

# TECH JOBS OF TOMORROW: **BLOCKCHAIN**

**Whether you're hiring or applying for new roles in emerging technologies, it's important to know where that tech is headed and how companies are adapting their hiring and skills strategies.**

We've culled a few insights from the World Economic Forum's The Future of Jobs Report to get you up to speed on what you need to know about the blockchain jobs of tomorrow.

“Blockchain is predicted to have the greatest impact in the financial services industry...”

## **Blockchain, business and the Fourth Industrial Revolution**

Blockchain, or distributed ledger technology (DLT), is the emerging technology seemingly everyone is talking about, and a growing number of professionals are asking the question: Will my industry, company and role be affected? While some evidence suggests specific applications of distributed ledger technology (such as cryptocurrency) are cooling off from a corporate perspective, the answer to the questions is still largely “yes.”

This is because society is in the midst of the Fourth Industrial Revolution, where rapid technological developments are shifting the line between jobs performed by humans and those carried out by machines and algorithms. With blockchain being one of those disruptive developments, companies will need to make strategic decisions regarding hiring and skill building to leverage DLT and enhance the economic value it creates.

As certain tasks become automated in the future, companies will need to reconstruct traditional job roles, augment their productivity or create new ones entirely. To maintain business growth in an era of evolving technologies that necessitate an ever-changing set of skills, businesses must invest in their human capital.

## **Blockchain's impact across industries**

While nearly half of all companies surveyed intend to adopt DLT by 2022, blockchain is predicted to have the greatest impact in the financial services industry, where 73% of surveyed executives expect their enterprise to have adopted it by 2022. This is in line with current market trends, as countless projects are cropping up with the aim of utilizing blockchain to increase the efficiency and security of cross-border payments, share trading, contract enforcement, online identity management, rewards programs and more.

“At least 20% of companies in finance, healthcare and information sectors anticipate an average of 6-12 months of reskilling to get their workforce prepared to adopt new technologies”

The two other industries most poised to deploy DLT tools are global health & healthcare and information & communication, with 67% of companies in these industries expecting to adopt blockchain in some form by 2022. Changes could be seen in optimizing existing business operations to disrupting the way sensitive information is kept private. Enabling the decentralized and secure storage and transfer of information, blockchain has been recognized in Blockchain in Healthcare Today, a new academic journal, to have prominent potential to improve areas such as medical record keeping and distribution and patient consent management.

While the survey found that 55% of companies are not projecting to adopt DLT within the next three years, it's important to note that they're still anticipating an overall transition toward more technology adoption—and it's reasonable to expect that blockchain will have an ancillary impact on some of the technologies. For example, a majority of companies project the adoption of encryption (54%), digital trade (59%), cloud computing (72%) and app- and web-enabled markets (75%), and the way these technologies evolve could be significantly altered by as-yet-unknown advancements in blockchain.

### **Changing roles and new jobs in blockchain**

The First Industrial Revolution made a number of jobs redundant through mechanization while necessitating new roles to complement these technologies, and the proliferation of automation and artificial intelligence that will come as a result of the Fourth Industrial Revolution will be no different. Non-technical roles such as bookkeeping, material-recording and data-entry clerks will be rendered redundant by DLT. However, the Future of Jobs report predicts that companies' shifting task allocation and juggling of roles in the workplace will yield a net positive return in employment; an estimated 75 million jobs will be displaced by all new technologies, but 133 million additional roles will become available.

Given blockchain is still a novel, difficult-to-understand technology for many industries, it's no surprise that the three industries anticipating the largest adoption of DLT are already thinking about how to address large skills gaps. In fact, at least 20% of companies in finance, healthcare and information sectors anticipate an average of 6-12 months of reskilling to get their workforce prepared to adopt new technologies.

## What's next for blockchain?

There is an undeniable opportunity to take advantage of DLT, but it requires planning and significant reskilling in order to produce results. As you look to the future of blockchain for your company or your team, here are three industry-specific considerations to keep in mind:

### Blockchain in finance

The financial services industry in particular is poised to look far different in 2022 than it does now for one critical reason: automation. The change in how many work hours will shift from humans to machines—specifically for key tasks like administration, communication and data processing—is more pronounced in the financial services than any other industry. Blockchain could accelerate your organization's journey toward automation, or that growth may rely on more proven technologies such as app development and machine learning.

### Blockchain in healthcare

DLT has well-known applications as an encryption tool for health records, but its potential to be the gold standard of food safety is game-changing. Could foodborne illnesses be contained at rapid speeds with access to an immutable history of our food supply? Enhanced supply-chain tracking could stop the next romaine E. coli breakout before it happens across national and international ports and borders, among others.

### Blockchain in information & communication

The drive for automation in communication and information processing will continue to intersect with the growing need for advanced soft skills (such as persuasion and creativity) in human-centered roles. That intersection could serve to lift both technical and soft skills in tandem if you're committed to not leaving the latter behind.

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# TECH JOBS OF TOMORROW: MACHINE LEARNING

**Whether you're hiring or applying for new roles in emerging technologies, it's important to know where that tech is headed and how companies are adapting their hiring and skilling strategies.**

We've culled a few insights from the World Economic Forum's The Future of Jobs Report to get you up to speed on what you need to know about the machine learning jobs of tomorrow.

“The Future of Jobs survey found that 73% of all companies are planning to adopt machine learning in some form within the next three years”

## **Machine learning: the core of the Fourth Industrial Revolution**

Perhaps more than any other emerging technology, machine learning sits at the core of the Fourth Industrial Revolution for its potential to drastically change the nature of tasks, job roles and necessary skills.

Machine learning platforms automate the task of finding meaningful patterns in data, making it easier to get insights from extremely large data sets. That, in turn, supports the application of artificial intelligence (AI), automation and vast innovation across industries.

As more tasks become automated, companies will need to evolve existing roles and create new ones to meet the changing demand. To weather this next industrial revolution, companies need to invest in their workforce to adapt to machine learning instead of being overcome by it.

## **Machine learning's impact across industries**

For industries considering the potential impact of machine learning on business processes and job roles, it's not a question of if — but how much — they'll put machine learning to use to drive growth and innovation.

2018 was a bellwether year for machine learning, with companies growing their AI initiatives to advance autonomous driving, data security, fraud detection and personalization of the retail experience, among numerous applications. And it doesn't appear to be slowing down.

The Future of Jobs survey found that 73% of all companies are planning to adopt machine learning in some form within the next three years. That impact will be most immediately felt in the information and communications technology (ICT) sector, with 91% of survey respondents planning to adopt machine learning by 2022.

“Companies overwhelmed by the prospect of adopting machine learning technology at a large scale should focus on finding value and time savings in critical organizations where adoption will be most seamless”

The two other sectors shifting rapidly to adopt machine learning the most are the automotive, aerospace, supply chain and transport and the consumer, with 87% and 82% of companies in these industries expecting to adopt machine learning in some form by 2022, respectively.

By some estimates, new technologies (such as machine learning) may displace 75 million jobs over the next three years. Yet the potential for new roles to emerge is even larger, representing a predicted 133 million jobs — a significant net growth in employment.

### **Changing roles and new jobs in machine learning**

According to the Future of Jobs report, this massive shift toward machine learning adoption will require reskilling of at least 54% of the current workforce, as well as broad education and training support to accommodate the new roles.

Companies overwhelmed by the prospect of adopting machine learning technology at a large scale should focus on finding value and time savings in critical organizations where adoption will be most seamless, and use those successful test cases as a roadmap for other organizations. For example, beginning with automating simple, repeatable tasks in IT frees humans from repetitive work and empowers them to devote time to strategic and creative activities. Those activities will then fuel continued technological innovation.

In other words: Human creativity, deep work and cognitively demanding tasks will get a boost as manual administrative tasks such as data entry, bookkeeping and accounting are handled through automation.

While the reality of automation becoming mainstream brings up very real concerns around job displacement, companies can prepare by devoting resources and attention to the growth of key machine learning-related roles, include data analysts and scientists, AI and machine learning specialists, process automation experts and human-machine interaction designers. Complementary roles such as robotics engineers, blockchain specialists and information security analysts will also grow as a result.

### **What's next for machine learning?**

Taking advantage of machine learning requires methodical planning and skills redevelopment. When evaluating the potential of automation for your company via machine learning and AI, here are three industry-specific considerations to keep in mind.

#### **Machine learning in information and communication technology**

Machine learning could accelerate organizations' ability to automate the operation and maintenance of ICT networks and services, making emerging 5G networks more efficient, for example. But the uses extend beyond simply

network expansion and efficiency into other areas of business; a mix of machine learning and data science best practice could help organizations optimize pricing models to help maximize profits as well as improve threat detection capabilities.

As with all industries that deal with communication, though, the question remains: How will you responsibly hand over historically human-driven functions like communication to machines without dehumanizing them?

### **Machine learning in automotive, aerospace, supply chain and transport**

Companies will increasingly rely on data scientists and AI and machine learning specialists to take advantage of opportunities to improve the customer experience and drive greater efficiency and productivity across the supply chain chain.

In addition to feeding the growth of autonomous driving, the automotive, aerospace, supply chain and transport industries will use machine learning in other revolutionary ways, including predictive maintenance of large machines and equipment, delivery forecasting and human-robot collaboration.

### **Machine learning in consumer**

Will companies be able to use machine learning to identify what customers want before the actual customer does?

With a clear roadmap that incorporates skilling and reskilling the workforce, machine learning could accelerate the ability of companies in this industry to predict buying behaviors, anticipate and avoid customer churn and personalize the shopping experience while also driving greater productivity overall.

Organizations that take the time to better understand the potential of machine learning in their field and develop a clear strategy to evolve their value chain in response will find themselves better prepared to take advantage of machine learning's vast potential. Just as important will be getting real about their ability to meet these new skills in their local labor market, and creating a skilling approach to help address the workforce shift.

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# TECH JOBS OF TOMORROW: ✓ BIG DATA

**Whether you're hiring or applying for new roles in emerging technologies, it's important to know where that tech is headed and how companies are adapting their hiring and skilling strategies.**

We've culled a few insights from the World Economic Forum's The Future of Jobs Report to get you up to speed on what you need to know about the tech jobs of tomorrow. This article on big data is the final in a four-part series, with previous editions on blockchain, machine learning and cloud computing.

“It's estimated that 62% of information and data processing and information search and transmission tasks will be performed by machines by 2022”

## **Big data: On the verge of ubiquity**

The WEF Future of Jobs Report pinpoints the widespread adoption of big data analytics as one of four specific technological advances “set to dominate the 2018-2022 period as drivers positively affecting business growth,” along with high-speed mobile internet, artificial intelligence and cloud technology.

According to the report, 85% of all companies are likely or very likely to expand their adoption of user and entity big data analytics by 2022, making this technology category the leader in terms of “emerging” technology adoption.

It's also important to note that the intersection of machine learning, artificial intelligence and big data will drive a significant shift in how work is accomplished, with more tasks automated than ever before as the efficacy and availability of data increases.

For example, it's estimated that 62% of information and data processing and information search and transmission tasks will be performed by machines by 2022, compared to 46% today.

This shift in the nature of work will drive key skills gaps across industries. According to the Future of Jobs report, between 2018-2022, “all industries expect sizable skills gaps, and more than 50% of the workforce will need at least some level of reskilling.”

“It’s estimated that more than 151,717 data science jobs are going unfilled in the United States alone”

### **Big data’s impact across industries**

While the data scientist role topped LinkedIn’s list of most promising jobs of 2019, the company also estimated that more than 151,717 data science jobs are going unfilled in the United States alone.

The impact of this shortage already keeps CIOs up at night — and according to a 2018 KPMG report, big data and analytics lead the list of roles suffering from a skills shortage.

A majority of companies in nearly every industry have adopted or are expected to adopt big data analytic technology by 2022, with information and communication technologies (93%), aviation, travel and tourism (89%) and global health and healthcare (87%) expecting to adopt it at the highest rates.

Given big data’s level of popularity and the demand for data roles, companies in these industries and others can expect fierce competition for qualified individuals — and should be planning well into the future to help mitigate against the damaging effect of skills shortages.

But there is plenty of reason for optimism. As the workforce undergoes major reskilling efforts to account for key skills gaps caused by the Fourth Industrial Revolution, the WEF Future of Jobs report reports that up to 75 million jobs may be displaced in the move to machine-based tasks. However, 133 million new roles are predicted to emerge as the division of labor between humans, machines and algorithms evolves.

### **Changing roles and new jobs in big data analytics**

As big data analytics adoption continues to grow, data analysts and data scientists are needed to support the practical applications of machine learning and artificial intelligence. And by doing so, turning large data sets into actionable insights that solve new business challenges.

From a jobs standpoint, these roles will be highly in-demand across most industries, as will a new role called “big data specialists.” While not fully defined by the WEF, this role is defined as “related to understanding and leveraging the latest emerging technologies,” and also includes AI and machine learning specialists, process automation experts, user experience and human-machine interaction design and others.

As should be expected, database and network specialists will also continue to be in demand to support the adoption of big data analytics and manage the computing power needed to do so.

## What's next for big data?

Ensuring that workforce gaps don't get in the way of your big data initiatives requires immediate and ongoing attention, since competition for trained big data specialists is fierce. When defining your big data initiatives, here are three industry-specific considerations to keep in mind.

### 1) Big data in information and communications technology industry

For information and communications technology companies, skills gaps in local labor markets is one of the main barriers to adoption of emerging technologies like big data analytics. To help overcome this issue, 57% of companies in this industry will look to expand task-specialized contractors and other tactics to meet the immediate needs for talent.

Machines will also play a role in filling these gaps, allowing humans to do mission-critical strategic work.

The share of task hours machines spend on administrative activities versus humans will grow from 39% to 57% in this industry as the need for data entry clerks, administrative support, user support, accounting, bookkeeping and similar roles declines. Even with complex and technical activities, machines take on an increased share of the workload, from 25% in 2018 to 46% in 2022.

### 2) Big data in aviation, travel and tourism

Among the three industries mentioned in this article, the aviation, travel and tourism industries faces the largest reskilling challenges, with 68% of companies' workforces needing some form of training to adapt to big data and other emerging technologies, with 18% needing more than a year of training and reskilling.

With global tourism forecast to exceed \$1.8 billion by 2030, organizations able to sort through the promise of big data for these markets, and develop strong training and hiring programs, stand to gain a major competitive advantage over those who take a more traditional or cautious approach.

### 3) Big data in global health and healthcare

Nearly 80% of global health and healthcare organizations report "lack of understanding of the opportunities" as the biggest barrier to adoption of new technology, more than any other sector in the WEF report. This signals a need to modernize and be able to effectively compete with promising startups and technology-first health companies.

According to Health IT Analytics, as health organizations achieve greater data maturity, big data and predictive analytics can be used to develop risk-based scoring to determine when individuals might benefit from additional treatment or intervention, improve data-driven supply chain management, advance precision medicine and augment data security, among other initiatives.

Whether traditional health care companies can take advantage of opportunities like this relies entirely on their ability to adopt and deploy foundational data technology effectively.

Big data analytics is obviously expected to play a large role in that migration as a key input to machine and AI-driven tasks. When considering how ubiquitous big data and data science already is as a business function, it's fair to wonder whether big data should even be classified as an "emerging" technology — or whether it's a must for any business hoping to compete now or tomorrow.

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# TECH JOBS OF TOMORROW: CLOUD COMPUTING

**Whether you're hiring or applying for new roles in emerging technologies, it's important to know where that tech is headed and how companies are adapting their hiring and skilling strategies.**

We've culled a few insights from the World Economic Forum's The Future of Jobs Report to get you up to speed on what you need to know about the tech jobs of tomorrow. This article on cloud computing is the third in a four-part series, with two previous editions on blockchain and machine learning and an upcoming report on big data.

“In 2019, cloud computing will firmly establish itself as the foundation of tomorrow's enterprise application platforms.”

## Cloud computing: A key enabler for digital transformation

When it comes to digital transformation, one technology is poised as a key enabler in supporting business agility and innovation: cloud computing.

According to Forrester, “in 2019, cloud computing will firmly establish itself as the foundation of tomorrow's enterprise application platforms.” In this way, a solid cloud computing strategy acts as the “gateway technology” for companies to feel comfortable and confident adopting other emerging technologies in the years to come.

More than half of companies have already implemented public or private cloud solutions, according to IDG's “2018 State of Digital Business Transformation,” led only slightly by big data and mobile technology. IDG also expects cloud computing's role to grow over the coming years, with many companies adopting a “cloud-only” approach for new systems.

Like each of the technologies listed in the “The Future of Jobs Report,” cloud computing will drive job change across a range of industries. Overcoming workforce skills gaps is a top job-related concern as technology leaders grapple with this increased demand for cloud.

## Cloud computing's impact across industries

Cloud computing will be a strategic driver of new business models over the next three years, with 72% of companies reporting that they're likely to adopt cloud solutions by 2022. (That's in line with the 73% of companies who plan to implement machine learning technology by 2022 as mentioned in the previous edition in this series, again signaling these two crucial technologies as deep wells of opportunity for a large majority of companies.)

“With the increased convergence of teams into multifunctional units, the need for soft skills like communication and collaboration will become that much more important.”

Industries who most anticipate adopt cloud computing by 2022 include **information and communications technology** (at 91% of companies in this industry expecting to adopt), **aviation, travel and tourism** (79%) and **oil and gas** (78%).

### Changing roles and new jobs in cloud computing

Cloud computing is changing IT job roles in a number of ways, as automation becomes the default and business models shift to accommodate digital-first strategies. As a backbone to support these new models, companies are continuing to adopt DevOps practices, requiring developers and IT operations teams alike to learn new skills.

Going forward, nimble teams will be expected to understand a range of cloud platforms as well as automation, orchestration, configuration management, and security — all while adapting software development processes for as-a-service applications and continual delivery cycles. Further, with the increased convergence of teams into multifunctional units, the need for soft skills like communication and collaboration will become that much more important.

Across the three leading sectors, the aviation, travel and tourism sector faces the largest reskilling challenges, with 68% of the workforce in that sector anticipating some length of training to adapt to cloud computing and other emerging technologies, and 18% expecting more than a year of retraining and reskilling, according to the Future of Jobs report.

Meanwhile, the information and communications technology and oil and gas industries report that half of their workforce will need some level of reskilling.

### What's next for cloud computing?

Driving value from cloud computing calls for strong planning and ongoing reskilling to deliver results. When building your short- and long-term cloud computing strategies, here are three industry-specific considerations to keep in mind.

#### Cloud computing in information and communications technology industry

For companies in information and communications technology, advances in cloud computing ranks as the second highest trend driving industry growth.

Cloud computing will be instrumental as the foundation of increased adoption of automation in all of its forms, especially as machine learning revolutionizes the way digital information is filtered, catalogued, disseminated and consumed.

Companies in this industry hoping to compete on the machine learning front (consider chat bots, for example) will need to insure they have a solid, dependable cloud framework in place well before.

### **Cloud computing in aviation, travel & tourism industry**

While barely making the top ten list of trends driving innovation in the aviation, travel and tourism sector, cloud computing will be adopted by nearly 8 of 10 business in the industry by 2022. This supports the idea of cloud technology as an under-the-radar but core enabler of business operations for this industry.

According to a recent World Economic Forum white paper, “cloud computing offer(s) companies the opportunity to radically reinvent their operations,” and “create agile organizations in which innovation can flourish.”

We can expect cloud to enable a host of fundamental but necessary advancements in this space, including creating a more seamless and personalized travel experience for consumers, and delivering better security across national and international ports and borders, among others.

### **Cloud computing in oil and gas**

Advances in cloud technology are the leading trend driving industry growth for the oil and gas industry, according to the Future of Jobs report. Cloud computing is already a mainstay for companies as they seek to increase their intelligence and automation capabilities to improve services and drive revenue growth.

Significant and distributed computational power is needed to support data analytics in the field and deliver the insights needed to increase efficiency, the key to improving margins in this sector. Cloud technology could also support evolving seismic imaging technologies to improve well monitoring, for example, or make development drilling more accurate and cost efficient.

As companies plan for the jobs, roles and skills their technology-focuses organizations will need in the future, success will come as leaders understand opportunities, map key skills gaps in both the local labor market and leadership teams and employing flexible hiring practices to attract and retain the best talent. And no matter what happens, you can expect cloud technology to be at the center of that evolution.

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