

After the Storm

The Jobs and Skills that will Drive the
Post-Pandemic Recovery

February 2021



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Executive Summary

The recession left in the wake of the COVID-19 pandemic is unprecedented. The changes have been so profound that fundamental patterns of how we work, produce, move, and sell will never be the same.

If the U.S. is going to have a recovery that not only brings the economy back to where it was but also ensures a more equitable future, it is crucial to understand what jobs and skills are likely to drive the recovery. How will the new economic patterns be translated into specific roles and skills for workers? How can workers, training institutions, and employers anticipate what will be needed?

In this report, Burning Glass Technologies uses our database of more than 1 billion current and historical job postings, along with the best available expert views, to anticipate what jobs will be most important in the post-pandemic labor market.

- We project these roles will account for 15.5 million to 18 million new jobs created over the next five years.
- These jobs represent significant fractions of the labor market: currently 13% of demand and 10% of employment, but in addition they are important inflection points for the economy. A shortage of talent in these fields could set back broader recovery if organizations can't cope with these demands.
- Jobs in these new "economies" are projected to grow at almost double the rate of the job market overall (15% vs. 8%).
- Together, these five growth engines will come to comprise one in six jobs by 2026 (16%).
- These jobs pay well, with the median salary for all five economies at roughly \$59,000 per year, 34% above the national median.
- Growth in these economies outperformed the overall economy at the height of COVID-19. Between March and September 2020, job postings in these economies were up 11% even as the overall market fell -12%.

We identified five distinct fields that will shape the recovery:

The Readiness Economy

The pandemic has shown the weaknesses in health care, cybersecurity, insurance, and a range of other fields that provide social resilience. Roles like cybersecurity experts and software engineers will be in demand, but so will project managers and other organizers of work.

The Logistics Economy

Anyone who tried to buy a roll of toilet paper in the spring of 2020 knows how supply chains failed under the sudden new demands of the pandemic. Besides new demand for advanced logistics skills, there will likely also be growth in advanced manufacturing, and the Internet of Things will become more critical to creating chains that are both efficient and resilient.

The Green Economy

Even before the Biden administration's new emphasis on climate policy, the nation's energy system was slowly but steadily shifting to renewables. Ambitious climate goals and incentives are likely to speed the shift.

The Remote Economy

In at least some fields and roles, the shift to remote work forced by the pandemic is likely to be permanent. A growing dependence on data, software, and networks will drive change, while eventually artificial and virtual reality will play a larger role.

The Automated Economy

The pandemic won't slow down the adoption of automation and artificial intelligence—if anything it will accelerate the trend. Employers will prioritize automation over hiring back low-value workers. Jobs developing—and driving—automation will thrive.

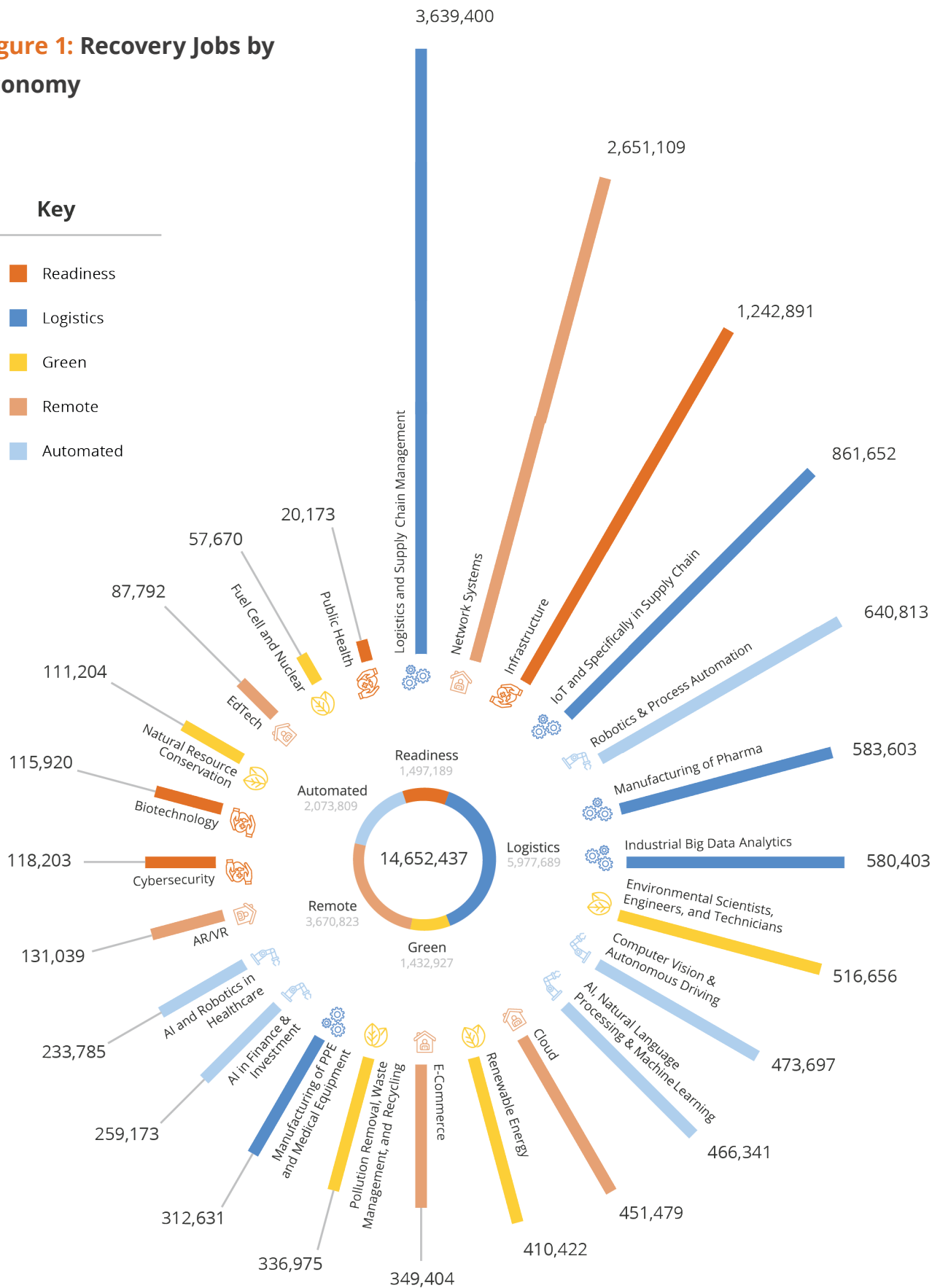
Table 1: Current and Projected Recovery Jobs

Economy	Demand	% of US Demand	Employment	% of US Employment	Median Salary	Pre-COVID Growth (FY2014-FY2019)	COVID Growth (Mar-Sep 2020)
Readiness	508,278	1%	1,497,187	1%	\$58,817	45%	-31%
Logistics	1,646,509	4%	5,977,689	4%	\$52,700	16%	18%
Green	250,724	1%	1,432,927	1%	\$52,639	48%	-21%
Remote	1,605,364	4%	3,670,823	2%	\$66,058	65%	36%
Automated	828,784	2%	2,073,809	1%	\$60,406	131%	-22%
Overall	4,839,659	13%	14,625,435	10%	\$59,090	48%	11%

Note: The sum of the percent of demand and employment may not equal the overall percent due to rounding.

Sources: Burning Glass Technologies job posting data and Bureau of Labor Statistics JOLTS data.

Figure 1: Recovery Jobs by Economy



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Introduction

Pandemics end. Economies recover. The economists may argue over which letter the recovery will look like on the graph—a U, a V, a W, or a K—but inevitably the last leg will point upward.

In every recovery, however, some jobs—and some workers—lead the way, while others are left behind. Who leads and who lags rests on choices by government, business, and education. Policy choices can keep some workers from falling too far behind. The training investments a company makes can drive the future-readiness of its workforce. And the new programs launched by colleges and universities can both assure opportunity for graduates and enrollment growth for institutions. Decisions can also ensure that the economy doesn't fall short in having sufficient talent in critical areas, becoming bottlenecks to broader recovery.

In this report, Burning Glass Technologies projects which jobs and which skills will lead the way as the economy recovers from the COVID-19 pandemic. We have reviewed what experts and employers are saying and analyzed the Burning Glass database

of more than a billion current and historical job postings, reflecting the skills employers demand in the real world.

Overall, we project that a range of 15.5 million to 18 million new jobs created over the next five years will be at the center of the recovery. The economic energy this represents is exciting but this also has the potential to be a seismic labor market shift. Both the roles and the skills underlying those roles are likely to be different from the ones that drove prosperity before the pandemic, raising the potential for significant mismatch between the current workforce and the workforce needed for the decade ahead.

The skills underlying jobs have been in tremendous flux for years, much more so than the jobs themselves. New occupations do arise: No one had heard of a mobile app developer before the iPhone was invented. But research based on job postings has shown the skills required in many common jobs has changed up to 40% over the past decade, a change that is driven by technological advancement.¹ These include

¹ Deming, David and Noray, Kadeem, "STEM Careers and the Changing Skill Requirements of Work," National Bureau of Economic Research, <https://www.nber.org/papers/w26680>

roles like mechanical drafters, pharmacists, and actuaries; jobs that many would consider staid and stable but in fact are being reshaped significantly.

The pandemic's impact is already visible in the skills requested in job postings. The skills cited below have seen dramatic relative shifts in demand in job postings over the past year.

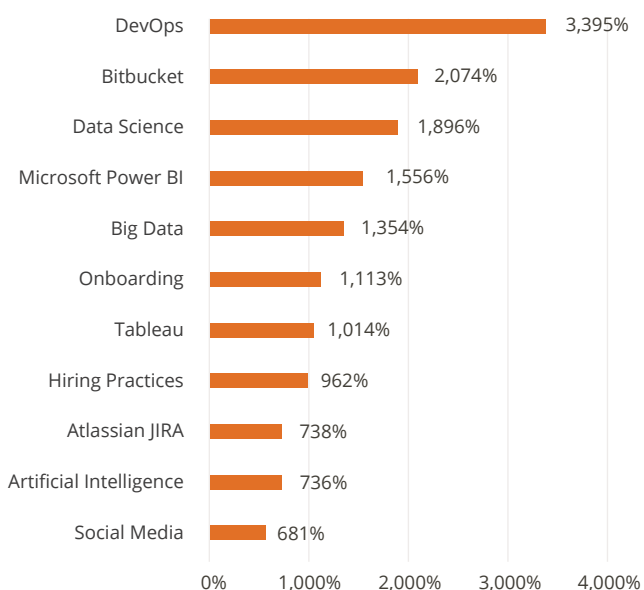
You can see employers desperately seeking skills to cope with the pandemic (PPE, Videoconferencing, Cleaning). Sales Management becomes critical when all your sales are handled remotely. Other skills are more specialized: Range of motion, for example, refers to physical therapist openings.

Some of these shifts may stick beyond the pandemic, while others probably won't. If you look over the past 10 years, the relative shifts in skill demand start to show how emerging technologies recast the economy.

Over the past decade, you can see the disruptive skills that drive fundamental change. All this underscores that understanding what is being reshaped may be more useful than identifying what is "new."

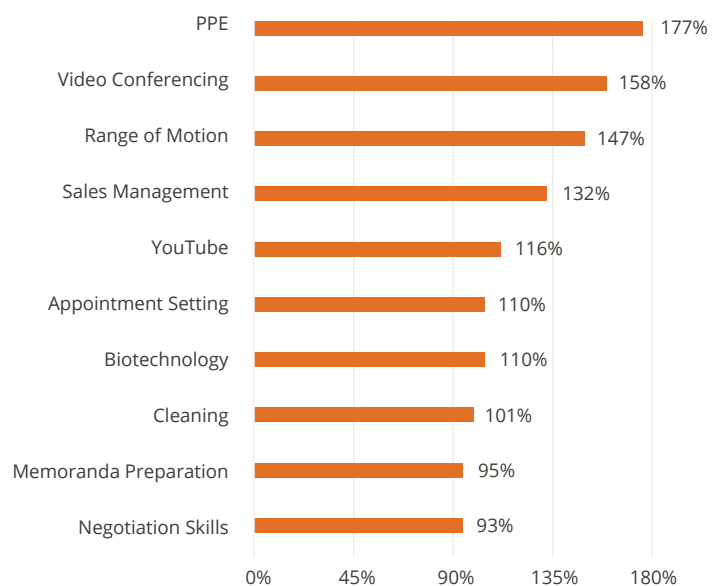
The blow to employment has been extreme because of the singular nature of the COVID-19 crisis, which is both a natural disaster and a recession. At depths of the crisis in May, job postings were down by half compared to the same period in 2019. Even in December 2020 postings were 39% below 2019 levels.

Figure 2: Largest Relative Shifts in Skill Demand, 2010-2020



Source: Burning Glass Technologies job posting data.

Figure 3: Largest Relative Shifts in Skill Demand, 2019-2020



Source: Burning Glass Technologies job posting data.

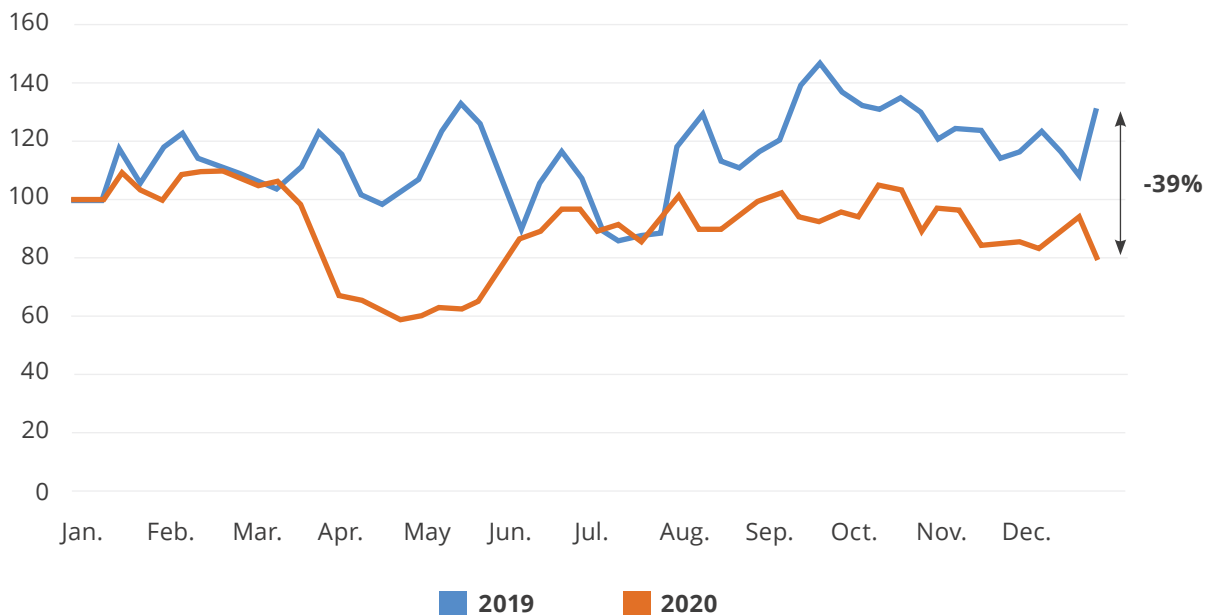
The dual nature of the crisis will also shape the recovery. Natural disasters force society to rebuild; there is no choice. But recessions force businesses to rethink. Employers will want to make sure they avoid making the same mistakes again. They reconsider how to be more efficient, how many workers they really need and at what cost, and how far technology can enhance or replace human labor. This rethinking has been one factor behind the “jobless recoveries” from the past few recessions.^{2,3}

This combination of disaster-and-recession is why the pandemic has been often called a “black elephant,” a term coined by the environmentalist Adam Sweidan. The phrase is a cross between a “black swan,” an

unlikely event with major consequences, and the “elephant in the room,” or a problem that everyone knows about but no one wants to discuss.

The pandemic has made the cost of a “black elephant” event painfully apparent. One of the most striking lessons from the pandemic has been how difficult a black elephant is to contain to one field. Pulling on one thread unravels so many others. Most people would assume a pandemic would strain the health care system, but not that it would overload the supply chains for groceries and toilet paper, alter commuting and working patterns (possibly forever), and upend the educational system. All of that changes the skills required across many fields.

Figure 4: US Job Postings Index: 2019 vs. 2020



Source: Burning Glass Technologies job posting data.

2 Forsythe, Eliza, Lisa B. Kahn, Fabian Lange, and David Wiczer. “Labor demand in the time of COVID-19: Evidence from vacancy postings and UI claims.” *Journal of public economics* 189 (2020): 104238.

3 Natalia A. Kolesnikova, Yang Liu, “Jobless Recoveries: Causes and Consequences” Federal Reserve Bank of St. Louis, April 2011, <https://www.stlouisfed.org/publications/regional-economist/april-2011/jobless-recoveries-causes-and-consequences>

The pandemic is accelerating the technological trends that were already changing the future of work:

- Automation, as technology creates new ways of doing work that once required human intervention;
- Digitalization, in which a greater proportion of jobs now require digital skills – for example, 8 in 10 middle-skill jobs now ask for digital skills;⁴
- Hybridization, where jobs combine skill sets that formerly did not travel together – for example, marketing managers now need to program databases while mobile app developers need to understand content and design as well as programming.⁵

The Five Economies

These trends will drive the economy in five distinct, but interrelated and transformative directions:

The Readiness Economy

The pandemic has brought into high focus our state of health care readiness. But it has also exposed flaws in our infrastructure, cybersecurity, insurance, and a range of other fields that provide social resilience. Roles like cybersecurity experts and engineers will be in demand, but so will

project managers and other organizers of work.

The Logistics Economy

Many of the fundamental concepts behind our supply chains, such as global sourcing and “just-in-time” manufacturing, buckled under the pressure of the pandemic. In addition to increased demand for advanced logistics skills and growth in advanced manufacturing as critical commodity production is “re-shored,” the Internet of Things will become more critical to creating chains that are both efficient and resilient.

The Green Economy

Despite the political reluctance to act on climate change, utilities and consumers are already placing their bets on renewable energy. Seventy percent of the new electricity generation expected to come online in 2021 is projected to be from solar and wind power.⁶ More aggressive moves by the incoming Biden administration to act on climate and improve the nation’s energy infrastructure could speed the shift.

The Remote Economy

As more work gets performed remotely, there will be growing dependence on the data and software that are the key underpinnings of the remote economy. Expertise in cloud computing and network systems are the drivers here, but over time

4 Burning Glass Technologies, “Beyond Tech: The Rising Demand for IT Skills in Non-Tech Industries,” August 2019, <https://www.burning-glass.com/research-project/beyond-tech/>

5 Burning Glass Technologies, “The Hybrid Job Economy: How New Skills are Rewriting the DNA of the Job Market,” January 2019, <https://www.burning-glass.com/research-project/hybrid-jobs/>

6 Energy Information Administration, “Renewables account for most new U.S. electricity generating capacity in 2021,” Jan. 11, 2021, <https://www.eia.gov/todayinenergy/detail.php?id=46416>

artificial and virtual reality will play a larger role.

The Automated Economy

The pandemic won't slow down the adoption of automation and artificial intelligence—if anything it will accelerate the trend. Employers will prioritize automation over hiring back low-value workers. Jobs developing—and driving—automation will thrive.

By our calculations, these five economies will drive anywhere from 15.5 million to 18 million job openings over the next five years.

The Three Scenarios

While each of these economies has the potential to be a significant economic dynamo, none of them is entirely new. At the outset of the pandemic, these five economies comprised nearly 5 million jobs in total, an increase of 48% over the prior five years. That's roughly in line with the increase in job openings across the entire economy.⁷

Not all of these five economies grew at the same rate, however. Roles in the automated economy rose 19% annually, while those in the more staid logistics economy grew only 3% annually.

But, even for those economies that had been on a slow growth trajectory, there is every reason they should evolve and accelerate in the years ahead. So the

Table 2: Economy Growth Over Five Years

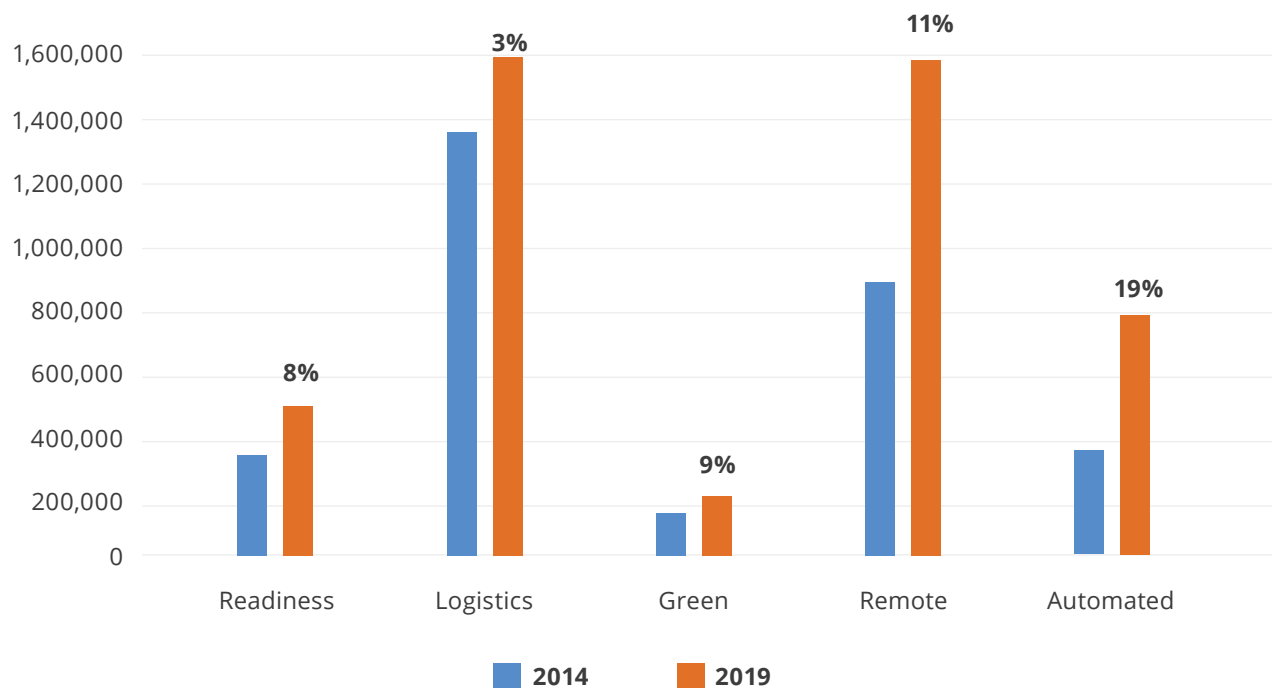
Economy	2014 Demand	2019 Demand	Annualized Growth Based on Net Job Posts
Readiness	343,643	496,942	8%
Logistics	1,368,065	1,590,399	3%
Green	162,938	240,416	9%
Remote	944,834	1,559,754	11%
Automated	349,025	806,401	19%
All Economies	3,168,505	4,693,912	9%
US	23,972,284	35,229,843	8%

Sources: Burning Glass Technologies job posting data and Bureau of Labor Statistics JOLTS data.

⁷ Estimates based on the federal government's JOLTS data

question is how quickly they will grow. Based on our estimates, these roles could account for 15.5 million to 18 million job openings over the next five years. The lower, or baseline, projection assumes growth continues as it has for the past five years. The other two scenarios envision growth rates increasing by 25% and 50%, respectively.

Figure 5: Annualized Growth, 2014-2019, Based on Net Job Posts



Sources: Burning Glass Technologies job posting data and Bureau of Labor Statistics JOLTS data.

Table 3: Growth Rate Scenarios by Economy

Economy	Baseline Scenario		25% Increase Scenario		50% Increase Scenario	
	Growth Rate	5-Year Openings Projection	Growth Rate	5-Year Openings Projection	Growth Rate	5-Year Openings Projection
Readiness	8%	1,562,994	10.08%	1,657,439	12.10%	1,756,874
Logistics	3%	4,337,261	4.03%	4,442,036	4.83%	4,549,046
Green	9%	766,323	10.66%	815,248	12.79%	866,902
Remote	11%	5,359,159	13.89%	5,804,660	16.67%	6,282,331
Automated	19%	3,489,665	24.01%	3,988,786	28.82%	4,548,798

Sources: Burning Glass Technologies job posting data and Bureau of Labor Statistics JOLTS data.

Common Threads: Building Apps, Analyzing Data & Managing Change

Certain roles, and certain skills, cross over different economies—not a surprise since technological change is driving transformation everywhere. But it is a reminder that the skills demanded in a specific role are often a combination of technical ability, human or “soft” skills, and specific industry knowledge.

Software developers are a prime example. All of the five economies have strong demand for developers as they rush to implement new technologies. But there’s no such thing as a generic software developer. In addition to specific programming languages, developers need to understand the business case they are working on. A health care app has different demands than a supply chain management app or a financial services app.

Figure 6: 14 Foundational Skills Key for All Graduates

These 14 skills are in high demand both for digitally intensive jobs and the wider economy. The outer ring shows the total open entry-level postings (March 2019-Feb. 2020) and the growth in number of postings (2017-2019).



Another consistent theme is project management. Any organization values the ability to get things done. And the larger the changes involved, the more employers need workers who can get them done efficiently.

Finally, the new insights provided by big data analytics are reshaping what organizations know and how they can act on that insight. Data science and analytics skills will be prized across sectors.

Previous Burning Glass research has shown that a success across occupations has come to depend on a set of New Foundational Skills: a combination of digital skills, human skills, and business skills.⁸ These skill sets allow workers to keep up with new technologies, collaborate in teams, and solve practical business problems. That combination of skills holds true across the economies we examine here.

The Middle-Skill Imperative

Throughout this report, we have worked to call out not only the high-skill jobs that we expect to grow but also those middle-skill jobs with promise. One of the concerns about a so-called “K-shaped” recovery is that jobs for college-educated, high-skill workers will come back much faster than those for lower-skill workers. Even before the COVID crisis, however, technology has been “hollowing out” the job market, with middle-skill jobs more likely to be offshored or replaced by technology, while high- and

lower-skill jobs gain. Middle-skill jobs have historically been the ones that propel and keep families in the middle class. With only one-third of Americans holding a college degree, this has profound implications for equity and prosperity.

There are middle-skill opportunities in each of the five economies. Automation may be a prime culprit in the “hollowing out” of middle-skill jobs, but there will still be jobs in this field that don’t require a college degree. Robotics Technicians, Repair Technicians, and Automotive Service Technicians are all occupations that will increasingly require knowledge of AI and robotics. The demand for these roles in AI is currently small but will be essential once the field gets rolling—everything eventually needs to be repaired.

Biotechnology, infrastructure, green industries, and health care also have middle-skill opportunities. Biotechnology, for example, has a significant number of high-skill manufacturing roles. Solar panels and wind turbines need to be installed and maintained. And there also will be sales and business development opportunities.

But it is true that more sophisticated skills will, in most cases, be the driving force in these fields. These have tended to be college-level roles in the eyes of employers. But even when the skills may not require a college degree, they may well require retraining for middle-skill workers to keep up.

⁸ Burning Glass Technologies, “The New Foundational Skills of the Digital Economy,” March 2019, <https://www.burning-glass.com/research-project/new-foundational-skills/>

3

The Readiness Economy

Public health will undoubtedly be a national priority in the aftermath of the pandemic, for much the same reason that energy dominated 1970s policy after the OPEC oil embargo, or terrorism took first place after 9/11: The scars are still fresh, and the problem urgent.

Expanding public health capacity, while perhaps daunting, is also a well-defined challenge. There are clear credentialing requirements, training organizations, and talent pipelines to provide the nation with more nurses, medical technicians, coders, and other roles.

But the focus of readiness efforts will not be solely on public health problems for the simple reason that such a course is excessively narrow in its awareness of vulnerability. Scenarios that were formerly the province of specialists and screenwriters will likely become priorities. Institutions will rethink how they guard against a range of potential crises, such as

cybersecurity breaches, power grid failure, or environmental catastrophe. Readiness against these threats is likely to become a standard part of strategic planning.

But planning means little without the talent in place to carry it out.

Out of the five we examined, the Readiness Economy has the richest opportunities for middle-skill workers. Specialized training may be required but many of these roles already have talent supply chains that can be expanded to fill the need.

Sectors of the Readiness Economy

Biotechnology

Rapidly changing virus mutations and variants have demonstrated that biotechnology roles, including scientists, researchers, and manufacturers, will be in high demand.

Cybersecurity

Private companies and governments alike have succumbed to cyberattacks as an increasing amount of work has moved online. Cybersecurity roles will lead the way in ensuring businesses and the public sector are ready for future global crises.



Infrastructure

Infrastructure will be key to disaster preparedness, including utility workers, engineers, and others who maintain essential systems.

Public Health

Limited access to COVID testing and slow vaccine rollouts have shown that our public health capacity needs a boost. In addition to those in the medical sector, this will include public outreach and communications.

Table 4: The Readiness Economy

Sector	Demand	Employment	Median Salary	Baseline Scenario		25% Increase Scenario		50% Increase Scenario	
				Growth Rate	5-Year Openings Projection	Growth Rate	5-Year Openings Projection	Growth Rate	5-Year Openings Projection
Biotechnology	38,148	115,920	\$61,455	1.74%	112,995	2.18%	114,471	2.61%	115,963
Cybersecurity	62,271	118,203	\$83,175	37.41%	602,667	46.76%	767,219	56.11%	968,587
Infrastructure	329,671	1,242,891	\$54,910	6.32%	1,096,098	7.90%	1,148,008	9.48%	1,202,075
Public Health*	5,428	20,173	\$56,179	-13.67%	9,870	1.00%	15,468	2.00%	15,937

Note: Overall economy demand is less than the sum of each sector's demand because some job postings appear in multiple sectors.

**Scenarios have been updated to 1% growth and 2% growth to reflect predicted shift towards this sector.*

Sources: Burning Glass Technologies job posting data and Bureau of Labor Statistics JOLTS data.

4

The Logistics Economy

Most people don't think about supply chains until they break—and global supply chains broke down dramatically in the wake of the pandemic. Global restrictions on movement and sudden shifts in demand left some suppliers overstretched and others with bare shelves. For example, back in March when restaurants closed and people stocked up on food, consumer spending shifted to grocery shopping by 29% and away from restaurants by 27%. But food couldn't just be shifted from restaurants to supermarkets; restaurant packaging and containers are different in size, price, and brand.⁹

Creating more resilient supply chains is a highly sophisticated endeavor that affects jobs from data analytics to the warehouse floor.

While this has been the slowest-growing sector of the five economies, there is

actually a significant amount of overlap between the jobs and skills in demand here and in the Automated Economy. The primary reason is the rise of a field called Industrial Big Data Analytics, which sifts the manufacturing data produced by the Internet of Things to improve operations.¹⁰ Put in that perspective, it is perhaps less surprising that one of this economy's fastest growing skills will be for data privacy. The more supply chains are driven by data collected from the Internet of Things, the more privacy concerns will arise.

As a result, the rise of this economy is likely to drive as much of a surge in demand across all sectors for Business Intelligence Analysts and for Software Developers as for more traditional logistics roles, with similar rates of growth for technical roles like Computer Systems Engineers, and Network Engineers. But there will also be increased demand for Supply Chain Managers

9 McKinsey & Co., "US food supply chain: Disruptions and implications from COVID-19," July 2, 2020, <https://www.mckinsey.com/industries/consumer-packaged-goods/our-insights/us-food-supply-chain-disruptions-and-implications-from-covid-19>

10 Journal of Big Data, "Predictive big data analytics for supply chain demand forecasting: methods, applications, and research opportunities," July 25, 2020, <https://journalofbigdata.springeropen.com/articles/10.1186/s40537-020-00329-2>

and sales-oriented roles like Business Development Managers.

Demand for millions of warehouse and delivery workers surged during the pandemic, and it is reasonable to believe that demand in these roles will remain strong as a much higher proportion of Americans work from home (see the Remote Economy). But those roles are not likely to drive change in this sector, nor are the skill demands expected to shift. The challenge for middle-skill workers in this sector will be

in gaining the skills to move up or move on. Some roles, such as Supply Chain Managers and Sales Representatives, may be good options for these workers with additional training.

Sectors of the Logistics Economy

Industrial Big Data Analytics

New data management and data analysis will be required to handle the huge output of data from manufacturing across systems and applications.

Table 5: The Logistics Economy

Sector	Demand	Employment	Median Salary	Baseline Scenario		25% Increase Scenario		50% Increase Scenario	
				Growth Rate	5-Year Openings Projection	Growth Rate	5-Year Openings Projection	Growth Rate	5-Year Openings Projection
Industrial Big Data Analytics	244,190	580,403	\$56,410	2.46%	716,091	3.07%	729,294	3.69%	742,713
IoT and Specifically in Supply Chain	340,181	861,652	\$52,700	1.74%	976,308	2.17%	989,035	2.61%	1,001,909
Logistics and Supply Chain Management	899,661	3,639,400	\$42,580	3.14%	2,452,608	3.93%	2,510,387	4.71%	2,569,369
Manufacturing of Pharma	176,908	583,603	\$54,536	4.43%	570,633	5.53%	589,576	6.64%	609,073
Manufacturing of PPE and Medical Equipment	91,974	312,631	\$49,061	9.71%	317,055	12.14%	340,104	14.57%	364,614

Note: Overall economy demand is less than the sum of each sector's demand because some job postings appear in multiple sectors.

Sources: Burning Glass Technologies job posting data and Bureau of Labor Statistics JOLTS data.

Internet of Things (specifically in Supply Chain Management)

IoT technology that fuels cloud services, mobile computing, and analytics has already changed the logistics economy. This will continue to impact asset tracking, inventory and warehouse management, and fleet management.

Logistics and Supply Chain Management

Product managers, analysts, and other analytical roles will be in high demand to bring together technical skills and an understanding of available infrastructure.

Manufacturing of Pharma

As the race to manufacture vaccines and new treatments for COVID and its variants continues, manufacturing of pharmaceuticals will become increasingly important.

Manufacturing of PPE and Medical Equipment

Shortages of masks and other PPE throughout the pandemic have contributed to some of this manufacturing being “on-shored” and returned to U.S. locations, a trend that is likely to continue.



5

The Green Economy

The challenge of the green economy is largely one of scale and speed. Fossil fuel infrastructure is deeply embedded in the economy. President Biden has called for carbon-free electricity by 2035 and 100% clean energy by 2050 (many other industrialized nations have made similar pledges). General Motors has announced it intends its entire product line to be off gasoline and diesel fuel by 2035.¹¹ Yet today the U.S. is still overwhelmingly dependent on fossil fuels, with roughly 80% of all our energy coming from oil, natural gas, and coal.

The economic trend is green, even without additional incentives. Even before the recent announcement, the growth in energy use was expected to be in renewables, with baseline government projections estimating that 38% of all electricity generation will be from renewables by 2050.¹² Although solar installations—and energy use in general—took a major dive in the second quarter of 2020 because of the pandemic, it's

significant that solar made up the difference and then some in the rest of the year.¹³

In fact, despite the pandemic, demand increased for Solar Sales Representatives (up 70%) and Solar Installers (up 56%) between 2019 and 2020. These jobs don't require a bachelor's degree and pay well. There are other sub-BA roles that have good prospects in this field, such as Wind Turbine Technicians and Environmental Technicians.

There are other signs that the green economy held onto its growth potential in the pandemic. Demand for alternative energy managers continued to grow (88%), as did Financial Analysts (68%) and Engineering Managers (61%). Postings for some roles, such as Environmental Engineers and Environmental Planners, fell roughly 22% from 2019 to 2020, but could rebound as the economy recovers.

11 Wall Street Journal, "GM to Phase Out Gas- and Diesel-Powered Vehicles by 2035," Jan. 28, 2021, <https://www.wsj.com/articles/gm-sets-2035-target-to-phase-out-gas-and-diesel-powered-vehicles-globally-11611850343>

12 Energy Information Administration, Annual Energy Outlook 2020, <https://www.eia.gov/outlooks/aeo/>

13 SEIA/Wood Mackenzie Power & Renewables, "U.S. Solar Market Insight Q4 2020, Dec. 15, 2020 <https://www.seia.org/research-resources/solar-market-insight-report-2020-q4>

In many ways, the green economy overlaps with the infrastructure demands of the readiness economy. If, for example, the U.S. moves more toward electric cars, then it will need a network of charging stations to rival the corner gas station. President Biden has already proposed adding 500,000 new charging stations around the country,

which is nearly five times the number of gas stations in the U.S.^{14,15} Such an effort would create jobs, but the skills involved would be those already found among construction workers and electricians. A corresponding decline in gasoline vehicles would create jobs for environmental technicians to decommission gas stations.

Table 6: The Green Economy

Sector	Demand	Employment	Median Salary	Baseline Scenario		25% Increase Scenario		50% Increase Scenario	
				Growth Rate	5-Year Openings Projection	Growth Rate	5-Year Openings Projection	Growth Rate	5-Year Openings Projection
Environmental Scientists, Engineers, and Technicians	87,330	516,656	\$52,985	6.08%	266,132	7.60%	278,257	9.12%	290,868
Fuel Cell and Nuclear	10,801	57,670	\$72,193	7.60%	41,678	9.49%	44,050	11.39%	46,539
Natural Resource Conservation*	20,504	111,204	\$43,126	-3.11%	44,446	1.00%	50,295	2.00%	51,819
Pollution Removal, Waste Management, and Recycling	26,165	336,975	\$38,874	11.81%	93,400	14.76%	101,651	17.72%	110,534
Renewable Energy	92,008	410,422	\$52,639	14.86%	377,702	18.58%	419,616	22.29%	465,535

Notes: Overall economy demand is less than the sum of each sector's demand because some job postings appear in multiple sectors.

* Scenarios have been updated to 1% growth and 2% growth to reflect predicted shift towards this sector.

Sources: Burning Glass Technologies job posting data and Bureau of Labor Statistics JOLTS data.

14 CNET, "Biden administration promises an EV era, new world for the auto industry," Jan. 20, 2021, <https://www.cnet.com/show/news/joe-biden-administration-ev-autos-transportation-infrastructure/>

15 There were 111,000 U.S. retail locations that sold gasoline in 2016. Statista.com, "Number of gasoline station establishments in the United States from 2013 to 2016," March 5, 2020, <https://www.statista.com/statistics/525107/number-of-gasoline-stations-in-the-united-states/>

Sectors of the Green Economy

Environmental Scientists, Engineers, and Technicians

This sector includes jobs focused on studying the health of the environment and ways in which we can move to a more sustainable future. Public and private investment in this field is expected to surge as federal policy shifts.

Renewable Energy

Investment in renewable or clean energy sector is expected to increase under the new administration. This will drive hiring in the sector mostly for individuals specialized in solar and wind energy. New technological advances could also create jobs for those who specialize in other alternative energy sources such as geothermal or biofuels.



Fuel Cell and Nuclear

Nuclear power is controversial but remains the world's largest source of non-fossil fuel energy. Fuel cells, while only in limited use, have potential as a clean energy source. In addition, as the pandemic drives funds into health care, we also expect to see a proliferation of nuclear-based technologies in medicine.

Pollution Removal, Waste Management, and Recycling

As the world grinded to a halt under lockdown orders and the smog of pollution cleared the air and fuel waste cleared from waterways, we got a view of what could be if we manage to keep pollution and waste under control. This, along with the march to alternative energy, will boost hiring in this sector.¹⁶

Natural Resource Conservation

This includes jobs that aim to preserve the Earth's natural resources and habitats. This sector is driven by government spending and regulation and is expected to increase during the Biden administration.

¹⁶ "NASA Model Reveals How Much COVID-related Pollution Levels Deviated from the Norm," NASA Earth Sciences News Team, Nov. 17, 2020, <https://www.nasa.gov/feature/goddard/2020/nasa-model-reveals-how-much-covid-related-pollution-levels-deviated-from-the-norm>

6

The Remote Economy

The pandemic plunged both work and school into a massive adoption of remote technology—one that is likely to stick. But it also comes with a lot of questions still to be answered.

“Zoombombing,” or hijacking a videoconference session, was an annoying and sometimes offensive hacking threat that arose during the pandemic, but not a particularly dangerous one. Yet it was indicative of the problem: Organizations that had spent huge sums securing their corporate systems now had all of their employees working from home, using unsecure personal devices, badly configured home Wi-Fi networks, and applications that were never designed for widespread use. Effectively, millions of new security holes opened overnight.

“Security Operations Centers (SOCs) have been designed to look for anomalous behaviors; today, SOCs are operating with impaired visibility because everything looks

anomalous,” said cybersecurity experts at the World Economic Forum.¹⁷

Cloud computing and network systems roles are the drivers of the Remote Economy, but artificial and virtual reality is the future of the sector. The more people learn and work from home, the more they will want to recreate the in-person experience—or at least have a richer virtual one.

At this point, the remote economy is primarily a college-educated economy. There will likely be some increased demand for customer service reps and truck drivers, but these are also under threat by the advances in the automated economy.

There is, however, a demand for sales and marketing roles across sectors—many of which are roles that may ask for a bachelor’s degree but may not actually need one. Additional targeted training could open up these roles to a wider pool.

¹⁷ World Economic Forum, “5 principles for effective cybersecurity leadership in a post-COVID world”, May 26, 2020, <https://www.weforum.org/agenda/2020/05/principles-for-effective-cybersecurity-leadership-covid-19-coronavirus-pandemic-cyberattacks-cyber-risk-security-cloud-technology/>

Sectors of the Remote Economy

AR/VR

With workers at home, AR and VR technologies will help employees collaborate and connect with their colleagues from far-flung locations. New sectors, such as medical appointments, may also move toward using AR/VR technology to perform remote work.

Cloud

Prior to the pandemic, cloud technology was already on the rise. This will continue to be imperative to supporting the remote economy.

E-Commerce

As more people work from home, shopping habits will continue to shift from in-person to online. With the expansion of the

e-commerce sector comes an increased need for logistics, enhancing the logistics economy.

EdTech

Students and parents have experienced a number of experimental education technology platforms throughout the pandemic thus far. With remote learning potentially necessary in the future, new developments in EdTech will meet the needs for better online curriculum development and execution. This will also accelerate to the shift in higher-ed toward micro-credentials and certificates.

Network Systems

In order to keep the remote economy going, Network Administrators and other IT roles will become more pivotal to ensuring a productive workforce.

Table 7: The Remote Economy

Sector	Demand	Employment	Median Salary	Baseline Scenario		25% Increase Scenario		50% Increase Scenario	
				Growth Rate	5-Year Openings Projection	Growth Rate	5-Year Openings Projection	Growth Rate	5-Year Openings Projection
AR/VR	59,531	131,039	\$66,058	33.57%	422,725	41.96%	526,820	50.35%	652,092
Cloud	288,694	451,479	\$79,799	32.10%	1,832,051	40.12%	2,264,233	48.15%	2,780,911
E-Commerce	92,244	349,404	\$57,725	27.81%	545,277	34.76%	657,280	41.71%	788,531
EdTech	18,454	87,792	\$52,069	23.63%	100,854	29.54%	118,532	35.45%	138,828
Network Systems	1,201,305	2,651,109	\$74,187	7.32%	3,608,721	9.15%	3,806,741	10.99%	4,014,276

Note: Overall economy demand is less than the sum of each sector's demand because some job postings appear in multiple sectors.

Sources: Burning Glass Technologies job posting data and Bureau of Labor Statistics JOLTS data.

7

The Automated Economy

Automation and artificial intelligence were going to reshape the world of work whether the pandemic happened or not. What the pandemic has done is sharply accelerate the advantages of automating jobs.

The ultimate impact of automation on the job market is still a question mark. The seminal work on the risk of automation estimates half of all jobs could be automated, but that doesn't mean they will be.¹⁸ A recent study by MIT found that more jobs will be changed by automation than created or destroyed—and based on our study of job postings, we agree.¹⁹

In the near term, however, the most certain impact is on roles that create and maintain automation systems. Many of the skills in demand for these roles are similar whether the specific field is health care, robotics, or finance. Kubernetes, TensorFlow, Docker Software, and Deep Learning appear

regularly in job descriptions. Deep Learning, Computer Vision, and Autonomous Driving, however, do have a distinctive set of skills apart from AI in general.

Besides Software Developers, some of the essential roles here are likely to be Data Scientists, Network Engineers, and Product Managers.

Sectors of the Automated Economy

AI and Robotics in Health Care

This includes jobs that use artificial intelligence or robotics to assist health care workers. For example, AI can potentially be used to improve the accuracy of medical diagnoses and discover new drug therapies. Robotics can be used to perform long-distance surgery (doctor and patient no longer have to be in the same hospital) and

18 Oxford Martin School, "Automation and the future of work – understanding the numbers," April 13 2018, <https://www.oxfordmartin.ox.ac.uk/blog/automation-and-the-future-of-work-understanding-the-numbers/>

19 MIT Work of the Future, "The Work of the Future: Building Better Jobs in an Age of Intelligent Machines," Nov. 17, 2020, <https://workofthefuture.mit.edu/research-post/the-work-of-the-future-building-better-jobs-in-an-age-of-intelligent-machines/>

increase surgical precision. We expect the use of these technologies to proliferate as the health care industry looks for ways to treat patients remotely, predict ailments more accurately, and develop treatments more quickly.

AI in Finance and Investment

This sector includes jobs that use artificial intelligence to help bankers and investors make sound financial decisions. In particular, AI in finance enhances the ability to calculate

risk. This technology is also a substitute to workers in this field as it reduces the time, cost, and error associated with manual risk calculation. As the pandemic laid ruin to financial markets, we expect the industry to increase the adaptation of these technologies.

AI, Natural Language Processing (NLP), and Machine Learning

This is a broad sector and covers a range of jobs from developers to workers who use

Table 8: The Automated Economy

Sector	Demand	Employment	Median Salary	Baseline Scenario		25% Increase Scenario		50% Increase Scenario	
				Growth Rate	5-Year Openings Projection	Growth Rate	5-Year Openings Projection	Growth Rate	5-Year Openings Projection
AI and Robotics in Healthcare	98,512	233,785	\$55,255	8.41%	321,697	10.52%	341,970	12.62%	363,359
AI in Finance & Investment	130,271	259,173	\$73,483	12.90%	507,408	16.12%	556,332	19.35%	609,338
AI, Natural Language Processing & Machine Learning	251,079	466,341	\$69,540	39.80%	2,096,055	49.75%	2,702,873	59.70%	3,452,926
Computer Vision & Autonomous Driving	112,050	473,697	\$45,105	19.19%	512,530	23.99%	585,768	28.79%	667,933
Robotics & Process Automation	246,180	640,813	\$60,406	19.30%	1,143,090	24.13%	1,307,359	28.96%	1,491,759

Note: Overall economy demand is less than the sum of each sector's demand because some job postings appear in multiple sectors.

Sources: Burning Glass Technologies job posting data and Bureau of Labor Statistics JOLTS data.

the technology to enhance their productivity and capacity. Natural Language Processing, for example, has become increasingly important in customer service departments to increase capacity and handle surges in calls. NLP technology can often handle routine requests from customers and more efficiently get customers to the right representative.

Computer Vision and Autonomous Driving

This includes jobs that are mostly focused on research and development of these technologies. The surge of online shopping amid the pandemic has strained shipping, delivery, and other vehicle-for-hire services. This has pushed investment in autonomous vehicles as companies look for ways to increase capacity.

Robotics and Process Automation

Robotics and Process Automation covers robotics and artificial intelligence as it relates to manufacturing and production. While this sector will create high-paying jobs for developers of this technology, it will likely replace factory workers.



8

Implications

The world's response to the pandemic was a failure of preparedness. The recovery from the pandemic should not suffer from the same failure. Understanding the direction of skill change allows policymakers, employers, and educators to fashion a response that can speed the recovery.

A central part of this response should involve career pathways—mapping out the shortest, most cost-effective ways to reskill displaced workers. In this approach, workers would build on the skills they already have to get to “adjacent” jobs that offer better prospects for pay and promotion. This can lead to a far more strategic approach to career development.

For example, a retail worker in an electronics store could, with the addition of some basic computer skills, move on to customer support, and then to a Computer User Support Specialist. This kind of “help desk” job is a good gateway to an IT career, and particularly to the networking and cybersecurity roles needed in the recovery economies we have identified.

In research conducted for the World Economic Forum by Burning Glass and BCG, we found that this reskilling strategy was a far more cost-effective solution for governments than traditional public support, and more cost-effective for business than firing and rehiring workers as skill needs change. As for the workers themselves, our report found that with reskilling, workers at risk of automation could expand their career options fivefold, with the opportunity to increase income by up to \$15,000.

Without reskilling, one in four workers would see their income drop by \$8,600.²⁰

Policy makers

No one savors the idea of a K-shaped recovery where the skilled prosper and the less-skilled do not. That takes us toward an economy that is not only less equitable but also less prosperous. A successful economy cannot be constantly vulnerable to cyberattacks or other shocks. Nor will businesses be globally competitive if they can't find the skilled workers they need.

20 “Towards a Reskilling Revolution,” January 2018, World Economic Forum, http://www3.weforum.org/docs/WEF_FOW_Reskilling_Revolution.pdf.

Upskilling and reskilling programs can be directed toward building those future skills that offer high value for both businesses and workers. Career pathways can be designed to move displaced workers into more promising roles. And government financial aid can be structured to encourage working learners to pick up individual skills as needed, rather than drop out of the workforce to gain a degree.

Finally, by leveraging the skills likely to drive the recovery, policy can encourage faster, more equitable growth.

Employers

With millions of Americans unemployed, a skills gap may seem a distant prospect. But a million unemployed waitstaff is of little use to an employer who needs a Kubernetes developer. Shortages of key skills can create bottlenecks that can slow a recovery—and with many technical skills, that can also

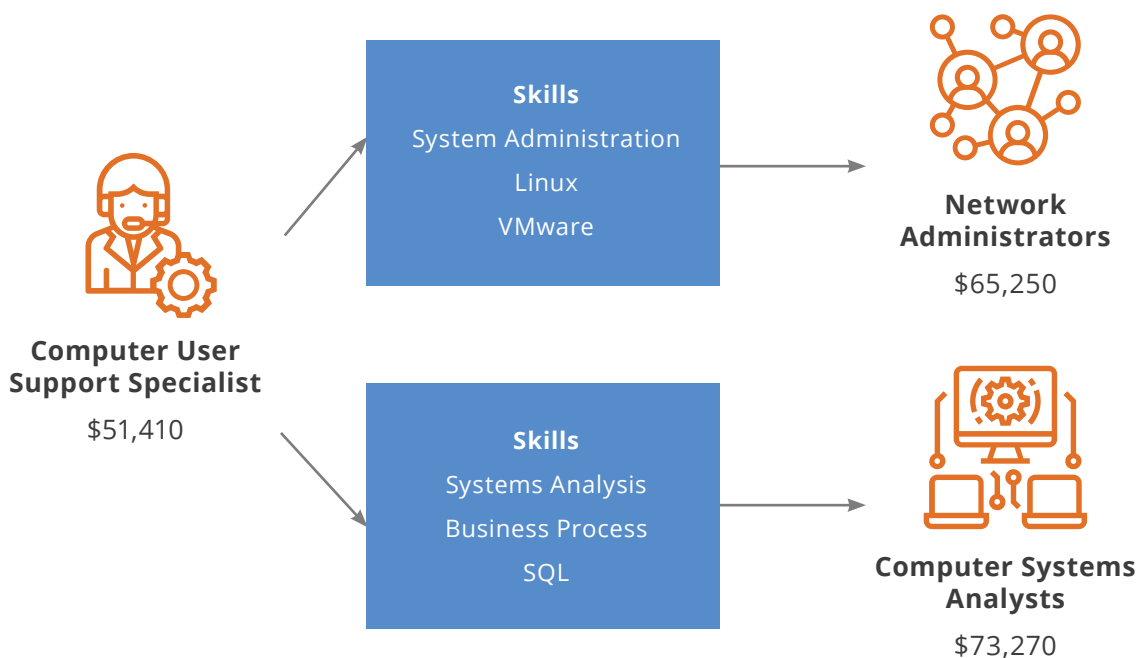
encourage employers to look for remote talent elsewhere.

If employers see these skill demands on the horizon, they can both create more effective talent pipeline externally and internally, preparing their workforces to switch to new and promising technologies.

Educators

The U.S. higher education system is facing an unprecedented financial crisis, but also a great opportunity. There will be significant need for workers to retool and new possibilities for workers to advance up the career ladder. Yet we have a higher education system that is still primarily focused on providing degrees to traditional students. A more flexible, bite-sized approach could give higher education the chance to broaden its base and meet the needs of these new economies.

Figure 7: Job Paths Based on Skills



9

Methodology

We defined four to five sub-sectors for each of the five economies:

- Readiness: Biotech; Public Health; Infrastructure; Cybersecurity
- Logistics: Manufacturing of PPE and Medical Equipment; Manufacturing of Pharma; Logistics and Supply Chain Management; IoT specifically in supply chain; Industrial Big Data Analytics
- Automated: Robotics and process automation jobs; Artificial Intelligence, Natural Language Processing, Machine Learning; Computer vision and autonomous driving; AI (diagnosis) and Robotics in Health Care; AI in Finance and Investment
- Remote Economy: Network engineers/architects/support; AR/VR; Cloud related jobs; E-commerce; EdTech
- Green: Environmental Scientists, Engineers, and Technicians; Fuel Cell and Nuclear; Natural Resource Conservation; Pollution Removal, Waste Management, and Recycling; Renewable Energy

For each sector in each economy, we identify top jobs requiring a bachelor's degree or above (BA+ jobs), top jobs requiring less than a bachelor's (sub-BA jobs), and emerging titles. For each of these occupations, we also identify key emerging skills. This focuses on skills that are growing from 2014 to 2019, some of which may be new skills and some of which are core to the job. Since each sector is unique and distinct, we do not provide a list of skills at the economy level, but rather at the occupation level.

9

Appendix

The roles and skills below are a selection of those likely to underlie each of the five economies. In each case, the roles and skills were selected based on how frequently they are cited in job postings in the relevant fields as well as by our analysis of likely trends.

The Readiness Economy

Table 9: Biotechnology

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Researcher / Research Associate	BA+	1,991	1,913	\$67,807	Gene Therapy qPCR CRISPR Python
Quality Control Analyst	BA+	754	818	\$59,948	Laboratory Testing Gene Therapy Enzyme-Linked Immunosorbent Assay (ELISA)
Biostatistician	BA+	584	1,661	\$124,924	Statistical Programming Quality Assurance and Control Next Generation Sequencing (NGS)
Production Worker	Sub-BA	339	389	\$38,036	Cell Culturing Chemical Engineering Bioreactors

Table 10: Cybersecurity

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Cyber / Information Security Engineer / Analyst	BA+	30,640	31,086	\$97,598	Platform as a Service (PaaS) Infrastructure as a Service (IaaS) Microsoft Azure CyberArk Cloud Architecture
Software Developer / Engineer	BA+	4,262	4,456	\$105,760	Risk Management Framework Nessus CyberArk
Technology Consultant	BA+	1,036	864	\$107,551	Information Security Cybersecurity Assessment Penetration Testing Threat Analysis

Table 11: Infrastructure

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Civil Engineer	BA+	21,605	17,318	\$82,343	Municipal Engineer Forensic Engineering SketchUp Community Development
Computer Systems Engineer / Architect	BA+	7,973	7,268	\$102,226	SysML Ansible Cloud Architecture Chef Infrastructure Automation
Mechanical Engineer	BA+	7,873	4,901	\$81,695	3D Printing / Additive Manufacturing (AM) 3D rendering Office Automation
CAD Designer / Drafter	Sub-BA	3,650	2,430	\$48,329	Geographic Information System (GIS) Information Systems Land Survey Computer-Aided Design (CAD) Software
General Engineering Technician / Technologist	Sub-BA	3,200	2,626	\$52,868	Welding Masonry Nondestructive Testing (NDT)

Table 12: Public Health

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Physician	BA+	332	306	\$174,451	Influenza Disease Prevention Vaccination Emergency Medicine
Family / School / General Social Worker	BA+	158	218	\$51,406	Mental Health Influenza Needs Assessment
Registered Nurse	Sub-BA	724	748	\$63,943	Influenza Anesthesiology Communicable Disease knowledge

The Logistics Economy

Table 13: Industrial Big Data Analytics

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Business / Management Analyst	BA+	9,866	8,279	\$91,472	Data Privacy Python Tableau
Sales Representative	BA+	6,212	3,631	\$59,746	Information Systems Data Privacy Data Security
Customer Service Representative	Sub-BA	2,511	2,342	\$33,543	Big Data Analytics Big Data Business-to-Business

Table 14: IoT and Specifically in Supply Chain

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Business Development / Sales Manager	BA+	6,614	4,795	\$94,914	Internet of Things (IoT) Machine Learning Tableau
Project Manager	BA+	6,476	4,345	\$93,039	Data Security Data Privacy Big Data Tableau
Production Worker	Sub-BA	1,438	1,437	\$32,407	Quality Assurance and Control Information Security Electromechanical Assemblies

Table 15: Logistics and Supply Chain Management

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Logistics / Supply Chain Analyst	BA+	1,797	1,599	\$55,211	Tableau Operations Analysis Change Management Network Hardware/ Software Maintenance
Network Engineer / Architect	BA+	1,307	1,164	\$92,568	Warehouse Management Systems Supply Chain Planning Infrastructure as a Service (IaaS) Management Consulting
Warehouse / Distribution Supervisor	Sub-BA	5,430	7,009	\$39,293	Operations Management Process Improvement Key Performance Indicators (KPIs) Third-Party Logistics (3PL) Programs

Table 16: Manufacturing of Pharma

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Researcher / Research Associate	BA+	4,255	4,617	\$72,158	Genomics Data Science Machine Learning Predictive Models
Chemical / Process Engineer	BA+	2,392	2,326	\$83,898	Cell Therapy Immune System Gene Therapy Python
Laboratory Technician	Sub-BA	2,449	2,508	\$35,878	Inventory Management Inventory Control Informed Consent Procedures

Table 17: Manufacturing of PPE and Medical Equipment

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Account Manager / Representative	BA+	1,977	1,666	\$68,532	Toxicology Complex Sales Business-to-Business Sales
Regulatory Affairs Specialist	BA+	1,209	1,311	\$68,853	Negotiation Skills Good Clinical Practices (GCP) External Auditing
Production Worker	Sub-BA	1,503	1,428	\$28,350	ISO 14001 Standards Quality Management Ergonomics

The Green Economy

Table 18: Environmental Scientists, Engineers, and Technicians

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Sustainability Specialist	BA+	2,360	2,260	\$73,305	Cost Estimation Hydrology Sustainable Design
Energy Engineer	BA+	2,290	1,872	\$82,666	Python Photovoltaic (PV) Systems Carbon Reduction
Environmental Technician	Sub-BA	10,813	10,244	\$34,387	Performance Analysis Process Control Emissions Monitoring

Table 19: Fuel Cell and Nuclear

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Nuclear Engineer	BA+	775	904	\$113,385	Ionizing Radiation Performance Analysis Environmental Restoration Machine Operation
Mechanical Engineer	BA+	384	350	\$59,873	Python Power Plant Systems Machinery
Power Distributor / Plant Operator	Sub-BA	951	928	\$53,128	SQL Data Warehousing Extraction Transformation and Loading (ETL) Schematic Diagrams

Table 20: Natural Resource Conservation

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Forester	BA+	3,376	3,153	\$41,572	Environmental Science Geographic Information System (GIS) Data
Wildlife Biologist	BA+	2,973	2,701	\$46,652	Construction Monitoring Environmental Restoration AutoCAD Debris and Litter Control
Forest / Conservation Technician	Sub-BA	5,104	5,013	\$35,855	Disaster Response Database Management Survey Instruments

Table 21: Pollution Removal, Waste Management, and Recycling

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Water / Wastewater Engineer	BA+	5,330	4,718	\$82,016	Hydraulic Engineering Python Esri Software Urban Planning
Water Treatment Specialist / Waste Water Operator	Sub-BA	6,766	6,783	\$39,464	Plant Safety Ion Exchange Analytical Testing
Hazardous Materials Worker	Sub-BA	3,645	4,192	\$35,042	Debris and Litter Control Equipment Maintenance

Table 22: Renewable Energy

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Software Developer / Engineer	BA+	1,840	1,478	\$94,093	NoSQL Energy Conservation Machine Learning
Energy Analyst / Auditor	BA+	873	701	\$70,012	Sales Energy Consulting Python
Solar Sales Representative	Sub-BA	7,083	12,089	\$41,097	Renewable Energy Energy Sales Energy Consulting
Solar Installer	Sub-BA	4,679	7,344	\$33,761	Roofing Solar Systems Electrical Work

The Remote Economy

Table 23: AR/VR

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Hardware Engineer	BA+	1,492	1,344	\$113,856	Deep Learning Robotics Lidar Convolutional Neural Network (CNN)
Mobile Applications Developer	BA+	855	488	\$108,114	Swift (Programming Language) Machine Learning Artificial Intelligence Internet of Things (IoT)
Customer Service Representative	Sub-BA	116	128	\$39,698	Virtual Reality (VR) Graphics Processing Units (GPU) Key Performance Indicators (KPIs)

Table 24: Cloud

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Network Engineer / Architect	BA+	19,960	19,790	\$118,137	Internet of Things (IoT) AWS CloudFormation Artificial Intelligence IBM Cloud Oracle Cloud
Cyber / Information Security Engineer / Analyst	BA+	13,881	15,676	\$111,539	Cloud Architecture Cloud Security Application Puppet
Web Developer	BA+	8,385	10,052	\$95,805	Laravel Django Microsoft Certified Professional Azure Flask Swift (Programming Language)
Repair / Service Technician	Sub-BA	534	649	\$88,526	ServiceNow IBM Cloud Microsoft Visio

Table 25: E-Commerce

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Marketing Manager	BA+	1,531	1,323	\$79,393	Tableau
Account Manager / Representative	BA+	833	960	\$78,627	Client Base Retention Direct Sales
Laborer / Warehouse Worker	Sub-BA	13,610	217,871	\$25,181	Lifting Ability
Inventory Associate	Sub-BA	11,222	147,633	\$26,760	E-Commerce Lifting Ability

Table 26: EdTech

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Software Developer / Engineer	BA+	1,119	915	\$101,820	React Javascript Microsoft Azure Functional Programming Multithreaded Programming
Curriculum and Instructional Designer / Developer	BA+	442	452	\$64,221	HTML5 Quality Assurance and Control Videography Student Learning Outcomes
Product Manager	BA+	435	317	\$105,682	Data Science Key Performance Indicators (KPIs) Market Analysis
Bookkeeper / Accounting Clerk	Sub-BA	39	36	\$38,096	Accounts Payable / Accounts Receivable Customer Checkout

Table 27: Network Systems

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Network / Systems Administrator	BA+	131,259	103,295	\$75,830	Microsoft Azure Risk Management Framework Meraki
Security Management Specialist	BA+	20,267	18,548	\$62,669	Surveillance Asset Protection Prevention of Criminal Activity Python
Computer Operator	Sub-BA	3,523	3,273	\$41,066	ServiceNow Performance Management Software Maintenance

The Automated Economy

Table 28: AI and Robotics in Health Care

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Physician	BA+	5,859	6,696	\$226,238	Robotics Surgery
Medical Scientist	BA+	3,106	3,134	\$59,374	Python Machine Learning Data Science Microarrays Proteomics
Health Care Administrator	BA+	2,977	2,908	\$79,252	Tableau Data Science Python R
Researcher/ Research Associate	BA+	796	597	\$58,671	Data Science qPCR Robotics Machine Learning Genomics

Table 29: AI in Finance and Investment

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Financial Quantitative Analyst	BA+	3,170	1,584	\$100,995	Artificial Intelligence Natural Language Processing Machine Learning Data Science Python
Product Manager	BA+	2,010	1,944	\$106,378	Machine Learning Python Data Science Key Performance Indicators (KPIs)
Financial Manager	BA+	1,577	1,430	\$102,370	Artificial Intelligence Data Science Python Machine Learning Robotics

Table 30: AI, Natural Language Processing, and Machine Learning

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Data Scientist	BA+	32,348	25,955	\$117,352	Deep Learning Computer Vision Artificial Intelligence
Researcher / Research Associate	BA+	5,724	5,133	\$93,545	Quantum Computing Genomics Deep Learning
Product Manager	BA+	5,398	4,776	\$118,018	Artificial Intelligence Data Science Python Machine Learning Deep Learning
Marketing Manager	BA+	3,120	2,820	\$101,714	Internet of Things (IoT) Computer Vision Artificial Intelligence IBM Watson
Medical Coder	Sub-BA	405	8	\$52,528	Speech Recognition Coding Quality
Automotive Service Technician / Mechanic	Sub-BA	207	283	\$73,962	Artificial Intelligence Python Machine Learning

Table 31: Computer Vision and Autonomous Driving

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Software Developer / Engineer	BA+	6,398	5,430	\$99,906	Deep Learning Robot Operating System (ROS) Artificial Intelligence Robotics Simultaneous Localization and Mapping (SLAM)
Geographer / GIS Specialist	BA+	3,564	2,901	\$52,886	Machine Learning Hazard Identification Intelligence Analysis Object Oriented Development Software Data Visualization
Hardware Engineer	BA+	867	625	\$109,975	Deep Learning Artificial Intelligence Robotics Robot Operating System (ROS) Machine Learning
Network Engineer / Architect	BA+	537	734	\$101,661	Machine Learning Robotics Lidar Computer Vision Autonomous Systems
Automotive Service Technician / Mechanic	Sub-BA	2,235	2,114	\$51,026	Business Development Vehicle Inspection Customer Contact Repair

Table 32: Robotics and Process Automation

Occupation	Education Level	2019 Demand	2020 Demand	Median Market Salary	Top Skills
Electrical Engineer	BA+	7,860	6,295	\$87,555	Artificial Intelligence Internet of Things (IoT) Electric Vehicle Machine Learning Python Image Processing
Business / Management Analyst	BA+	5,673	4,343	\$92,386	Machine Learning Artificial Intelligence Robotics
Product Manager	BA+	2,659	2,791	\$108,667	Machine Learning Python Robotics Data Science
Robotics Engineer	BA+	2,659	2,490	\$90,473	Motion Planning Python Simultaneous Localization and Mapping (SLAM) Artificial Intelligence Autonomous Systems
Robotics Technician	Sub-BA	3,254	3,168	\$46,316	Microsoft Operating Systems SQL Conveyor Systems Oscilloscopes Servo Drives / Motors
Repair / Service Technician	Sub-BA	2,346	3,284	\$46,762	Performance Analysis Conveyor Systems Electrical Diagrams / Schematics Technical Support Servo Drives / Motors

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