

Predicts 2018: AI and the Future of Work

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Artificial intelligence will have a profound impact on how we will work — some jobs will become obsolete, others will be created, most will change. IT leaders must orchestrate changes in their enterprise's workforce as seriously as they seek to reap the business value of AI.

Key Findings

- The business value of artificial intelligence (AI) comes from customer experience, cost reduction and revenue generation. Realizing this value will lead to variable degrees of job loss and job creation across industries and job categories.
- Investments in AI are in the early stages in many domains. CIOs are perfectly positioned to review the initial impacts of these investments on workers.
- Combinations of humans and machines — known as "centaurs" — will perform in jobs more effectively than either human experts or AI-driven machines working alone will.
- Industry leaders will need to balance cost savings from automation with well-considered customer experience improvements. AI and automation will not always delight customers, which we illustrate with a focus on multichannel retail.

Recommendations

IT leaders investing in AI should:

- Expand their strategy development repertoire by using frameworks such as Gartner's business model framework to develop a clear line of sight to business value, and to assess AI's relevance to the various business value components.
- Transform from episodic or nonexistent learning to continuous learning in order to reduce employee churn and sustain growth. Work with HR to upskill employees to maximize the effects of AI-enabled roles and decisions.
- Test and evaluate the impact of AI on jobs and tasks across all work categories. Consider what organizational structures will best support new business models and how to engage talent.

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Strategic Planning Assumptions

In 2020, AI becomes a positive net job motivator, creating 2.3 million jobs while only eliminating 1.8 million jobs.

In 2021, AI augmentation will generate \$2.9 trillion in business value and recover 6.2 billion hours of worker productivity.

By 2022, one in five workers engaged in mostly nonroutine tasks will rely on AI to do their jobs.

Through 2022, multichannel retailer efforts to replace sales associates through AI will prove unsuccessful, although cashier and operational jobs will be disrupted.

Analysis

AI has captured our collective interest. Fictional stories of humans interacting with fully intelligent AI fascinate us. Leaders in technology have projected the end of jobs and spoken of AI's potentially dire outcomes. Notable studies have emerged over the last years projecting varying degrees of job losses: University of Oxford's Frey and Osborne study,¹ David Autor's work on the future of automation,² McKinsey Global Institute's study³ and the Susskinds' work on the future of the professions.⁴ This task-level analysis and focus on certain professions has provided valuable insight and fueled the ongoing debate as to what, in the end, the impact of AI will be on jobs.

What You Need to Know

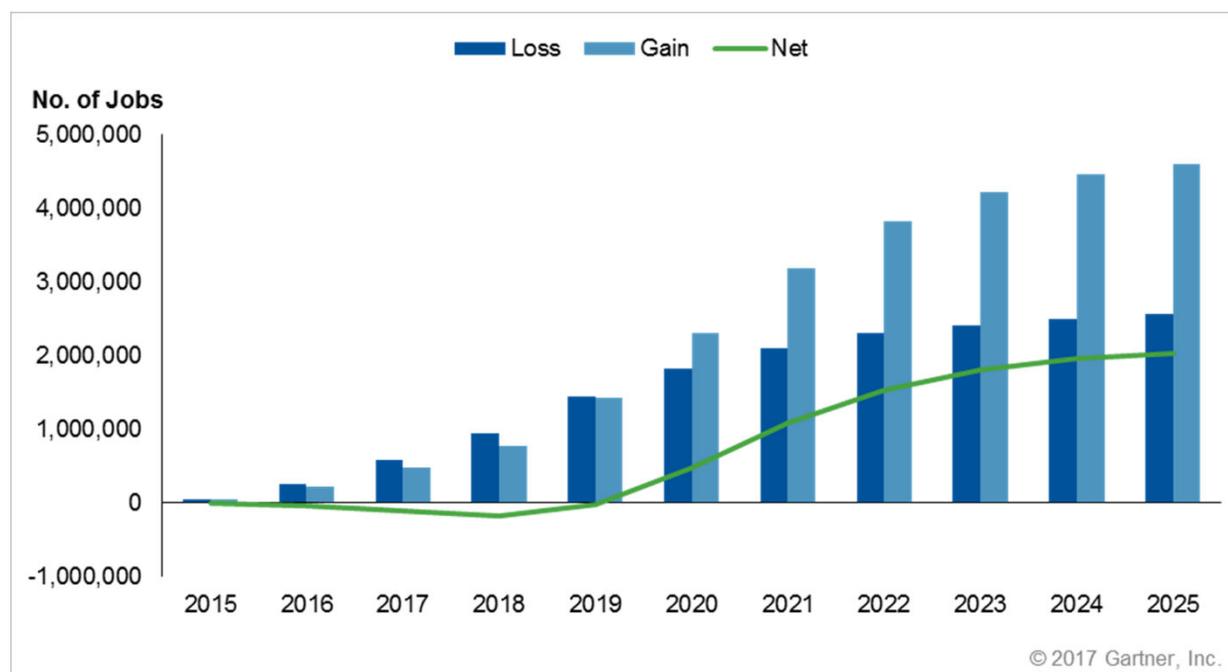
Gartner has evaluated the impact of AI on jobs through the lens of its business value framework for AI. This framework focuses on AI investments that improve customer experience, reduce costs and

provide new revenue opportunities. The analysis shows that there is a staggering \$2.9 trillion in new business value opportunities attributable to AI in 2021.

The analysis purposefully does not consider other factors that could impact global jobs, such as the emergence of new industries, geopolitical shifts, globally accessible talent pools putting pressure on wages in higher-paying economies, or evolving forms of labor representation to collectively defend worker interests. It also leaves to the side broader economic changes, such as the potential impact of AI on productivity. Thus, the predictions in this document focus on the business value created by AI and the resulting amount of hours of work saved, the number of jobs lost, and the number of new jobs created.

The projection of jobs lost and gained can be seen in Figure 1.

Figure 1. Projected Impact of AI on Jobs Through 2025



Source: Gartner (November 2017)

Significant innovations in the past have frequently been associated with a transition period of temporary job loss, followed by recovery and business transformation. The AI business value framework projects the end of such a transition period to be around 2020, at which point a net job gain is observed (see Figure 1). The AI community has raised the alarm on the possible negative effects of AI on jobs earlier compared to similar prior situations. This could help to even further shorten the transitional period, although we did not consider such shortening in our formal model.

IT leaders, including CIOs as well as enterprise architecture and technology innovation leaders, should not only focus on the projected net increase of jobs, however. Reducing the debate to a

single projection can be misleading. Through each investment in AI-enabled technologies, they must take into consideration:

- What (if any) jobs will be lost
- What new jobs will be created
- How it will transform how workers collaborate with others, make decisions and get work done.

Strategic Planning Assumptions

Strategic Planning Assumption: In 2020, AI becomes a positive net job motivator, creating 2.3 million jobs while only eliminating 1.8 million jobs.

Analysis by: Svetlana Sicular, John-David Lovelock

Key Findings:

- AI-enabled decision support is the greatest contributor to business value creation, overshadowing AI process automation throughout the entire forecast period of 2015 through 2025, globally.
- 2020 will be the pivotal year in AI jobs dynamics: AI will eliminate more jobs than it created through 2019 (mostly in manufacturing). Starting in 2020, AI-related job creation will cross into the positive territory, reaching 2 million net-new jobs in 2025.
- The number of jobs affected by AI varies by industry: healthcare, public sector and education will see continuously growing job demand; manufacturing will be hit the hardest.

Near-Term Flags:

- Healthcare providers, public sector, banking and securities, communications, media and services, retail, and wholesale trade will benefit from AI without ever suffering annual net job loss.
- Manufacturing and transportation are disproportionately big contributors to job losses: 938,000 manufacturing jobs will be eliminated due to AI by year-end 2019. The transportation industry will see net job growth from AI for the first time in 2020.
- Global IT services firms will have massive job churn in 2018; adding 100,000 jobs and dropping 80,000.

Market Implications:

Gartner is confident about the positive effect of AI on jobs. The main contributor to the net job growth is AI augmentation — a combination of human and artificial intelligence, where both complement each other. AI effects on jobs are at their earliest stage globally. To predict how and where AI will change the job landscape, we looked at where and how business value is created, by industry, by country over a 10-year span, from 2015 through 2025.

We can predict with confidence the employment dynamics up to 2025. Beyond 2025, new industries and job roles will be created, but they are hard to foresee; like in the past, it was hard to foresee smartphones, social networks and adtech. We can tell for sure that AI-related jobs will steadily grow starting in 2020. In 2021, AI augmentation will generate \$2.9 trillion in business value and recover 6.2 billion hours of worker productivity. In the long term, AI will reduce labor cost as a percentage of revenue, but a portion of that revenue will keep translating into new jobs, albeit different jobs that command a higher salary than those that have been obsoleted.

A single answer about the AI influence on job losses and gains doesn't cover the entire picture. All industries will experience varying levels of time and effort savings. Just a few industries will incur overall job loss, some industries will see net job loss for only a few years, and most industries will never experience net job loss at all.

Today, a wide range of companies have begun their AI initiatives. Vendors are rapidly introducing new AI features in existing products. Capital investments are leading to tremendous proliferation of AI startups. The AI hype is new, but AI is not. AI has already had proven results in anomaly detection, cybersecurity, securities trading, medical diagnostics, customer satisfaction, DNA sequences classification and many more cases. Despite such richness of the AI scope, most dire warnings of job losses confuse AI and automation. Automation has driven productivity and returns on capital and on labor all the way back 200 years.

Unfortunately, debates about automation overshadow the greatest AI benefit — augmentation of humans with AI for decision support. Stitch Fix, a personalized shopping company, is the example of symbiosis of people and AI. Stitch Fix uses AI to narrow down a huge merchandise selection from the market to fit customer preferences, and leaves the final choice of items and personal touch to human designers. Stitch Fix created jobs not only for 65 data scientists, but for thousands of designers. The company had revenue of \$730 million in fiscal 2016, and Fortune reported Stich Fix's 2017 IPO to be worth between \$3 billion and \$4 billion.⁵

The AI effects on jobs differ year by year. In 2018, AI will lead to \$200 billion in new revenue and 768,000 new positions. In the same year, 2.8 billion hours of work effort will have already been recovered globally. In most cases, savings and efficiencies of AI mean improved productivity of the job. While recovery does not always translate into job loss, 943,000 jobs will be eliminated in 2018. Job loss is predominantly in the middle-skilled jobs — typified by jobs where the training is received "on the job." Low-end and low-skilled jobs will see some churn, but will fare better.

AI-prompted employee churn is a new reality. AI will improve the productivity of many jobs, it will eliminate millions of middle- and low-level positions, and it will create millions more new positions of highly skilled, management and even the entry-level and low-skilled variety.

Recommendations:

- Now is the time to impact the long-term AI direction. For the greatest value, focus on augmenting people with AI. We are at the pivotal point: Where will AI go? This is up to you — you will choose the problems for AI to solve. We say: Enrich people's jobs, reimagine old tasks

and create new industries. AI can handle patterns it has already seen, and humans break new ground.

- Transition to continuous learning. To reduce employee churn and sustain growth, transform from episodic or nonexistent to continuous learning. Upskill employees to maximize effects of AI-enabled roles and decisions.
- Transform your culture to make it rapidly adaptable to AI-related opportunities or threats. AI will be taking away routine tasks, freeing up employees to be more productive and creative by doing what humans can do best. Invest in reinforcing agility, soft skills and creative innovative attributes that will be needed in the symbiotic culture of people and AI.

Related Research:

"Augmented Analytics Is the Future of Data and Analytics"

"Wealth Management CIOs Deploy AI to Create Amazing Insights by Augmenting Human Intelligence"

"Digital Humanism Requires an Agile Culture"

"Shape the Future of Customer Experience With Customer Analytics"

"Information as a Second Language: Enabling Data Literacy for Digital Society"

Strategic Planning Assumption: In 2021, AI augmentation will generate \$2.9 trillion in business value and recover 6.2 billion hours of worker productivity

Analysis by: Michael Rollings, John Lovelock, Whit Andrews

Key Findings:

Gartner's forecasts show a staggering \$2.9 trillion in new business value opportunities attributable to AI, as well as the ability to recover 6.2 billion hours of worker productivity. That business value is attributable to using AI to, for example, drive efficiency gains, create insights that personalize the customer experience, enticing engagement and commerce, and to aid in expanding revenue-generating opportunities as part of new business models driven by the insights from data.

While many industries will see accretive business value, manufacturing is one that will receive a massive share of the business value opportunity. This will occur through automation leading to cost savings, and through the ability to remove friction in value chains, leading to more revenue — for example, in the optimization of supply chains and go-to-market activities.

Yet this only tells one side of the story. While AI will undoubtedly lead to these gains, industries will not stand still to let AI be the only factor that determines winners and losers. Indeed, industries such as outsourcing are seeing a fundamental change in their business models, whereby the cost reduction from AI and the resulting productivity improvement must be reinvested to permit reinvention and to pursue new business model opportunities. For instance, if outsourcers only

reaped the cost savings potential by implementing AI to reduce repetitive work, they would miss the opportunities to engage with clients on higher-level outcomes.

While AI may be able to take on repetitive and mundane tasks that free up humans for other activities, the symbiosis of humans with AI will be more nuanced. It will require reinvention instead of simply automating existing practices. For example, instead of a machine replicating the steps that a human performs to reach a particular judgment, the entire decision process can be refactored to use the relative strengths and weaknesses of both machine and human, to maximize value generation and perhaps redistribute decision making to increase agility.

Organizations will augment their employees, their customers and their ecosystem participants to do more with humans and machines than either could do on their own. Most organizations may not pursue the leading-edge uses of AI, such as building robots and self-driving cars. Increasingly, though, AI will inject insights into everyday decision-making activities, serve as agents in delegated tasks and fundamentally change how people work.

Market Implications:

Capturing the potential business value will require spending, especially when seeking the more near-term cost savings. Spending on AI for customer experience and revenue generation will likely benefit from AI being a force multiplier — the cost to implement will be exceeded by the positive network effects and resulting increase in revenue.

This forecast does not address how much of the \$2.9 trillion opportunity and the 6.2 billion hours of worker productivity enterprises will need to reinvest in order to remain relevant — much less thrive and lead — as many industries undergo digital transformations. There will likely be a related effect that increases the speed of digital transformation for some industries as they repurpose staff to deliver more-value-added activities.

Suppliers with AI-enabled products and services that demonstrate a clear line of sight to business value may experience substantial near-term growth.

Recommendations:

- Reinvest the majority of gains to drive digital transformation, rather than standing still. Most of AI's influence on business value will begin shifting to revenue generation in 2020, making it essential to view this as an opportunity for reinvention rather than simply cost reductions due to efficiency gains.
- Expand your strategy development repertoire by using frameworks such as Gartner's business model framework to develop a clear line of sight to business value, and to assess AI's relevance to the various business value components.
- Harness the disruptive potential of AI and machine learning in customer experiences by mapping the customer journey and identifying nascent customer requirements that AI uniquely uncovers (see "Prioritize the Six Styles of Customer Analytics for Better Customer Experience").

Related Research:

"Hype Cycle for Artificial Intelligence, 2017"

"A Chief Data Officer's Guide to an AI Strategy"

"Develop Your Artificial Intelligence Strategy Expecting These Three Trends to Shape Its Future"

"A Framework for Applying AI in the Enterprise"

"Ten Ways AI Will Appear in Your Enterprise — No One Source Can Meet All Your Business Needs"

Strategic Planning Assumption: By 2022, one in five workers engaged in mostly nonroutine tasks will rely on AI to do their jobs.

Analysis by: Craig Roth

Key Findings:

- Nonroutine work is growing faster than routine work in terms of number of workers and total wages. There is consequently greater opportunity in improving the broadening base and higher value found in semiroutine and nonroutine tasks.
- AI applied to nonroutine work is more likely to assist humans than replace them.
- Combinations of humans and machines — known as "centaurs" — will perform in jobs more effectively than either human experts or AI-driven machines working alone will.

Near-Term Flag: Through 2019, AI will be applied in narrowly defined specialties and more often to routine work. This is where the low-hanging fruit is and where benefits can be provided that are more quantifiable.

Market Implications:

AI has been first applied to highly repeatable tasks where a large quantity of observations and decisions can be analyzed for patterns (such as reviewing mammography scans for breast cancer). However, applying AI to less-routine work — work that is more varied due to lower repeatability and structure — will soon start yielding superior benefits. Nonroutine work is highly valued and increasingly prevalent.

AI applied to routine tasks tends to result in automation; AI applied to semiroutine and nonroutine cognitive tasks tends to make existing workers more effective by highlighting interesting connections in data and providing recommendations. As early as 2010, Garry Kasparov identified that:

*"Weak human + machine + better process was superior to a strong computer alone and, more remarkably, superior to a strong human + machine + inferior process."*⁶

Once knowledge workers incorporate AI into their work processes, the combination — known as a "centaur" — is hard to imagine living without. And, indeed, the centaur model will eventually become a competitive necessity.

Vendors are just beginning to seize the opportunity to improve nonroutine work through AI by applying it to general-purpose tools. Examples include natural-language queries of datasets, autoclassification of content, notification of "important" emails or instant messages, and introductions to colleagues who have similar interests. These new visible capabilities belie improvements beneath the surface in accumulation and analysis of the methods and outputs of knowledge work: emails and their metadata, information in employee profiles, spreadsheets and the decisions made from them, lists of team members, and usage information from devices and things in the instrumented workplace. The AI available today only scratches the surface of what this data will yield by 2022.

Recommendations:

- Apply AI-enabled automation to increase the *consistency* of highly repeating operational tasks and decisions. Apply AI-enabled human augmentation to increase the *quality* of cognitive tasks and decisions.
- Develop organizational competency for identifying semiroutine and nonroutine tasks that could benefit from emerging AI capabilities.
- CIOs should assume a centaur (human and machine) model first, looking for opportunities to improve efficiency over cutting costs or replacing staff.
- Jump-start your AI initiatives by utilizing AI capabilities embedded within general-purpose software. Build or outsource when essential capabilities are unavailable in the "buy" option.

Related Research:

"Maverick* Research: To Avoid Working for Robots, Make Robots Work for Your Organization"

"How We Will Work in 2027"

"Plan to Use Smart Machines as Robobosses"

"CIOs, Start the Debate: How Human Will Your Workforce Need to Be?"

Strategic Planning Assumption: Through 2022, multichannel retailer efforts to replace sales associates through AI will prove unsuccessful, although cashier and operational jobs will be disrupted.

Analysis by: Robert Hetu

Key Findings:

Multichannel retailing has a complex cost structure that has two major drivers: cost of goods sold and labor. Competitive challenges and the resulting investments required to facilitate a unified retail commerce experience for customers will drive significant efforts to automate tasks and processes that have survived relatively unchanged for decades.

Leveraging technologies such as AI and robotics, retailers will use intelligent process automation to identify, optimize and automate labor-intensive and repetitive activities that are currently performed by humans. The intent will be to reduce the labor costs through efficiency. This automation effort will cross all levels of operations, from headquarters to distribution centers and stores.

Currently, retailers are expanding their use of technologies to improve the in-store check-out process, such as self-check-out, which is reaching beyond grocery and big-box retailers into areas like convenience. Some retail companies such as Ahold are providing scanning devices to consumers for use as they load their shopping cart, further enabling a seamless transaction for the consumer exiting the store. Walmart is currently testing a scan-and-go process enabled by the customer's mobile device. Some retailers are experimenting with robotic solutions for customer service, and there are active experiments with virtual customer service assistants.

While all of these efforts will continue, research suggests that consumers of all ages still prefer to interact with a knowledgeable sales associate when visiting a store. This need is elevated in specialized areas such as home improvement, drugstores and cosmetics, where informed associates can make a significant impact on customer satisfaction. As a result, though they will reduce labor used for check-out and other operational activities, retailers will find it difficult to eliminate traditional sales associate functions.

Near-Term Flags:

- By 2020, merchant leaders will be algorithms, prompting the top 10 retailers to cut up to one-third of HQ merchandising staff.
- By 2020, at least one large multichannel retailer will pilot a fully automated, associateless physical store location.
- By 2020, 50% of retail customer service requests will be conducted, at least partially, through conversational AI applications.

Market Implications:

Retailers will be able to redeem labor savings from the elimination of highly repetitive and transactional jobs, but will need to reinvest some of those savings into training associates who can further enhance the customer experience. Retailers will view AI as a way to upskill and augment customer experiences rather than just removing humans from every process. Proficiency in using AI-enabled technologies will be a key part of differentiation strategies that enable traditional retailers to compete effectively with the more-agile e-commerce entrants that are taking market share.

Recommendations:

- Carefully investigate customer expectations before automating any task.
- Assess the potential impact to customers and associates that arise from interaction with machines. Whenever possible, implement AI that improves experience.
- Create a framework for use-case identification by identifying and targeting labor-intensive and repetitive activities.
- Accelerate innovations by augmenting selective processes with AI across customer-facing processes, and focus on improving customer engagement.

Related Research:

"Retail Digital Workplace Transformation Imperatives"

"Algorithmic Retailing: Using AI to Drive Smart Automation"

"Future of Experience: Generation Z Is Inspiring the Future of Customer Experience"

"Conversational AI Platforms Will Be the New Strategic Gateway for Retail Customer Loyalty in Digital Business"

"Reimagining Retail: Store Associates and Smart Machines Must Work Together"

A Look Back

In response to your requests, we are taking a look back at some key predictions from previous years. We have intentionally selected predictions from opposite ends of the scale — one where we were wholly or largely on target, as well as one we missed.

This topic area is too new to have on-target or missed predictions.

Gartner Recommended Reading

Some documents may not be available as part of your current Gartner subscription.

"A Framework for Applying AI in the Enterprise"

"Ten Ways AI Will Appear in Your Enterprise — No One Source Can Meet All Your Business Needs"

"Maverick* Research: To Avoid Working for Robots, Make Robots Work for Your Organization"

"How We Will Work in 2027"

"Algorithmic Retailing: Using AI to Drive Smart Automation"

"Plan to Use Smart Machines as Robobosses"

Evidence

¹ C. B. Frey, M. A. Osborne, "[The Future of Employment: How Susceptible Are Jobs to Computerisation?](#)" Oxford Martin School, University of Oxford, 17 September 2013.

² D. H. Autor, "[Why Are There Still So Many Jobs? The History and Future of Workplace Automation,](#)" Journal of Economic Perspectives, Vol. 29, No. 3, Summer 2015.

³ McKinsey Global Institute, "[A Future That Works: Automation, Employment and Productivity,](#)" January 2017 (*automatic download*).

⁴ R. Susskind, D. Susskind, "[The Future of the Professions,](#)" January 2016, Oxford University Press.

⁵ C. Morris, "[Stitch Fix Could Be Wall Street's Next Big IPO,](#)" Fortune, 31 July 2017.

⁶ G. Kasparov, "[The Chess Master and the Computer,](#)" The New York Review of Books, 11 February 2010.

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