry-relevant opportunities for leveraging technology to help your human workforce focus on tasks that are more complex.

- Create employee-training programs that are sensitive to the new skills required for your blended workforce.

- Integrate technology where specially trained workers were previously required. Use the augmentation technologies to make those jobs available to less skilled workers.

- Evaluate and apply technologies to address some of the worker safety issues in remote and challenging environments.

RESEARCH METHODOLOGY

Every year, the Technology Vision team collaborates with Accenture Research to pinpoint the emerging IT developments that will have the greatest impact on companies, government agencies, and other organizations in the next three to five years.

The research process this year began with gathering inputs from the Technology Vision External Advisory Board, a group comprising of more than two dozen executives and entrepreneurs from the public and private sectors, academia, venture capital, and startup companies. In addition, the Technology Vision team conducted nearly 100 interviews with technology luminaries, industry experts, and Accenture business leaders.

The team also tapped into the vast pool of knowledge and innovative ideas from professionals across Accenture, using Accenture's collaboration technologies and a crowdsourcing approach to launch and run an online contest to uncover the most interesting emerging technology themes. Over 1,700 participants actively engaged in the contest, contributing valuable ideas and voting on others' inputs.
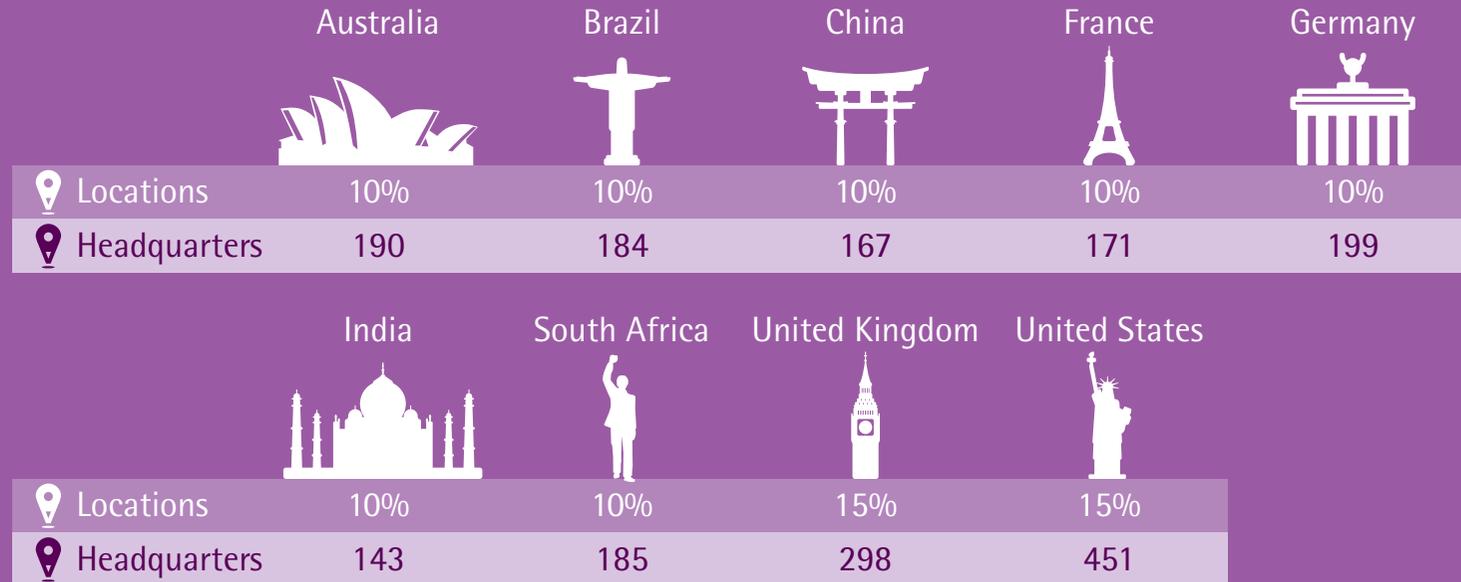
In parallel, Accenture Research conducted a global survey of 2,000 business and IT executives across nine countries and 10 industries to capture insights into the adoption of emerging technologies. The survey identified key issues and priorities for technology adoption and investment. Respondents include mostly C-level executives and directors. Functional and line of business leads were also included. Respondent company revenues were $500 million and over with the majority of companies over $6 billion.

As a shortlist of themes emerged from the research process, the Technology Vision team hosted a series of deep-dive sessions with Accenture leadership and external subject-matter experts, validating and further refining the themes. Once a set of trends emerged that appeared to be complete, the External Advisory Board was reconvened to validate the selection of trends and add insight from their own spheres of influence.
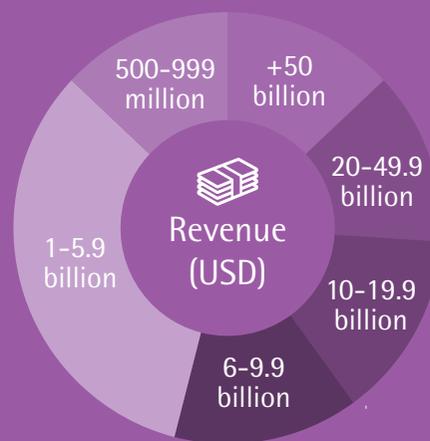
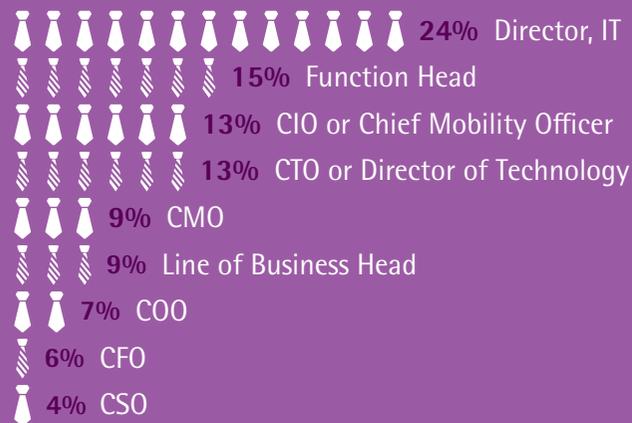The screens used during these processes weighed the themes for their relevance to "real world" business challenges. Specifically, the Technology Vision team sought ideas that transcend the well-known drivers of technological change, concentrating instead on the themes that will soon start to appear on the C-level agendas of most enterprises.

This process resulted in the five overarching themes presented in this year's report.

ACCENTURE TECHNOLOGY VISION 2015 SURVEY DEMOGRAPHICS

As a new input into this year's Technology Vision, we conducted a global survey of 2,000 business and IT executives across nine countries in order to understand their perspectives on key technology challenges they face, and identify their priority investments over the next few years. This survey was fielded from December 2014 through January 2015.

	Australia	Brazil	China	France	Germany
Locations	10%	10%	10%	10%	10%
Headquarters	190	184	167	171	199

	India	South Africa	United Kingdom	United States
Locations	10%	10%	15%	15%
Headquarters	143	185	298	451

Title

- 24% Director, IT
- 15% Function Head
- 13% CIO or Chief Mobility Officer
- 13% CTO or Director of Technology
- 9% CMO
- 9% Line of Business Head
- 7% COO
- 6% CFO
- 4% CSO

Revenue (USD)

- 500-999 million
- +50 billion
- 20-49.9 billion
- 10-19.9 billion
- 6-9.9 billion
- 1-5.9 billion

Industry

- 160
- 220
- 243
- 234
- 230
- 162
- 101
- 208
- 221
- 221

- Insurance
- Auto
- Life Sciences
- Banking
- Public Service
- Communications
- Retail
- Healthcare
- Utilities
- Industrial Equipment

END NOTES

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[1] "Natural Language Processing (NLP) Market worth $9,858.4 Million by 2018," Markets and Markets, October 2013. http://www.marketsandmarkets.com/PressReleases/natural-language-processing-nlp.asp.

[2] "Baidu Builds Largest Computer Brain for Online Queries," Bloomberg, September 4, 2014. http://www.bloomberg.com/news/2014-09-04/baidu-builds-largest-computer-brain-for-online-queries.html.

[3] "Gartner Reveals Top Predictions for IT Organizations and Users for 2015 and Beyond," Gartner, October 7, 2014. http://www.gartner.com/newsroom/id/2866617.

[4] Ibid.

[5] "Mercedes-Benz's Autonomous Driving Features Dominate the Industry—and Will for Years," Automotive News, August 4, 2014. http://www.autonews.com/article/20140804/OEM06/308049979/mercedes-benzs-autonomous-driving-features-dominate-the-industry.

[6] "Using Cameras and Fancy Algorithms to Track Spinning Space Junk," Wired, September 11, 2014. http://www.wired.com/2014/09/algorithm-spinning-space-junk/.

[7] "How an LA Times Reporter Got an Algorithm to Write Articles for Him," Business Insider, March 17, 2014. http://www.businessinsider.com/quakebot-robot-la-times-2014-3.

[8] "Rise of Robot Reporters: When Software Writes the News," New Scientist, March 21, 2014. http://www.newscientist.com/article/dn25273-rise-of-robot-reporters-when-software-writes-the-news.html#.VHuaEzHF_1Y.

[9] "Natural Language Processing (NLP) Market worth $9,858.4 Million by 2018," Natural Language Processing (NLP) Market [IVR, OCR, Pattern Recognition, Auto Coding, Text Analytics, Speech Analytics, Machine Translation, Information Extraction, Question Answer, Report Generation]—Worldwide Market Forecast & Analysis (2013–2018)," MarketsandMarkets, October 2013. http://www.marketsandmarkets.com/PressReleases/natural-language-processing-nlp.asp.

[10] "More AI for developers as Expect Labs releases the MindMeld API," Gigaom, February 19, 2014. https://gigaom.com/2014/02/19/more-ai-for-developers-as-expect-labs-releases-the-mindmeld-api/.

[11] "Accenture Life Safety Solution Named New Product of the Year," Accenture press release, October 23, 2012. http://newsroom.accenture.com/news/accenture-life-safety-solution-named-new-product-of-the-year.htm.

[12] "New Technology from Seeing Machines Offered in Caterpillar Mining Trucks to Combat Driver Fatigue," M2M Evolution, May 29, 2013. http://www.m2mevolution.com/topics/m2mevolution/articles/339753-new-technology-from-seeing-machines-offered-caterpillar-mining.htm.

[13] "Accenture and Philips Collaborate on Google Glass Proof-of-Concept in the Medical Equipment Technology Industry," Accenture, October 3, 2013. http://www.accenture.com/us-en/Pages/service-google-glass-medical-equipment-technology-industry.aspx.

[14] "Google Glass Helped to Enhance the Way that a Surgeon Can Perform Various Procedures," *Mobile Commerce Press*, February 21, 2014. http://www.mobilecommercepress.com/augmented-reality-wearable-technology-assists-cancer-surgery/8510991/.

[15] "Navy's Exoskeleton Could Make Workers 20 Times More Productive," *Wired*, September 10, 2014. http://www.wired.com/2014/09/navys-exoskeleton-could-make-workers-20-times-more-productive/.

[16] "The Future of Computer Intelligence Is Everything but Artificial," *Wired*, June 11, 2014. http://www.wired.com/2014/06/the-future-of-computer-intelligence-is-everything-but-artificial/.

[17] "Meet Amazon's Busiest Employee—the Kiva Robot," *CNET*, November 30, 2014. http://www.cnet.com/news/meet-amazons-busiest-employee-the-kiva-robot/.

[18] "Gartner Reveals Top Predictions for IT Organizations and Users for 2015 and Beyond," Gartner press release, October 7, 2014. http://www.gartner.com/newsroom/id/2866617.

[19] Jonathan Huang, "Data Driven Student Feedback for Programming Intensive MOOCs," Stanford Computer Forum, April 16, 2014. https://forum.stanford.edu/events/2014/2014jonathanhuanginfo.php.

[20] "Robotic Assistants May Adapt to Humans in the Factory," *MIT News*, June 12, 2012. http://newsoffice.mit.edu/2012/robot-manufacturing-0612.

[21] "Increasingly, Robots of All Sizes Are Human Workmates," *MIT Technology Review*, April 23, 2014. http://www.technologyreview.com/news/526691/increasingly-robots-of-all-sizes-are-human-workmates/.

[22] "Augmented Reality gets to Work," *MIT Technology Review*, February 24, 2014. http://www.technologyreview.com/news/524626/augmented-reality-gets-to-work/.

[23] "Volkswagen XL1 Gets an Augmented Reality Service App," *Mashable*, October 5, 2013. http://mashable.com/2013/10/05/volkswagen-augmented-reality/.

[24] "Gartner Reveals Top Predictions for IT Organizations and Users for 2015 and Beyond," Gartner press release, October 7, 2014. http://www.gartner.com/newsroom/id/2866617.

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About the Accenture Technology Labs

The Technology Vision is published each year by the Accenture Technology Labs, the research and development (R&D) organization within Accenture. For more than 20 years, the Technology Labs have helped Accenture and its clients convert technology innovation into business results. Our R&D team explores new and emerging technologies to create a vision of how technology will shape the future and shape the next wave of cutting edge business solutions.

The Accenture Technology Labs offers seminars on the Technology Vision, which provide a forum to discuss the trends in greater depth and explore the implications for your organization's business.

To learn more about the Accenture Technology Labs, or our seminars, contact a member of the Technology Vision team or visit www.accenture.com/technologylabs.

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