

Cognizant



Cognizant Jobs of the Future Index: First Annual Review



January 2020



Center For
The Future of Work

Jobs of the Future Morph into Jobs of the Now

The Fourth Industrial Revolution is changing the future of work for the 164 million people in today's U.S. labor force. New technologies and tools are transforming the workplace, eliminating some jobs, reinventing others and, most importantly, creating new roles and opportunities that are emerging at an increasingly rapid pace.

These dramatic shifts in employment patterns are making it more difficult to identify which jobs will fade as software becomes more "intelligent" and which new roles will emerge in a world where machines do more and more.¹ Traditional ways of thinking about job demand, training and reskilling, and long-term strategic workforce planning are becoming obsolete. It is clear that we need new ways to analyze workforce trends and patterns to help organizations and job seekers prepare for the future.

To this end, and particularly to benchmark the emergence of new jobs, Cognizant's Center for the Future of Work created the Cognizant Jobs of the Future Index[®] (CJoF Index). Established in October 2018 and updated quarterly since then, the index provides leading indicators for how the U.S. economy is adapting in the face of technology-based innovation and disruption.

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employers to remain competitive. It also offers a real-time tracking instrument that identifies shifts and changes in employer demand for a wide range of jobs considered to be important and relevant in the future.

Specifically, the index measures the change in demand for a set of 50 “jobs of the future,” 45 actual jobs and five proxy ones, to reflect potential new occupations we’ve identified over the last two years. (For more on these emerging jobs, see our reports “[21 Jobs of the Future](#)” and “[21 More Jobs of the Future](#).”²) It also includes eight sub-indices that represent families of similar jobs. The index builds on data sourced from Burning Glass, an organization that collects real-time data on over 36 million job postings in the U.S. economy. (For more on the CJoF Index methodology, see page 11.)

Our first annual CJoF Index report details highlights from the first year of what is planned to be a long-running, multi-decade initiative. During the inaugural 12 months of the index, the following key trends have emerged:

- The overall CJoF Index grew **12.8%**.
- While the index closely aligns with the general trajectory of the U.S. employment market, the 50 jobs tracked in the index grew 3.5 percentage points faster than jobs in the overall U.S. economy.
- The only arenas in which future jobs did not grow were in the legal and financial services job family, where job postings declined by **4.6%**.
- New jobs are emerging from a place of experimentation, and complement rather than replace existing jobs.
- The growth of new jobs is more anemic than we originally forecast, due to high demand for existing jobs.

Since its debut at the World Economic Forum’s Annual Conference in Davos in January 2019, the CJoF Index has established itself as an important new tool for understanding how software (and robotics) are, if not eating the world, certainly changing it. Key to the CJoF Index is the use of empirical data to test our hypothesis that the jobs of the future are growing faster than all jobs. The index uses real data to see the imagined possibilities of jobs of the future starting to come to pass.

To see the most up-to-date data and analysis of the current CJoF Index, please visit <https://www.cognizant.com/jobs-of-the-future-index>.

Growth of future jobs dampened by healthy growth in existing jobs

At the end of the first year of the CJoF Index, what have we learned?

As can be seen in Figure 1, the growth for the 50 jobs contained in the index is outpacing the growth of all jobs by 3.5 percentage points. The CJoF Index grew 12.8% between Q3 2018 and Q3 2019, while the All Burning Glass Jobs (ABGJ) Index grew 9.3% over the same period.

Secondly, while the CJoF Index is growing faster than the ABGJ Index, it broadly parallels it. When the overall ABGJ Index dipped in Q3 2017, so did the CJoF Index. And when the CJoF Index picked up steam again in Q3 2019, the ABGJ Index did as well.

This raises the question of why the CJoF Index is, seemingly, in such lockstep with the overall employment market. Are our “jobs of the future” less futuristic than we initially thought? Is their growth more closely tied to current macro-economic conditions than we suspected?

Looking at the trend lines in greater detail, we can see that the first real divergence in the two indices happened in the spring of 2017. At that point, the ABGJ Index began to dip, but the CJoF Index maintained healthy growth. Two quarters later though, the CJoF began to turn southward. Since then, the two have come back into close alignment.

Tracking job trends with the CJoF Index

2019 Q3

1.65

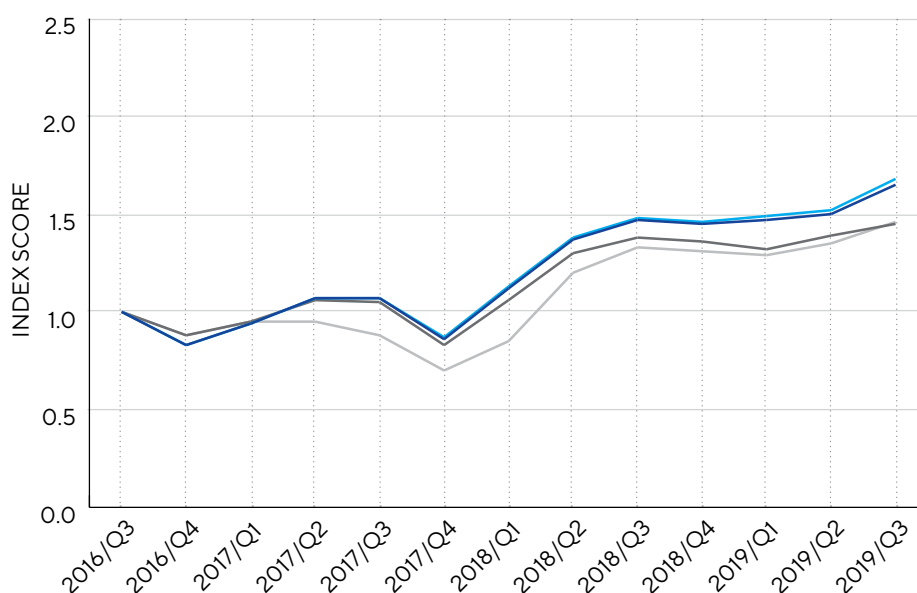
% Quarter Change: **10.02%**

% Year Change: **12.77%**

Quarter Jobs Change: **39,509**

Total Jobs: **433,915**

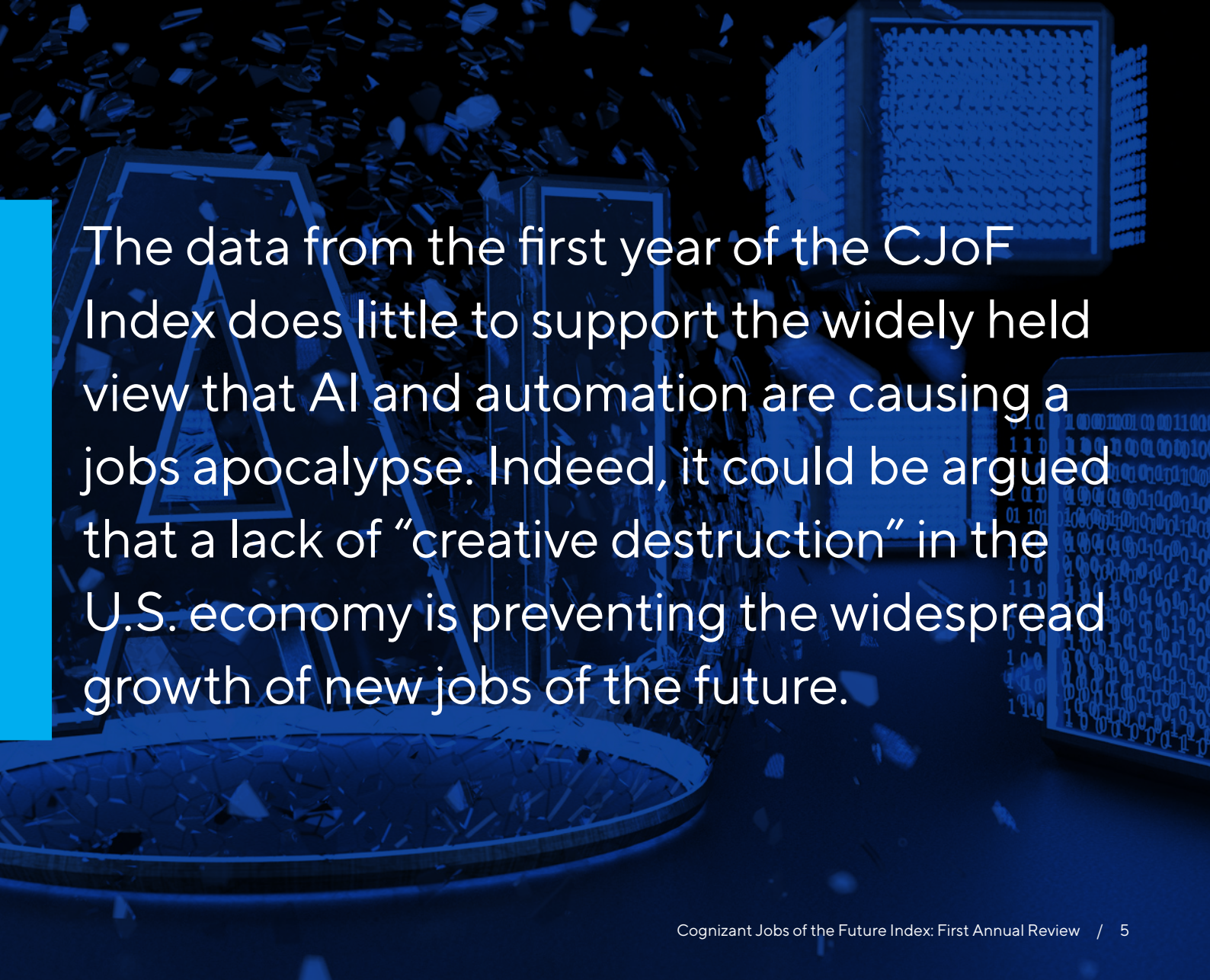
- CJoF Index (50 jobs)
- Real Jobs (45)
- Proxy Jobs (5)
- All Burning Glass Jobs



Source: Cognizant Center for the Future of Work
Figure 1

Our read is that, at a time of near-record-low unemployment in the U.S., when demand for workers is outstripping worker supply, the emergence of net-new types of jobs and the growth of existing but nascent jobs are largely tied to the overall health of the economy. In short, with an economy growing steadily and with close to maximum employment, there is limited pressure to create new job types because people are able to easily find employment with existing jobs. When jobs are plentiful, both employers and employees assume a “business as usual” posture. In this environment, new jobs emerge from a place of experimentation rather than desperation, and broadly complement, rather than replace, existing jobs.

The data from the first year of the CJoF Index does little to support the widely held view that AI and automation are causing a jobs apocalypse. Indeed, it could be argued that a lack of “creative destruction”³ in the U.S. economy is preventing the widespread growth of new jobs of the future.








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Algorithms, automation and AI set the pace for the jobs of the future

As seen in Figure 2, all the job families ended 2019 in positive growth territory. The algorithms, automation and AI (AAA) family represents the core of the CJoF Index, a reflection of the centrality of cutting-edge technology services and solutions to the future of work over the coming years. In the past year, the performance of this jobs grouping essentially mirrored the overall CJoF Index in value, because it represents more than 85% of the job postings captured in the CJoF Index.

The AAA family maintained a steady 13% annual growth, ending the year with 11% quarterly growth after a couple of low-growth quarters earlier in the year. This activity did not measure up to the growth seen in Q1 of the past year, however, which was more than 22%. This sustained growth illustrates that while the volume of postings within this jobs family continues to expand, the rate of growth has stabilized.





Taken as a holistic grouping, the AAA family includes 16 jobs. Here are the highlights:

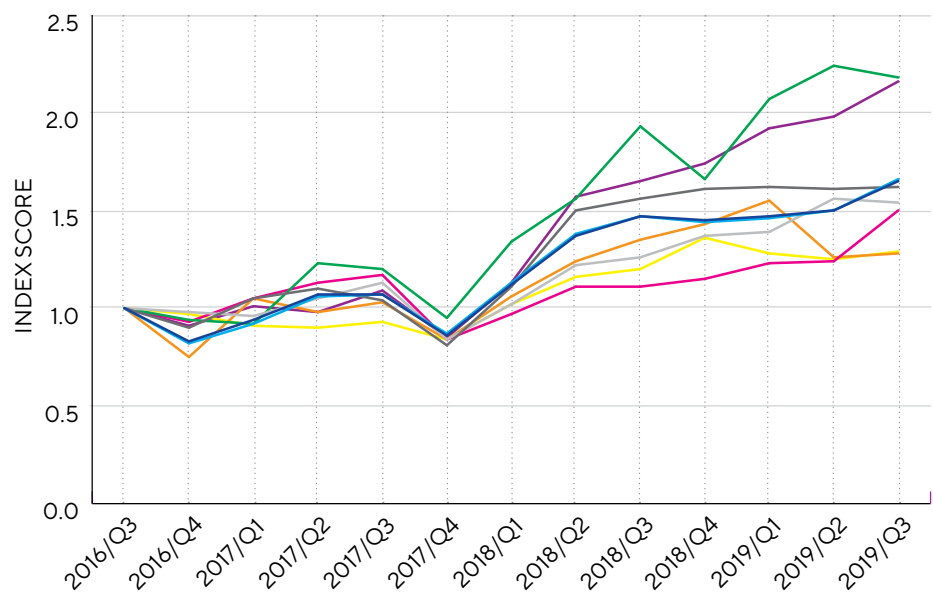
-  Highest indexed job (Q3 '18): **Data Scientist (2.24)**
-  Lowest indexed job (Q3 '18): **Chief Information Officer/Director of Information Technology (1.22)**
-  Highest indexed job (Q3 '19): **Data Scientist (2.64)**
-  Lowest indexed job (Q3 '19): **Technology Consultant (0.97)**
-  Fastest growing job: **Business Intelligence Architect/Developer (25.5% growth)**
-  Slowest growing job: **Technology Consultant (-34.4% growth)**

Positive growth for all job families in the index

2019 Q3
1.65

% Quarter Change: **10.02%**
 % Year Change: **12.77%**
 Quarter Jobs Change: **39,509**
 Total Jobs: **433,915**

-  CJoF Index (50 jobs)
-  Algorithms, automation and AI
-  Customer experience
-  Environmental
-  Fitness and wellness
-  Healthcare
-  Legal and financial services
-  Transport
-  Work culture



Source: Cognizant Center for the Future of Work
Figure 2



If data is the new oil, then the pipelines have to be engineered and capitalized upon by business intelligence architects and developers, the jobs with the highest growth in the AAA family.

The data confirms how crucial data is to every business. If data is the new oil, then the pipelines have to be engineered and capitalized upon by business intelligence architects and developers, the jobs with the highest growth in the AAA family at 25.5% overall. In keeping with the metaphor, just as geologists find new pockets of petroleum (or extract more value from existing deposits), it's data scientists who seek the highest value, return and meaning from that data. So it comes as no surprise that as of Q3 '19, data scientists enjoyed the status of highest indexed job, showing that digital transformation requires analytical capabilities in addition to technical skills to drive new business growth strategies.

Following close behind — and in the pole position of all things automation — are mechatronics engineers and robotics engineers, which as of Q3 '19 indexed at 2.35 and 2.29, respectively. As their names suggest, these roles combine disciplines of mechanical engineering, electronics, computer engineering and a deep understanding of robotics. Want to be a “human-machine teaming manager?” Design the next flying car based on your background in drones? Or the latest in deep sea submersibles? These are critical roles for aspiring applicants, both now and in the future, to which their outsized performance in the index is a testament.

While the AAA family remains robust and critical to the future of work, it's been tough if you're a technology consultant. The job of proving value has never been more important, and for that reason, the feet of technology consultants are increasingly being held to the fire. Over the past year, this job not only was the lowest indexed in the AAA family; it also declined year over year by 34.4%. We believe a big reason is that with the mission-critical nature of disruptive technologies, more companies are apt to hire these positions in-house vs. seeking them externally for one-off consultations or expensive staff augmentation.

From a geopolitical perspective, the globe continues to fracture into “the Splinternet.” The job of making the world (and its data) safe for digital connection, communication and commerce has never been more important. Within the AAA family of the CJoF Index, it's worth noting that the proxy job of “cyber calamity forecaster” has grown steadily to 1.46. The past year has seen a similar pattern for job openings for cyber/information security engineers and analysts (indexed at 1.35), as well as security/defense analysts and surveillance officers and agents in the U.S. At a time when the U.S. Cyber Command continues to ramp up personnel, the British Army in August 2019 launched a new division dedicated to fighting cyber threats. We expect to see these components of vigilance, detection and deterrence grow further in the coming years, providing a dose of reality to our proposed jobs of the future like “cyber attack agents.”

Healthcare: a healthy job of the future

Healthcare was the fastest growing family of the past year in the CJoF Index, growing 35%. This family includes biostatisticians (+29%), biomedical equipment technicians (+16%), health technicians (+15%), biomedical engineers (+15%), registered nurses (+12%) and genetic counselors (+10%).

The healthcare family includes eight jobs. Here are the highlights:



Highest indexed job (Q3 '18): **Biomedical Equipment Technician (1.45)**



Lowest indexed job (Q3 '18): **Genetic Counselor (0.85)**



Highest indexed job (Q3 '19): **Physician (3.83)**



Lowest indexed job (Q3 '19): **Genetic Counselor (0.94)**



Fastest growing job: **Physician (211.1%)**



Slowest growing job: **Genetic Counselor (10.3%)**

Interestingly, while the postings for physicians overall decreased by approximately 6.7% over the year, those for physicians with digitally enabled skills (i.e., those counted in the index) rose by 211%. When seen in the aggregate, the share of new physician postings requiring digital skills increased from 0.7% of the total in Q3 2018 to 2.4% in Q3 2019.

While the lowest growing job was genetic counselors, we expect to see an expanding set of roles by the end of the 2020s based on the advent of CRISPR technologies, such as “genomic portfolio directors” and “genetic diversity officers.” Today, the steady and continued growth in healthcare jobs mirrors the rising demand for healthcare services in an aging world. Currently, the healthcare sector is the largest employer in the U.S., surpassing the retail sector last year. Healthcare also represents a large and growing portion of the U.S. gross domestic product (GDP), with the Centers for Medicare and Medicaid Services (CMS) predicting that healthcare spending will account for nearly 20% of overall GDP by 2025.







The future of work in healthcare will also drive a renaissance in how we and future generations stay healthy and thrive in the 21st century. As the number of healthcare jobs continues to grow, many of these new positions will require familiarity with the latest technology innovations in the field. As indicated by the exponential increase in postings for physicians (+211%) and health information directors (+120%), demand for digitally-enabled skills will include digital record-keeping for healthcare management and the use of more AI-driven technology by practitioners to diagnose and treat patients.

It is important to note that while these occupations in the healthcare jobs grouping experienced large percent increases, the absolute number of jobs added was relatively small, with physicians' postings up by 1,516 and health information directors up by an added 324 positions. This stands in contrast with the AAA family, for example, which represents the vast majority of the jobs captured in the CJoF Index.

It's the (environmental) policy, stupid ... or, 'how to wreck a job of the future'

Policies are the frameworks underpinning any business transition from strategy to execution, including the growth (or contraction) of its workforce. In the environmental field, new technologies and shifting public sentiment on sustainability are making green business initiatives more attainable than before. The rising interest in “stakeholder capitalism”⁴ is shifting the narrative from a strict profit-and-loss discussion to one that considers the broader global community. The jobs sprouting in the environmental sector bring value to all stakeholders while putting dollars in the pockets of individuals (and large corporations).

A look at the six jobs comprised by the environmental family of the CJoF Index offers a vivid lesson on the impact of policy on embryonic jobs of the future. Here's a look at the highlights:

-  Highest indexed job (Q3 '18): **Sustainability Specialist (3.93)**
-  Lowest indexed job (Q3 '18): **Solar Installer (0.36)**
-  Highest indexed job (Q3 '19): **Sustainability Specialist (4.14)**
-  Lowest indexed job (Q3 '19): **Solar Engineer (0.47)**
-  Fastest growing job: **Solar Installer (63.6%)**
-  Slowest growing job: **Solar Engineer (-14.7%)**

In June 2017, when the Trump administration announced the U.S. withdrawal from the Paris Agreement, the CJoF Index immediately registered the seismic shockwaves; things looked especially grim between Q1 '18 and Q1 '19 for solar installers and solar engineers, both of which registered a negative change in that time period. Import tariffs on solar panels and solar cells from China, as well as new licensing requirements and changing legislation in many states, contributed to that initial fall.

Solar engineers — along with alternative energy managers — saw the largest percent decrease of all jobs within the environmental family from Q4 '18 to Q1 '19, with job postings declining by 25% and 24%, respectively. Sustained uncertainty around tariffs and legislation has continued to suppress job demand for these roles. The decline in solar engineer jobs — those on the cutting edge of innovation for scaled climate solutions — is alarming. Over the next decade, deep engineering and new massively scaled breakthroughs will literally make or break our ability to scale solutions for climate change — not just in the U.S. but also globally.

Yet the past year witnessed skyrocketing demand for sustainability specialists and solar installers. In something of a “tortoise vs. the hare” scenario, by Q3 2019, these once policy-hobbled positions attained the distinction of being the highest indexed job and the fastest growing job, respectively. In our view, this is because installers are all about “execution” of proven technologies. This is happening against a backdrop of states like California (the world's fifth largest economy) that are now accelerating their commitment to de-carbonization regardless of Washington's policy posture.

The future of work is no longer in the future

As we wrote in our original “21 Jobs of the Future” report in 2017, work has been central to mankind for millennia. Our very names convey that fact: Baker, Brewer, Glover, Woodman, Wright, Mason, Judge, Weaver, Hunter, Dyer, Fisher. In the future, work will continue to be core to our identity, our nature, our dreams and our realities. But it won’t necessarily be the work we know or do now.

Just as wheelwrights and farriers gave way to the automotive jobs of yesteryear’s Detroit, so too can we imagine the avionics technicians and aerospace engineers in our index giving way to flying car developers in Santa Clara, Santander or Sao Paulo. (Imagine the skills and qualifications in their attendant job description: “Practical, hands-on experience in any aspect of engineering and/or technical development will be weighted more heavily than academic qualification; doers – not dreamers – are sought.”)

As the jobs of the future grow – and “when” not “if” they accelerate growth – it’s certain that many more new jobs will be created that will provide tremendous opportunity for workers to create a diverse portfolio of careers and roles. Remember, before it can be built, it must be dreamt.

Hence the need for tools like the CJoF Index.

As we enter the 2020s, we will continue to update the index every quarter and identify highlights and insights from the data we see. Additionally, we are researching and developing a new framework that will insert a geographic overlay on the index, either quarterly or annually, showcasing regional insights within the U.S. This will allow us to index by city population size or county type, such as large metro, small metro, rural or small town, for example. We will also look at the feasibility of adding international components beyond the U.S., as well.

Our motto has been (and continues to be): *semper futurum opus est futuro – incipiens cras*. (Translation: “The future of work is always in the future – starting tomorrow.”) But the future of work gets closer for most of us, every day. The CJoF Index provides insight into tomorrow’s jobs landscape – and what you, as an employee and employer, need to do to remain competitive within it.

We encourage you to review our overall index, our eight job families and the trends within any of the jobs included in the index. (To see the most up-to-date data and analysis of the current CJoF Index, please visit www.cognizant.com/jobs-of-the-future-index.) We look forward to engaging with you in continued conversations about the jobs of the future and hearing your viewpoints on what is happening and why.

CJoF approach and methodology

The CJoF Index builds on data sourced from Burning Glass, an organization that collects real-time data on over 164 million jobs in the U.S. economy. Burning Glass obtains its data from online sources of job openings, other aggregators (i.e., Indeed, LinkedIn and ZipRecruiter) and primary sources (company websites). The organization uses an extensive de-duplication algorithm to ensure each job opening is counted only once. This fine-grained raw data allows us to gain a far more granular view of the real state of the economy than data collected and analyzed by the U.S. Bureau of Labor Statistics, which tends to provide a comprehensive view of employment trends but is seen as a lagging indicator.

To calculate the CJoF Index score, we take the sum of the current quarterly U.S. job openings and divide it by the quarterly total of U.S. job openings in the third quarter of 2016 (the baseline year for the index).

Each quarter, our partners at ESI ThoughtLab input the relevant data on the 50 occupations, aggregating the totals for the full CJoF Index and its various sub-indices. All totals are indexed against the 2016 third-quarter totals (base quarter) to create the index score for each job, the full CJoF Index and the various sub-indices. To ensure these openings represent jobs of the future, the team applies a filter to identify job openings requiring digital capabilities (resulting in a subset of total openings for the specific occupation, representing about 5% of the total openings tracked by Burning Glass).

One caveat: Rather than predicting the future, the index allows for the examination of macro trends (e.g., digital enablement) that will affect the future of all work. We believe the right question to ask is not, “Will my job be automated away” but instead, “What tasks within my job will be digitally enabled?”

The index attempts to answer questions such as:

- What new types of jobs are emerging due to the adoption of digital technologies such as artificial intelligence and Internet of Things?
- Which new jobs are growing faster than others?
- Which job “types” (i.e., families of similar jobs) are growing faster than others?
- Are some job roles evaporating or shifting to other occupations or locations?
- What is the balance between job openings requiring digital capabilities vs. the roles that don’t?

Endnotes

- ¹ Malcolm Frank, Paul Roehrig and Ben Pring, *What To Do When Machines Do Everything*, Wiley, 2017, www.amazon.com/What-When-Machines-Everything-Algorithms/dp/111927866X.
- ² “21 Jobs of the Future,” Cognizant Center for the Future of Work, November 2017, www.cognizant.com/whitepapers/21-jobs-of-the-future-a-guide-to-getting-and-staying-employed-over-the-next-10-years-codex3049.pdf, and “21 More Jobs of the Future,” CFoW, October 2018, www.cognizant.com/whitepapers/21-more-jobs-of-the-future-a-guide-to-getting-and-staying-employed-through-2029-codex3928.pdf.
- ³ “Creative destruction” was first coined by economist Joseph Schumpeter. For more on this term, see www.investopedia.com/terms/c/createdestruction.asp.
- ⁴ “The Davos Manifesto,” World Economic Forum, 2019, www.weforum.org/the-davos-manifesto.

About the authors



Ben Pring

Vice President, Director of Cognizant's Center for the Future of Work

Ben Pring co-founded and leads Cognizant's Center for the Future of Work. He is a co-author of the best-selling and award-winning books *What To Do When Machines Do Everything* (2017) and *Code Halos: How the Digital Lives of People, Things, and Organizations are Changing the Rules of Business* (2014).

Ben sits on the advisory board of the Labor and Work Life program at Harvard Law School. In 2018, he was a Bilderberg Meeting participant.

Ben joined Cognizant in 2011 from Gartner, where he spent 15 years researching and advising on areas such as cloud computing and global sourcing. Prior to Gartner, Ben worked for a number of consulting companies, including Coopers and Lybrand. At Gartner, Ben was the lead analyst on all things "cloud"; he wrote the industry's first research notes on cloud computing (in 1997!) and Salesforce.com (in 2001), and became well known for providing provocative but accurate predictions about the future of IT. In 2007, Ben won Gartner's prestigious annual Thought Leader Award.

Ben's expertise in helping clients see around corners, think the unthinkable and calculate the compound annual growth rate of unintended consequences has made him an internationally recognized authority on leading-edge technology and its intersection with business and society. His work has been featured in *The Wall Street Journal*, *Financial Times*, *The London Times*, *Forbes*, *Fortune*, *MIT Technology Review*, *The Daily Telegraph*, *Quartz, Inc.*, *Axios*, *The Australian* and *The Economic Times*.

Based in Boston since 2000, Ben graduated with a degree in philosophy from Manchester University in the UK, where he grew up.

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Robert Hoyle Brown is a Vice President in Cognizant's Center for the Future of Work. Since joining Cognizant in 2014, he has specialized on the topics of robotics, automation and augmented reality and their impact on business processes. He has worked extensively with the Cognizant Digital Operations Practice as head of market strategy, and also with Cognizant's Accelerator leadership to drive the development of its intelligent automation strategy, messaging and go-to-market outreach.

Robert is a Fellow at the Fisher Center for Business Analytics at the Haas School of Business at the University of California at Berkeley. He is also a member of the Bay Area Council, and a board member at Big Skills, Tiny Homes, a nonprofit tiny homes vocational initiative for high school graduates. In 2018, he was an Action Forum participant at the Aspen Institute.

Prior to joining Cognizant, he was Managing Vice President of the Business and Applications Services team at Gartner, and as a research analyst, he was a recognized subject matter expert in technology services. He also held roles at Hewlett-Packard and G2 Research, a boutique outsourcing research firm in Silicon Valley. He holds a bachelor's degree in history from UC Berkeley and, prior to his graduation, attended the London School of Economics as a Hansard Scholar.

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About Cognizant Center for the Future of Work

Cognizant's Center for the Future of Work™ is chartered to examine how work is changing, and will change, in response to the emergence of new technologies, new business practices and new workers. The Center provides original research and analysis of work trends and dynamics, and collaborates with a wide range of business, technology and academic thinkers about what the future of work will look like as technology changes so many aspects of our working lives. For more information, visit [Cognizant.com/futureofwork](https://cognizant.com/futureofwork), or contact Ben Pring, Cognizant VP and Director of the Center for the Future of Work, at Benjamin.Pring@cognizant.com.

About Cognizant

Cognizant (Nasdaq-100: CTSI) is one of the world's leading professional services companies, transforming clients' business, operating and technology models for the digital era. Our unique industry-based, consultative approach helps clients envision, build and run more innovative and efficient businesses. Headquartered in the U.S., Cognizant is ranked 193 on the Fortune 500 and is consistently listed among the most admired companies in the world. Learn how Cognizant helps clients lead with digital at www.cognizant.com or follow us [@Cognizant](https://twitter.com/Cognizant).

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