

How Skills Are Disrupting Work:

The Transformational Power of Fast Growing, In-Demand Skills

A “State of Skills” Report from the Burning Glass Institute,
the Business-Higher Education Forum, and Wiley

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The Business-Higher Education Forum's (BHEF) inaugural State of Skills report results from a decade of labor market analysis that identified emerging digital skills and **credential development** in response to that demand. This report marks a shift in focus to the most high-demand disruptive skills—those that will have the most disruptive impact on organizations' operations and workforce.

BHEF, in partnership with the Burning Glass Institute and Wiley, is leveraging the current landscape to understand our future reality. What skills will come to dominate the market, and what types of talent will go from niche to most needed? Most importantly, what skills should tomorrow's workers be acquiring today?

This report identifies four of the fastest growing, highest demand skill sets: Artificial Intelligence/Machine Learning, Cloud Computing, Product Management, and Social Media. Of course, these four aren't the only fast-growing skills, but they are some of the most disruptive.

As the oldest organization of business executives and higher education leaders, BHEF connects higher education institutions to business talent demand. Part of that process is illuminating emerging skills, and then building partnerships between business and higher education in response. We developed this report to drive value not only for our members and their partnerships, but also to define a new challenge for ourselves in the spirit of encouraging others to act.

With this data, we commit to work with our members and partners on a call to action that: 1) actively engages in strategic new business-higher education partnerships focused on closing newly researched skills gaps; 2) creates efficient and accessible pathways between higher education and the workforce; and 3) sets bold organizational targets and annually measures that impact.

With the strength of its members and partners, BHEF can anticipate skills needs, create equitable pathways between higher education and the workforce, and close talent gaps.

We invite you to join us as we enable today's learners to become tomorrow's most-valued workers. It is a critical journey that we undertake for our employers, our students, and our national competitiveness, and this report will help lead the way.

Brian K. Fitzgerald
CEO
Business-Higher Education Forum

We are in the midst of an immensely challenging time in the U.S. labor market.

With technology ever advancing, job requirements are evolving more rapidly than ever, making it hard for companies to find qualified workers and for individuals to qualify for good jobs. Keeping up with the changes is difficult on both sides, and it's only getting worse.

Educational institutions have an equally challenging task anticipating which classes and skills they should teach to help their students land well-paying jobs when they graduate and continue to succeed throughout their careers. It's a constantly moving target.

How can companies fill their open roles with qualified talent, and how can Gen Z and Millennials compete for those roles—and what should educational institutions prioritize to prepare learners for success—when the skills needed to fill certain positions are so quickly evolving?

The beauty of this insightful, invaluable “How Skills are Disrupting Work” report—created in partnership with the Burning Glass Institute and the Business-Higher Education Forum and sponsored by Wiley—is that it offers a blueprint to each of these three, interconnected groups on how to prepare for success.

The State of Skills report identifies four emerging skill sets that are *high-demand, durable, and accessible*. That is, they are required across many in-demand job categories, they will persist across time, and they can be learned by individuals across many walks of life.

For companies, the information in this report can be used to help build their own talent pipeline. Rather than having to find and hire a new workforce, companies can reskill and upskill the employees they already have with emerging skills.

For individuals, it offers a pathway to help determine the skills required to get a good job and successful career—durable skills that will have a big impact on their earnings five, 10, and 20 years down the road.

And for educational institutions, it serves as a guide to continued relevancy and enrollment; those that don't keep up in providing essential skills for the workforce will face even greater disruption than they are experiencing today.

At Wiley, our mission is to unlock human potential. We are devoted to promoting lifelong learning that helps bridge the gap between education and employment. That's why we're proud to be a part of this important report.

Josh Jarrett
Senior Vice President, Strategy
Wiley

Executive Summary



In 2021, one in eight job postings featured four skill sets that share two startling common features. These high-demand sets of skills—in Artificial Intelligence/Machine Learning, Cloud Computing, Social Media, and Product Management—are both among the country’s fastest growing and the economy’s most rapidly spreading into new industries. In some industries, skills from these sets are represented in up to a third of all job postings. They are showing up in surging numbers across the workforce, affecting an ever-widening diversity of jobs and industries and, together with similar skill sets, are entirely transforming work as we know it.

Across the U.S. economy, large-scale changes in work are occurring because of skills disruption: the constant re-invention of work driven by the vigorous, accelerating demand for new skills in virtually all jobs, and the spread of those skills across industries and around the world. In the past half decade, the average U.S. worker has had to replace or upgrade over a third (37%) of their skills simply to keep up with the demands of their occupation.

Skill disruption can power innovation, build worker and organizational capacity, boost productivity, and improve compensation and opportunities for advancement. But it can also upset norms and practices, render irrelevant the established education and training systems, and drive obsolescence and job loss. Technology’s role, in particular, is complex in this environment, augmenting many occupations while automating and hollowing out others.

By analyzing hundreds of millions of recent U.S. job postings, the Burning Glass Institute and the Business–Higher Education Forum (BHEF) identified four of the fastest-growing, highest-demand emerging skill sets:

- ◆ Artificial Intelligence/Machine Learning
- ◆ Cloud Computing
- ◆ Product Management
- ◆ Social Media

These four skill sets serve as a laboratory for understanding what business and education leaders can do to prepare workers and students for skills disruption. To illustrate how programs can help learners and workers acquire essential skills, this report includes profiles of recent innovations from the BHEF network.



These skills are moving from Silicon Valley to Main Street. One in five manufacturing jobs and one in four utilities jobs are being affected by these clusters of skills. They are migrating across occupations and industries, as well as geographically, so workers in these jobs are less narrowly concentrated in sectors and can be found in a greater diversity of regions throughout the country. Workers who possess these skills have strong advantages. Salaries become competitive for a wide range of experience levels, and opportunities for early career workers are abundant. Emerging skills are in demand across a broad spectrum of jobs, and they take time and effort to teach and to learn. These skills and technologies are impacting entire jobs and industries, further challenging traditional workforce development practices. Many occupations featuring lower-demand skill sets are submerging and experiencing negative growth, and workers in those jobs need a path forward.

Among the bulwarks for all workers are the foundational skills—the ability to set and achieve goals, manage projects, make sense of data, communicate effectively, and work well with teams. These skills are in high demand, lead to higher pay, afford workers greater mobility, and increase in value over time.

The future belongs to those who seek to understand, anticipate, and harness the power of emerging skills, rather than maintain a posture of reaction/response. There are ways to move forward: By acquiring a specific skill among these four emerging skill sets and seeking out a job that requires that skill, a Web Designer can become a UI/UX Designer, or an Operations Analyst can become a Data Scientist. Both transitions can have a major impact on a worker's earnings and upward mobility, but only the most enterprising and informed worker will make such a transition independently. The prospect of helping all those who are challenged by skill disruption hinges on the readiness of business and higher education to engage in understanding and planning for skill disruption over the long term.

For example, strategies for acquiring emerging skills and using them to unlock better jobs can become systemic. Business and higher education can begin by charting the adjacency of a worker's current lower-demand job to a high-growth job, and understanding which emerging skills, once learned, would enable them to secure that new job. Over time, companies and educators can build up the institutional capacity to prepare students and workers for the rapidly shifting world of work. In the process, they can also significantly advance racial and gender equity.

Skill disruption is not a simple matter, but viewing it as a challenge to be creatively engaged in is better than fearing it as a threat. If it is to be adequately understood and eventually leveraged, all stakeholders will be pressed to make changes in the way they make sense of skills data, educate students, reskill or upskill workers, or participate in the workforce. By understanding, anticipating, and harnessing skill disruption, it's possible to create strategies that go beyond mitigation, crafting instead a skill economy of emerging skills in which many more businesses, educational institutions, students, and workers can thrive.

Methodology



In order to better understand what is underway when emerging skills change jobs, workplaces, and even industries, and in order to inform leaders about how they can most effectively engage and respond to this new phenomenon, the Burning Glass Institute conducted a landscape analysis to identify and then delve into areas of great transformation. This paper features an examination of four clusters of skills that are experiencing rapid rates of growth, are in high demand, and are spreading across industries and geographic regions.

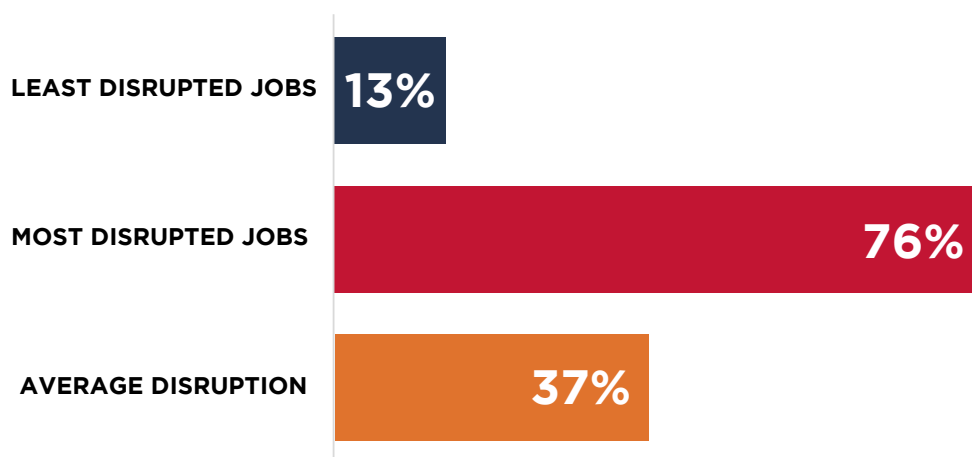
The Burning Glass Institute analyzed data from 228 million job postings from 2015 to the present, classifying each posting by the occupation it represents and the skills and credentials requested therein. By grouping these skills into meaningful clusters, one can understand the growth of demand for different skill sets over time and study their diffusion throughout firms, occupations, regions, and industries. In addition to growth, demand, and spread, the selection criteria of the skill clusters included a requirement that a university degree was not a prerequisite, and that formal or informal re-skilling could open up transition pathways to jobs that call for new, high-demand skills. We also prioritized identifying relatively new skills that have emerged over the past decade, noting that several have gone from being marginal to playing central roles in multiple parts of the economy.

Meta-trends confirm the central role skills play in reshaping the labor market

Across all sectors, workers are being challenged to learn new skills at an unprecedented rate.

The labor market also remains tight across sectors. Just as demand for workers is surging, the skills required for their jobs are changing fast. Skill turnover is significant, and many skills required in the workplace are new. On average, 37% of the top 20 skills requested for the average U.S. job have changed since 2016.¹ In the quartile of jobs with the greatest disruption, over three-quarters of the requested skills have changed in that period of time. The U.S. worker has to replace or upgrade an ever-growing proportion of their skills simply to keep up.

SINCE 2016, THE TOP 20 REQUESTED SKILLS FOR A GIVEN OCCUPATION HAVE CHANGED BY:



Source: Burning Glass Institute analysis of Lightcast job postings data.

The demand for new skills is spreading rapidly, across all sectors. Not long ago, the need for new skills tended to be concentrated in the tech sector. Now, however, the spread of the demand for new skills is transforming industries and sectors, rendering some skills virtually ubiquitous. In 2011, for instance, there were 294,000 job posts seeking people with data analysis skills in only 17 occupations; 10 years later, 1.2 million such jobs were posted in 81 occupations. Many of the skills are spreading to existing jobs, where workers are having to learn and apply them; but the spread is also happening in new occupations being created by these evolving skills.

Work increasingly demands skills from across domains. Many of the skills invading jobs are also crossing functional silos, requiring workers to exercise unfamiliar skills. Right-brain marketing people now need the analytical skills to make sense of and manipulate customer data. For example, 1 in 12 marketing jobs demanded data skills in 2013; now that number is 1 in 8. In design, the number has shifted from 1 in 20 to 1 in 13. By contrast, digitally skilled engineers and data analysts increasingly need skills in management, communications, or design in order to function in a collaborative workplace. The number of occupations with 2,000 or more job postings requesting creativity rose from 12 in 2012 to 55 in 2022, including roles like Computer Systems Engineers, IT Project Managers, and Program Managers.

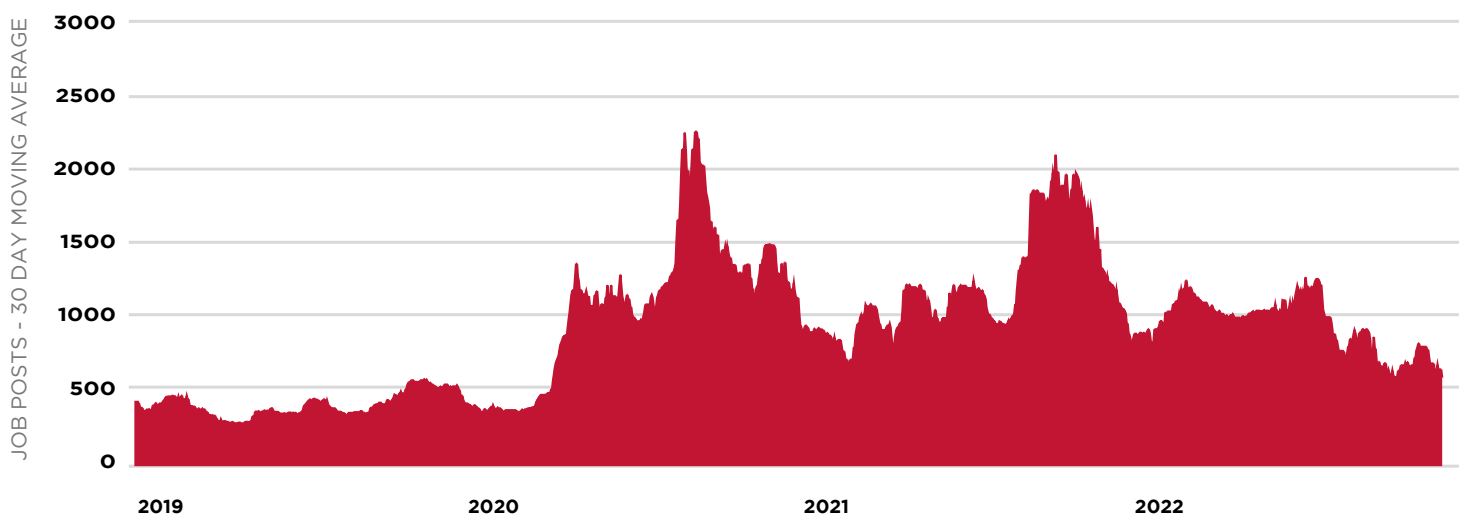
¹ "Shifting Skills, Moving Targets, and Remaking the Workforce," Matt Sigelman, Bledi Taska, Layla O'Kane, Julia Nitschke, Rainer Strack, Jens Baier, Frank Breitling, and Adam Kotsis. Boston Consulting Group, Emsi Burning Glass, and Burning Glass Institute, May 2022.

Emerging skills bring both an opportunity for innovation and a threat of obsolescence. For those who can acquire new skills rapidly and continuously, there are powerful opportunities to make new discoveries, lead industries, and excel. But skills disruptions also raise the risk of a new, more subtle form of obsolescence for all parties. Workers who have performed in a role for years may find that what is expected has changed so much that they lack the skills required to do that job going forward, particularly if they lose a long-held job and try finding a new one. At the same time, as employers redefine roles and seek to stay ahead of disruptions, they may find that the workforce they have is no longer the workforce they will need going forward. Educators face a daunting challenge: They must keep their finger on the pulse of new skills demands, and look ahead as best they can, in order to develop learning opportunities for workers and students that will meet the future needs of employers.

Digital skills are among the fastest growing and most rapidly spreading skills. A very large proportion of emerging skills are digital—there is a high correlation between the clusters of skills that are in greatest demand and the skills that rely heavily on technology. In the Skills Disruption Matrix developed by the Burning Glass Institute with BCG and Lightcast, more than 75% of the most-disrupted occupations were digital or technological in nature.²

It is important to distinguish between the prominent role of digital skills and occupations in the realm of skills disruption, and the overall role of technology as a sector in the marketplace. They are quite distinct. While digital skills have steadily grown and spread over the past seven years, the tech sector itself has fluctuated in performance. Tech sector market cap, which doubled from December 2019 to December 2021, has seen a major decline, and is down 37% in the past year. Similarly, job posting volumes for the largest technology companies are down 74% since September 2021. These rates are in sharp contrast to job posting volume across all jobs, which is up 10% over the same period.

JOB AD VOLUME IN FAANG + MICROSOFT COMPANIES HAVE DECLINED 74% SINCE SEPTEMBER 2021



Source: Burning Glass Institute analysis of Lightcast job postings data.

²"Shifting Skills, Moving Targets, and Remaking the Workforce," Matt Sigelman, Bledi Taska, Layla O'Kane, Julia Nitschke, Rainer Strack, Jens Baier, Frank Breitling, and Adam Kotsis. Boston Consulting Group, Emsi Burning Glass, and Burning Glass Institute, May 2022, p.28

Technology is playing a complex set of roles that often contrast with one another.

On the one hand, this report’s analysis of the high-growth skill sets demonstrates the accelerative effect that tech tools and apps can have in augmenting human work, boosting productivity, and “unlocking” new labor demand and work opportunities. For example, Deep Learning frameworks, such as TensorFlow, augment many of the advanced modeling tasks performed by Data Scientists and Data Engineers. However, making productive use of TensorFlow still requires advanced knowledge, and implementing the technology is far from automatic.

By contrast, the “automating” effects of some new technologies and tools decrease the demand and wage for labor. For example, the automotive industry uses about 7.5 robots per thousand workers. For each robot per thousand workers, average wages decline about 0.42%, resulting in an over 3% decline in average wages in this industry due to robots alone, let alone other technologies.³

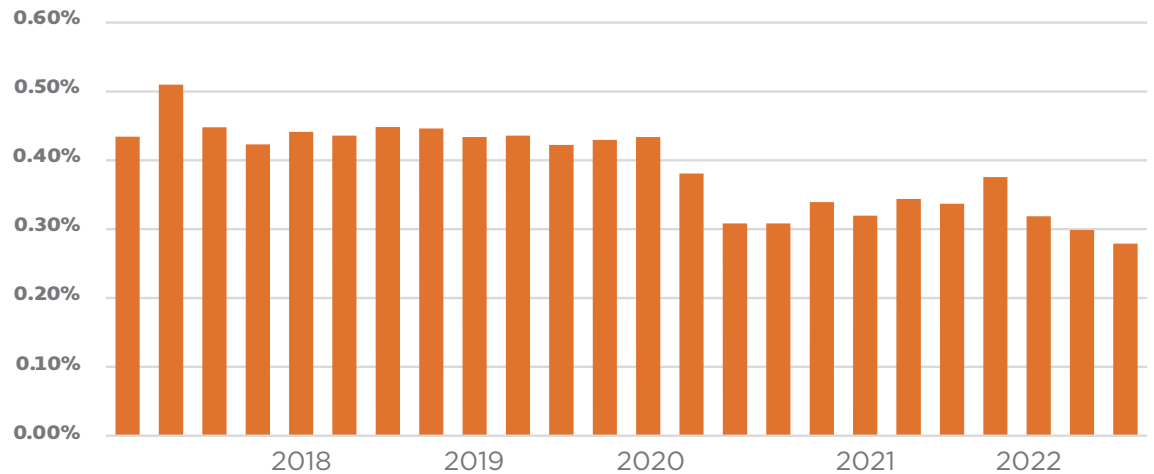
Some occupations and skill areas are “submerging.” Skills growth and spread has benefited some occupations and skill sets—but not all. The following skill sets, chosen for their large size and their comparatively slow or negative growth, are in active decline: Business Consulting, Specialized Sales, Database Architecture and Administration, Network Protocols, Web Design and Development, and Microsoft Development Tools. A similar decline is underway for common occupations including Database Administrator, Network/Systems Administrator, Personal Financial Adviser, and Auditor.

Take, for example, the occupation of Web Developer. The widespread use of multiple popular “low-code” apps—such as Canva, Wix, and Squarespace—are enabling hundreds of thousands of former clients or consumers to do for themselves what they would have called on a Web Developer to do in the past. **This in turn curbs demand and sometimes reverses the growth of the occupation and depresses compensation along with it.**

³“Robots and Jobs: Evidence from U.S. Labor Markets,” Acemoglu and Restrepo, 2020
<https://mitsloan.mit.edu/ideas-made-to-matter/a-new-study-measures-actual-impact-robots-jobs-its-significant>

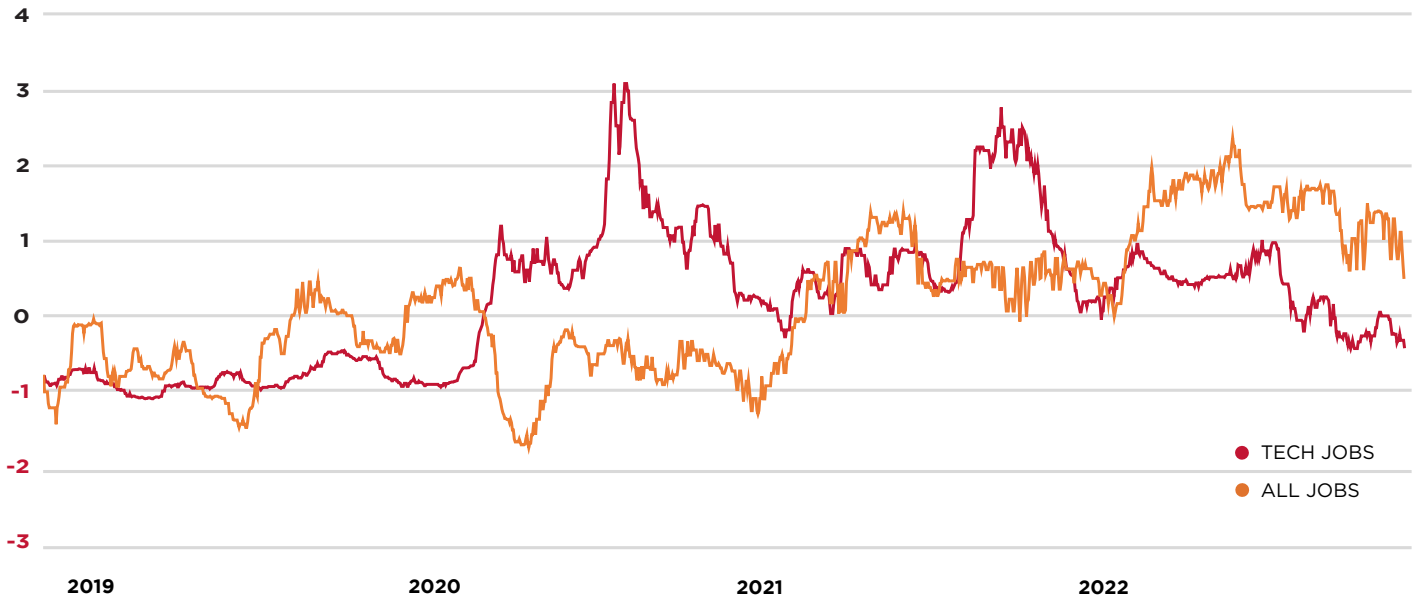
WEB DEVELOPMENT AND DESIGN SHARE OF JOB POSTINGS HAS DECREASED SINCE 2019

Posting frequency normalized to put web development and all jobs on same scale



Source: Burning Glass Institute analysis of Lightcast job postings data.

DEMAND FOR WEB DEVELOPMENT VS ALL JOBS: Z SCORE OF 30-DAY MOVING MEDIAN



Source: Burning Glass Institute analysis of Lightcast job postings data.

Foundational skills—in communication, writing, collaboration, management, and teaming—facilitate smooth transitions across occupations and prove remarkably durable across a career.

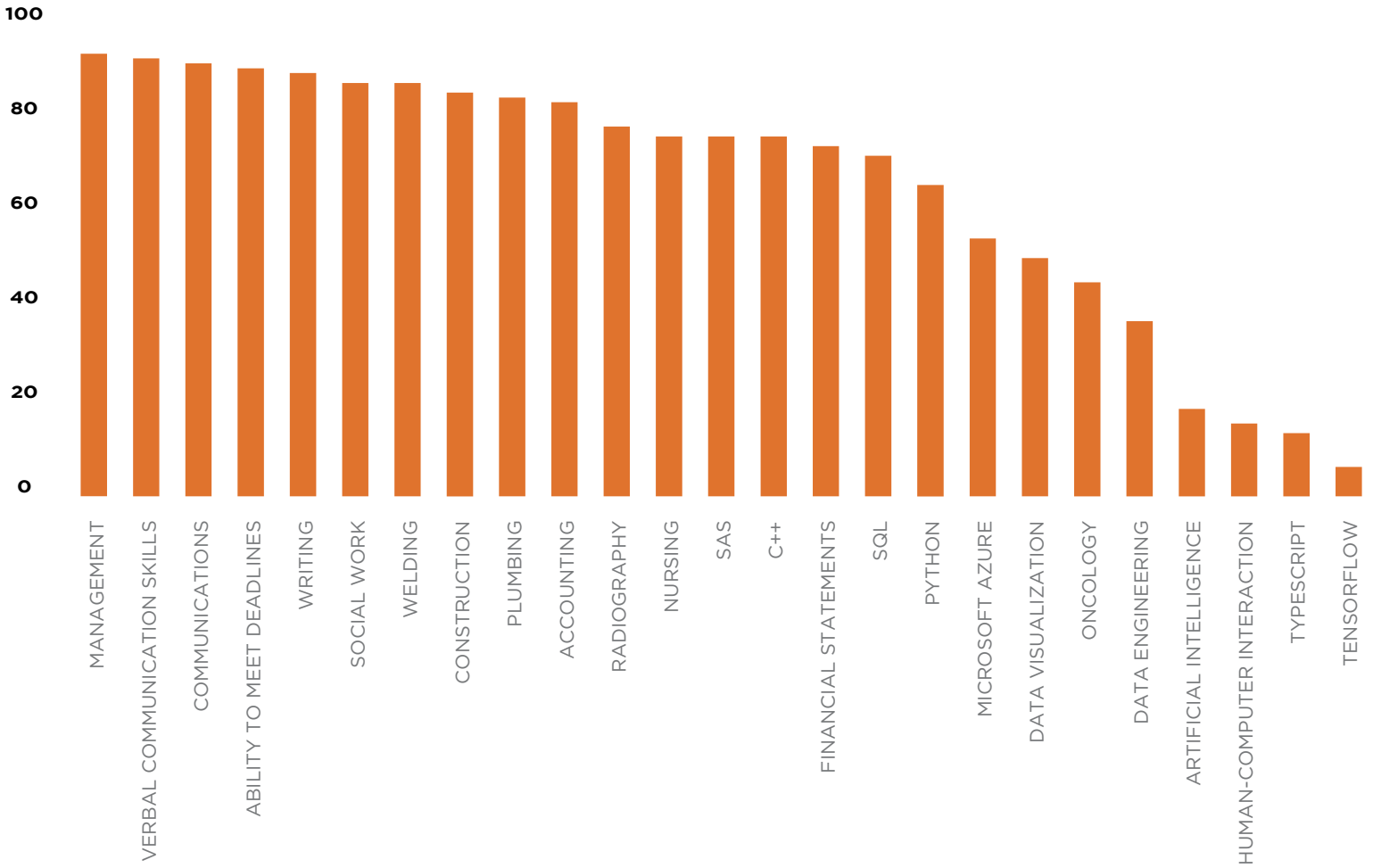
Skills have different motors and provide different value propositions. While emerging skills might help workers to specialize and find niche areas of demand to earn wage premiums, foundational skills provide a security net. They transcend occupation groups and provide the bridges to help workers move between disparate areas of work.

Recent research found that foundational skills include not only human skills like creativity, communication, and critical thinking, but also digital building block skills such as data analysis and computer programming, and business enabling skills like project management and data communication. Possession of these skills, which persist in value over time, enables workers to earn more and enjoy greater job mobility.⁴

Foundational skills endure over the course of a career. Therefore, training learners in foundational skills reaps lifelong dividends.

⁴“The New Foundational Skills of the Digital Economy: Developing the Professionals of the Future,” Business-Higher Education Forum and Burning Glass Technologies, 2018. https://www.bhef.com/sites/default/files/BHEF_2018_New_Foundational_Skills.pdf

DURABILITY SCORE



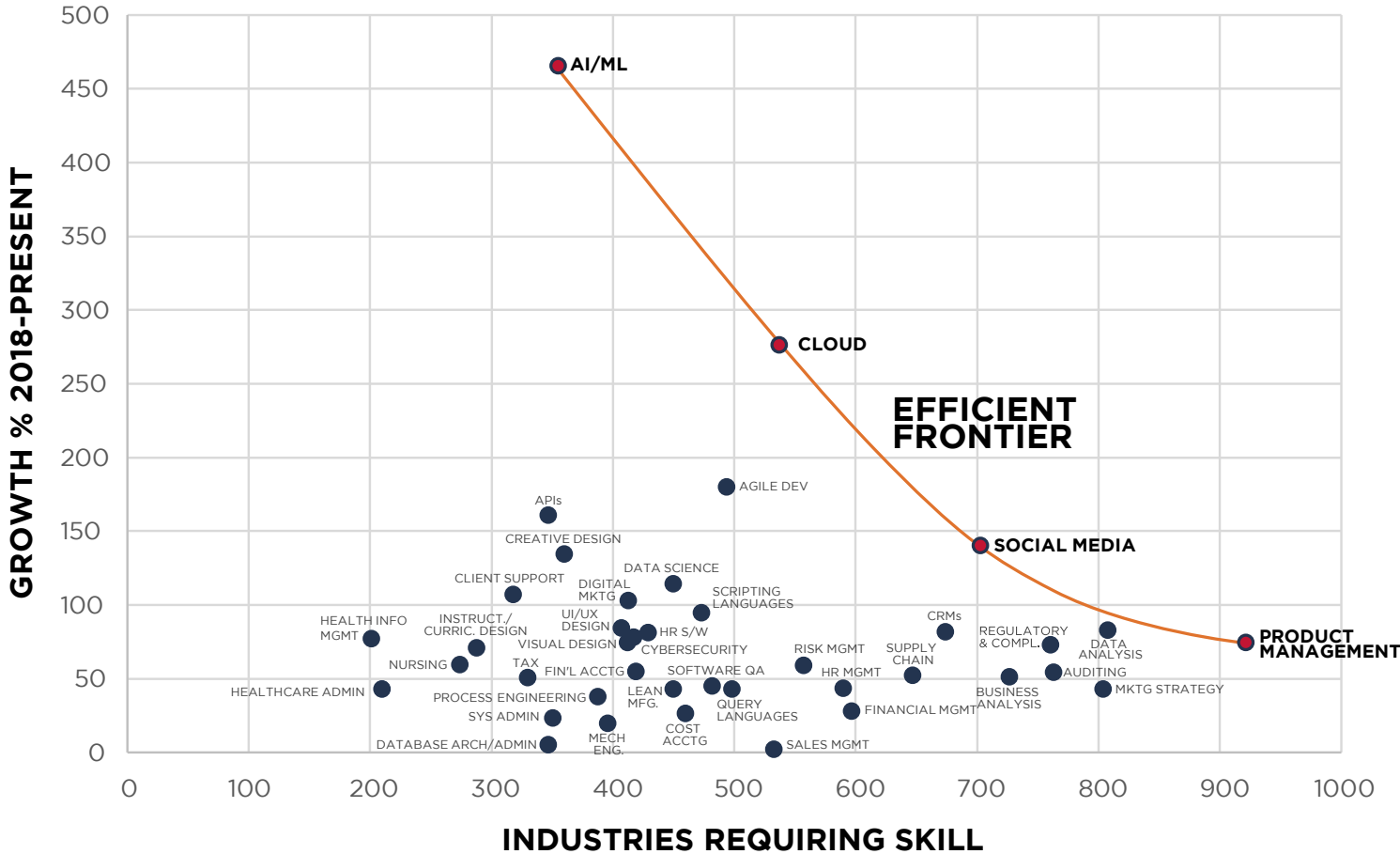
Source: Burning Glass Institute analysis of Lightcast job postings data.

Many foundational skills are extremely durable. This means that, once these skills are acquired, workers are less likely to need to update their knowledge to stay competitive. By contrast, many emerging skills like TensorFlow (a popular Deep Learning tool in Machine Learning) have low durability, requiring workers to update their knowledge regularly. Many skills are tied to programs or apps that can have a relatively short lifespan before being superseded by a new or more versatile replacement.

Identifying the Skills that Are Both Growing Fast and Spreading Wide

Within the disruption landscape, not all skills are created equal. Some skills are not only rapidly growing in demand but also touching an increasingly wider swath of occupations. That makes them particularly strong forces in redefining work. Their growth rate strains talent supply chains, and their spread means that they are inserting themselves into roles where they will be unfamiliar, challenging existing workers to learn them. Companies and universities can study the evolution of these skill sets first to understand how to educate current students/employees, and second, as the labor market becomes increasingly dynamic, to develop a model for the ongoing evolution of training curricula to meet ever-changing needs.

SKILL GROWTH VERSUS INDUSTRY DISPERSION



Source: Burning Glass Institute analysis of Lightcast job postings data.

In the figure above, we mapped skill growth versus dispersion, or spread, across occupations. This combination of factors shows how much a skill is growing, in an absolute sense, as well as how quickly it is expanding to new domains and occupations.

When a skill is storming the scene, it at first tends to be focused on a limited number of occupations in relatively few sectors, occupying the left side of the chart. As it spreads, the universe of jobs and sectors it is touching gets much bigger. The growth rate of these spreading skills may slow, but the growth is still greater than the market overall, as demonstrated by points on the bottom right of the chart.

Although they fall at very different points on the graph, four distinct skill sets (marked in orange) stand out: Artificial Intelligence/Machine Learning (AI/ML), Cloud Computing, Product Management, and Social Media.

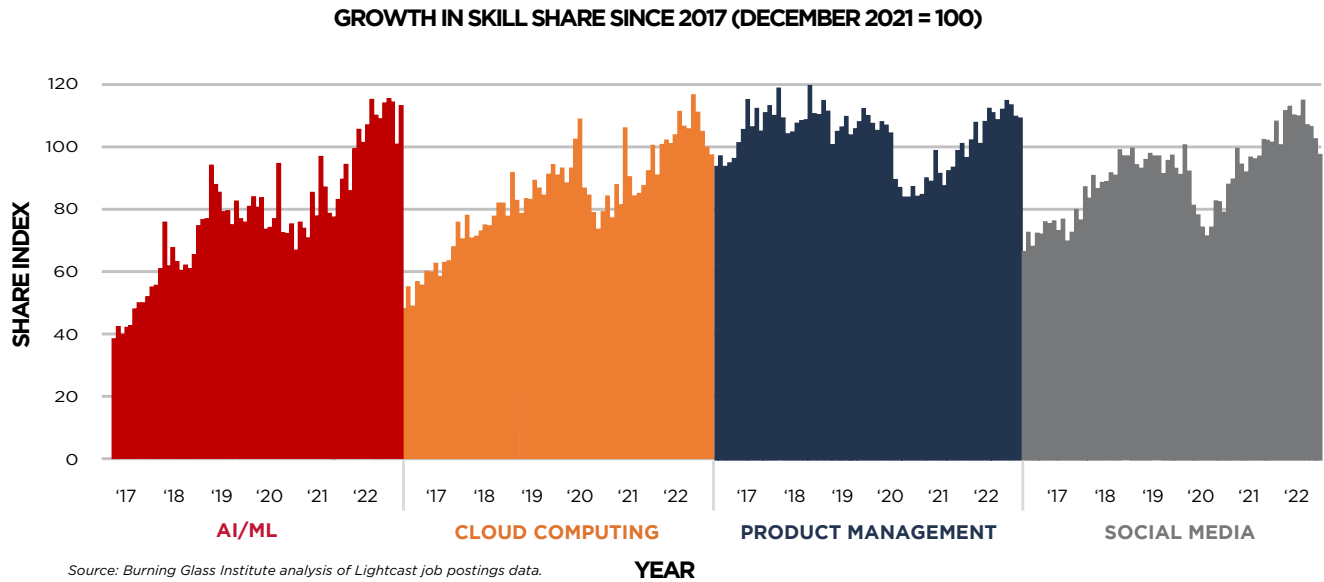
The four skill sets in orange are each pushing the bounds of the trade-off between growth and spread, in different ways. AI/ML, the fastest growing of any skill set, has grown at a rate of 370% over the past five years, which is two or three times faster than other high-growth skill sets; at the same time, it touches fewer sectors than many of the other skill sets shown. Cloud Computing is the fifth fastest growing of any skill set, and it is in demand across roughly 40% more sectors than AI/ML. By contrast, demand for Product Management has grown an impressive but somewhat more terrestrial 72% over the past five years. What makes product management unique is that this skill set has spread more widely than any other. In fact, it is the least sectorally concentrated of any skill set.

These four skill sets are doing something that none of the other skill sets are doing. Together, they form a line below which all of the other skill sets fall. All of the clusters below the line—a huge portion of the economy—are experiencing lower expectations of demand than these four skill sets.⁵ The metrics for these fast-growing, emerging skill sets versus for the foundational skills are naturally going to be different. Foundational skills are highly durable, while the strength of these emerging skills is in how well they can quickly evolve within the context they're being applied.

We will use these four skill sets as test cases for understanding the dynamics and impact of skill disruption and for developing strategies to turn challenge into opportunity.

⁵Economists call the line connecting the four skill sets in this figure an efficient frontier, because it demarcates these skill sets' consistent, reliable outperformance of other skill sets when compared across growth and spread.

AI/ML, Cloud, Product Management and Social Media: Four Emerging Skill Sets that Provide a Window into Skill Disruption

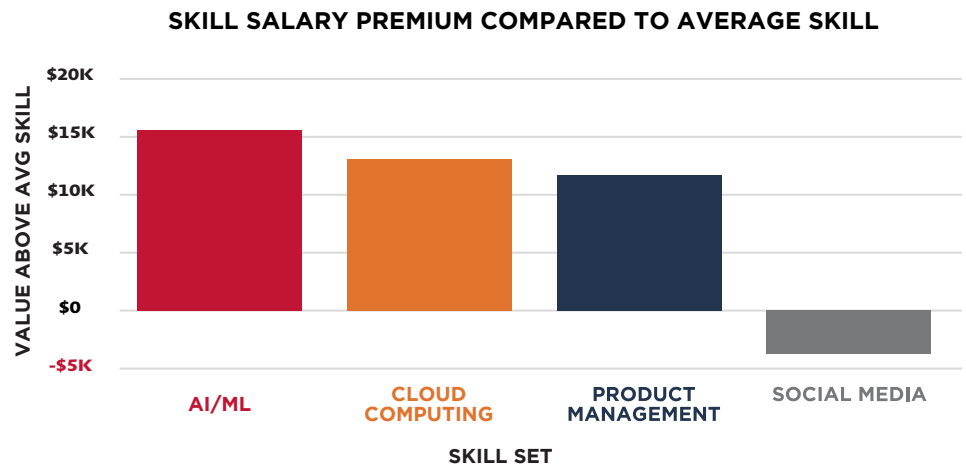


Selected based on the combination of their rapid growth and widening spread across the job market, AI/ML, Cloud Computing, Product Management, and Social Media together exemplify skills disruption and serve as a laboratory for understanding the broader trend. The five-year growth rate for these four skill sets was 122% in 2021, compared with a 10% growth rate for the average skill over the same period.

These skills form an increasingly large share of the requirements appearing in postings nationally. Over the past five years, they have grown their relative share of the market by over 30%, from 10.7% of overall postings in 2017 to 13.8% in 2021. Put differently, one out of eight of all job postings require one of these four emerging skills, extending across sectors as far afield as manufacturing and public administration. In 2021, there were over 5 million job postings that mentioned one of these skills. In some industries, they represent over a third of all job postings.

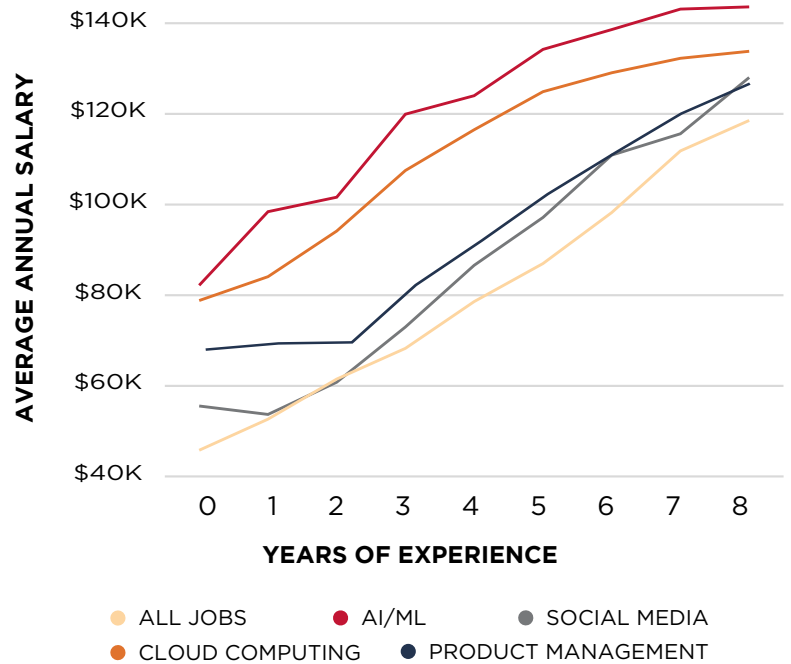
Within each of these skill sets, new technologies often augment labor to help workers become more productive. These technological advances and the accelerated acquisition of skills that they drive have also unlocked a wide range of new labor demands, including new and rapidly expanding occupations and work opportunities.

These skill sets offer outsized returns for learners. Individuals with AI/ML, Cloud, and Product Management skills earn significantly higher compensation. Notably, for entry-level work, jobs requesting Social Media skills are actually associated with lower-value work, though more experienced and specialized hires with these skills do eventually earn a substantive premium. In fact, jobs requiring expertise in Social Media with eight years' experience pay more than \$120,000 per year and only slightly less than jobs requiring expertise in Cloud Computing with equivalent experience.



These skills pay off no matter your level of experience. The chart below demonstrates that workers of all experience levels can look forward to not only higher earnings but also greater opportunity when they develop these skill sets. Each of the four skill sets outperforms U.S. jobs overall, and often by a wide margin. Lower-paid skill sets “catch up” to higher-paid ones over time: Within eight years, those with Product Management and Social Media skill sets substantially close the gap in compensation with those who have Artificial Intelligence/Machine Learning and Cloud Computing skill sets. A person with Social Media skills starts out making a third less than a novice with AI/ML skills. Eight years later, however, they not only make more than twice (231%) their starting salary but also earn just 11% less than their colleagues with AI/ML skills. One area of inquiry would be to learn more about how and why these gaps close.

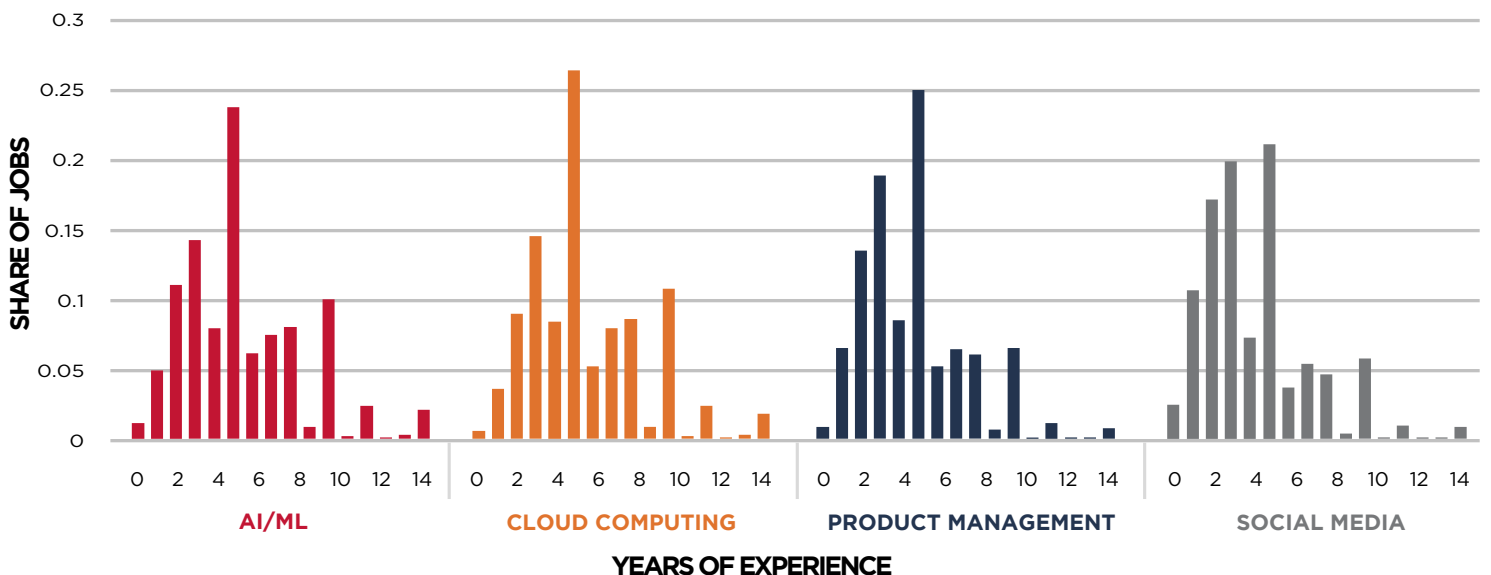
SALARY PER SKILL CLUSTER AND YEARS OF EXPERIENCE



Source: Burning Glass Institute analysis of Lightcast job postings data.

Opportunities are abundant, even for those at the entry level. These are advanced skills so one might think that they are in demand only for expert-level jobs. In fact, many jobs are open to people with limited experience. What’s more, even among openings for people with limited experience, jobs that require these skills offer significant pay premiums.

YEARS OF EXPERIENCE NEEDED BY JOBS IN EACH SKILL SET



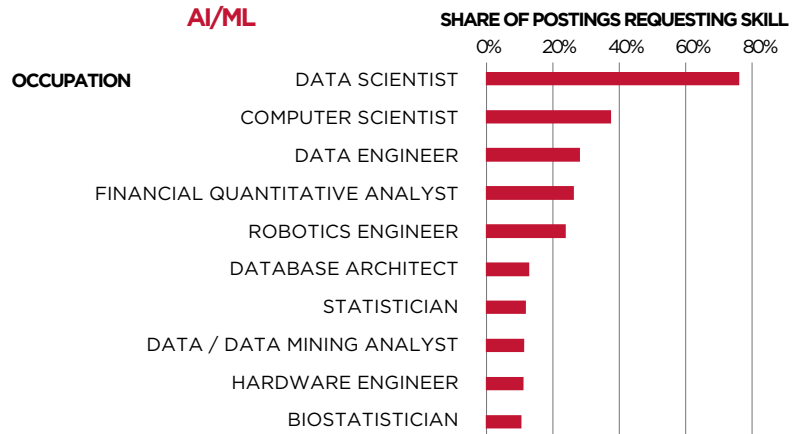
Source: Burning Glass Institute analysis of Lightcast job postings data.

Some Assembly Required: Building an Emerging Skill Workforce

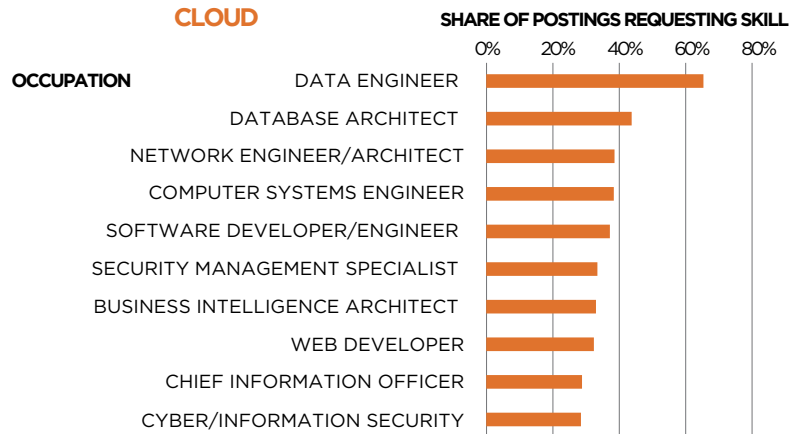
Building a workforce equipped with these emerging skills won't be easy. Colleges and employers alike need a clear map, supported by robust data, to chart the contours of this fast-emerging and rapidly changing landscape. Which jobs have the most intensive demand for these skills? Which specific skills do they require, both from these emerging skill sets and more broadly? This is the information that will enable the development of an effective talent pipeline.

These skills are coming to define a set of high-growth, high-value roles. Each of the four emerging skill sets is increasingly critical to an array of occupations. Many of these are technical occupations that require extensive preparation.

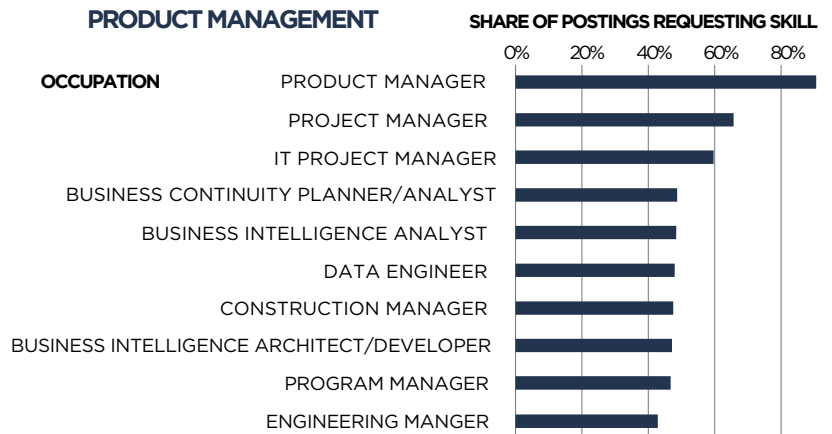
AI/ML



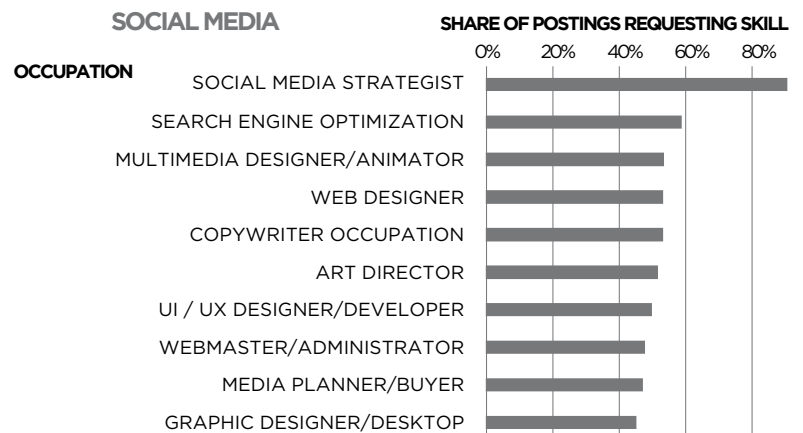
CLOUD



PRODUCT MANAGEMENT



SOCIAL MEDIA



Each of these clusters spans a number of technologies and skills that learners must master. The four skill sets we analyze in this report are described here for convenience in a sort of shorthand—that is, by singular titles, even though they contain a wide range of subskills. The field of artificial intelligence and machine learning, for example, has several branches; autonomous vehicle design is considerably different from natural language processing, which is similarly distinct from surgical robotics. Developing a workforce for each of these areas requires a deep awareness of the skills they require.

HIGH DEMAND CLOUD SKILLS

SKILL NAME	POSTINGS	FIRMS	GROWTH SINCE 2019
MICROSOFT AZURE	429,265	23,718	65%
SOFTWARE AS A SERVICE	296,753	21,601	32%
PUBLIC CLOUD	88,825	6,817	38%
AMAZON S3	72,610	7,641	25%
CLOUD INFRASTRUCTURE	68,913	8,536	35%
PLATFORM AS A SERVICE	67,759	7,113	9%
INFRASTRUCTURE AS A SERVICE	56,914	6,682	4%

HIGH GROWTH CLOUD SKILLS

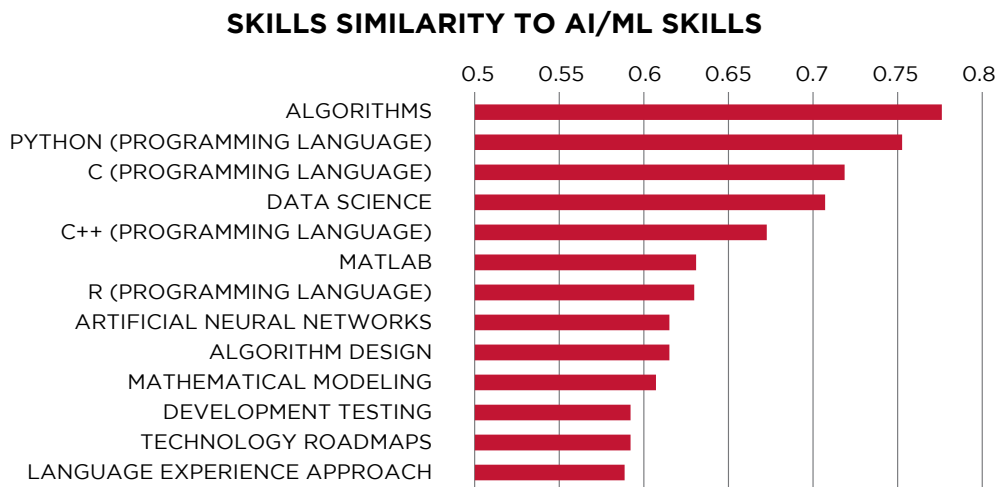
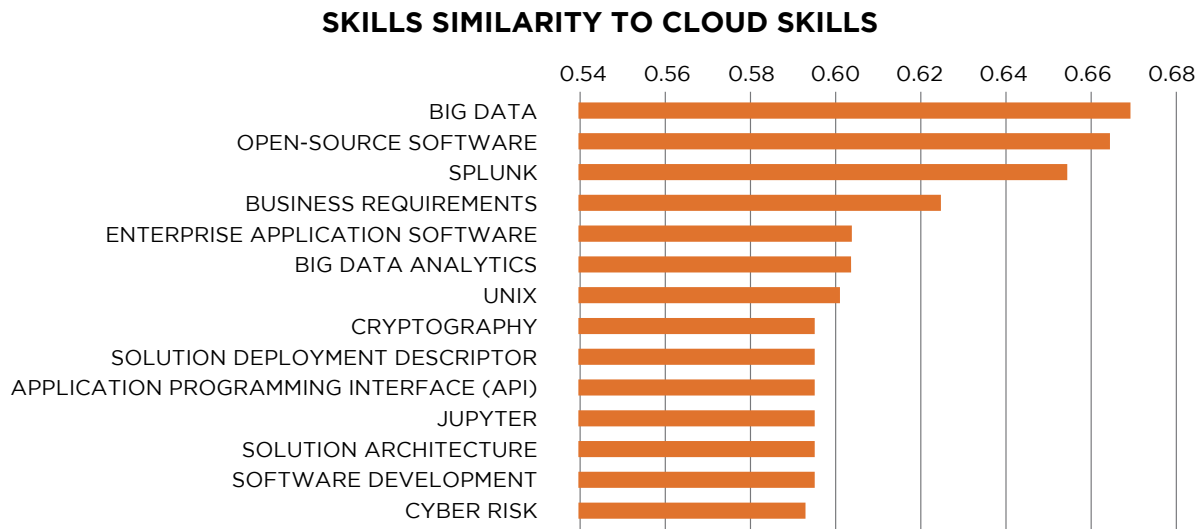
SKILL NAME	POSTINGS	FIRMS	GROWTH SINCE 2019
COLOCATION	23,388	727	550%
AWS SERVERLESS	5,335	898	307%
AZURE MONITOR	2,878	685	277%
AMAZON CONNECT	2,260	477	223%
CLOUD-NATIVE INFRASTRUCTURE	1,122	309	216%
SNOWFLAKE	2,785	810	180%
TWILIO	6,562	602	173%

Source: Burning Glass Institute analysis of Lightcast job postings data.

Importantly, these are dynamic fields. The figure above distinguishes the highest demand cloud skills from the highest growth cloud skills. The former reflects where demand is today while the latter reflects the field’s future. Developing a talent pipeline for these fields requires balancing between these two, addressing existing requirements while also anticipating where the market is headed.

Preparing for these jobs takes far more than just acquiring emerging skills

While AI/ML, Cloud Computing, Product Management, and Social Media are definitional to these roles, they are far from the only skills needed. For talent to access these fields, workers will need to develop a broader portfolio that spans both technical and foundational skills. The figure below shows some of the skills from outside these domains that travel along with them.

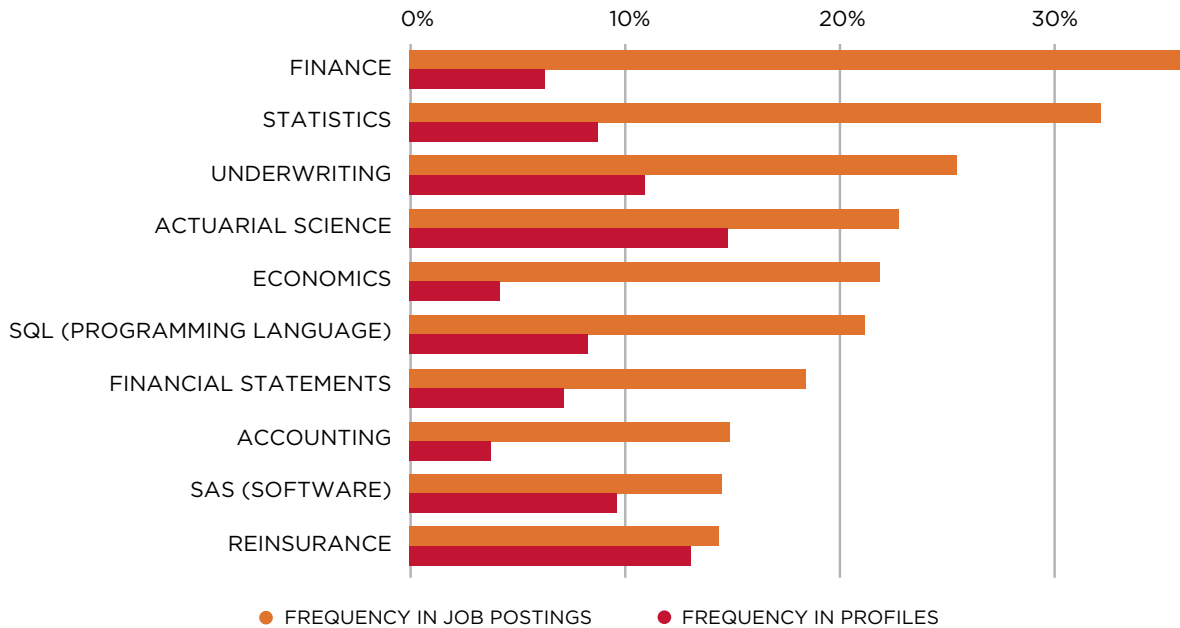


Source: Burning Glass Institute analysis of Lightcast job postings data.

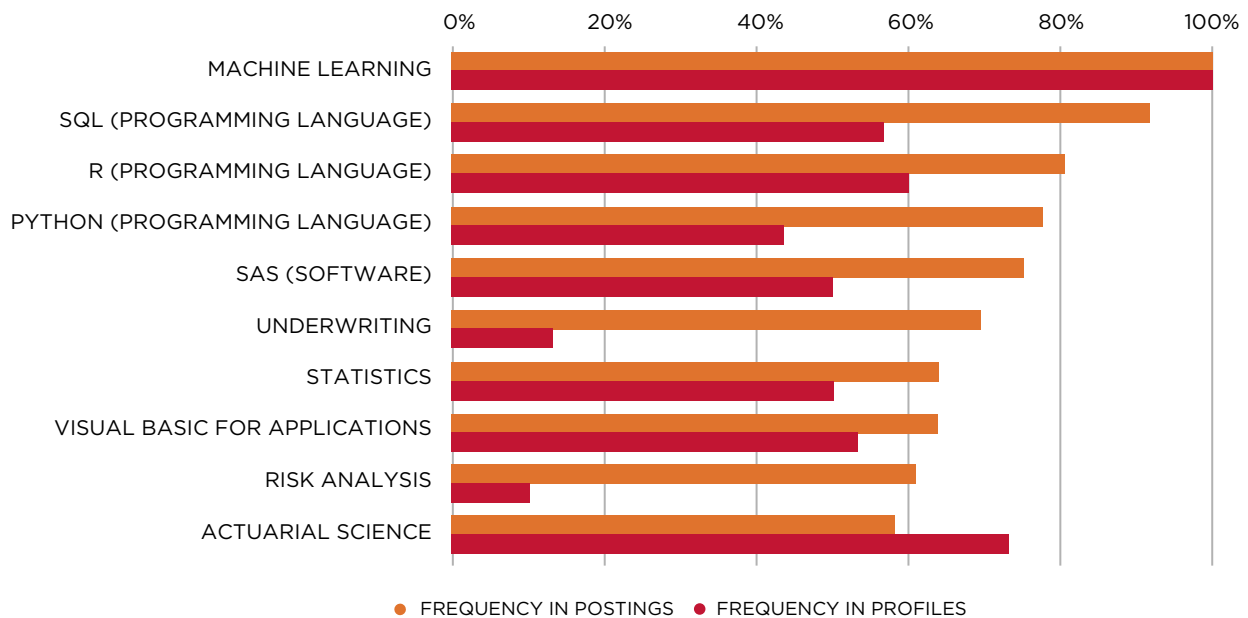
Not just cut and paste: How emerging technologies disrupt roles more broadly. One of the ways in which emerging skills earn their moniker is that they don't simply get added to the roster of requirements. Rather, because they represent fundamental shifts in the nature of the work and how it is executed, much of the rest of the job definition changes as well.

To understand what happens to a role when it is transformed by a disruptive technology, consider Actuaries. Actuaries do a lot of math and modeling. Machine learning does a lot of math and modeling, too. Interestingly, not many actuaries are yet required to have machine learning skills—only about 2%. But when they are, it is not just that ML skills are simply added to the job description. Rather, the job's entire skill DNA changes because the application of ML to the role shifts the focus of the work entirely.

SKILL FREQUENCY IN JOB POSTINGS AND PROFILES - ALL ACTUARIES



SKILL FREQUENCY IN JOB POSTINGS AND PROFILES: ACTUARIES WITH MACHINE LEARNING SKILLS



Source: Burning Glass Institute analysis of Lightcast job postings data.

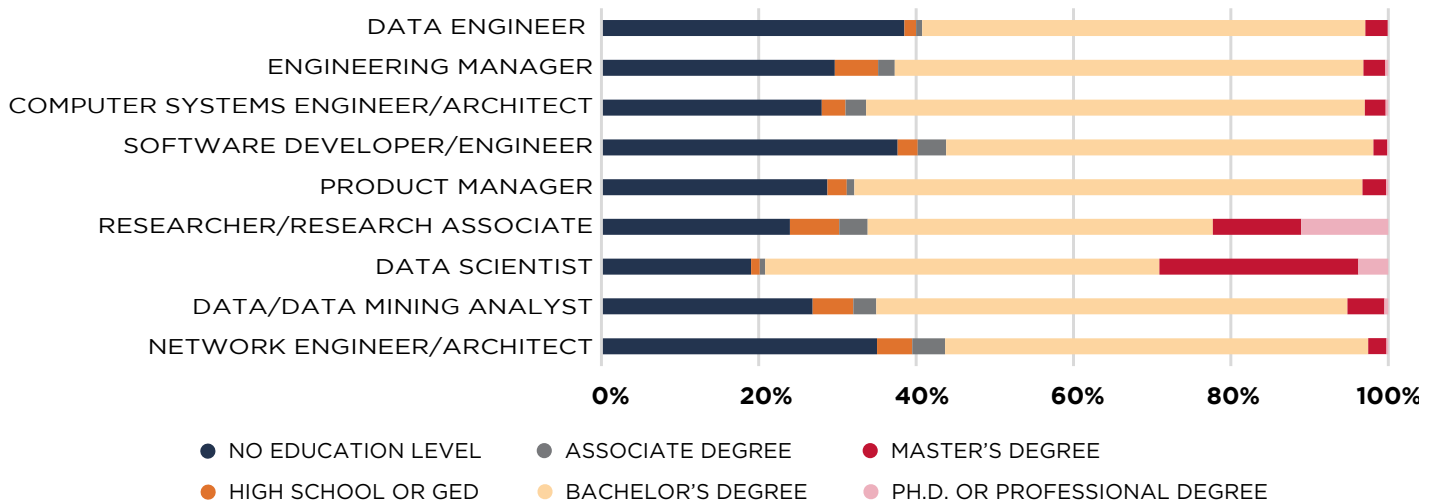
The top graph shows skill frequency in job postings for Actuaries. The bottom graph shows skill frequency in job postings for Actuaries who have machine learning skills. Looking at what is demanded of a person with ML skills, we see that four skills needed by Actuaries without ML skills—finance, financial statements, accounting, and reinsurance—are no longer even sought from those with ML skills. In their place are five new skills demanded of those with ML skills: ML, R, Python, Visual Basic for Applications, and Risk Analysis. Assessing the skills listed in Profiles, in

addition to their skills in these new areas, a much larger proportion of Actuaries with ML skills also listed skills in SQL, SAS, and Actuarial Science than among the Actuaries without ML skills. Note that the biggest gaps in skills listed in Profiles for ML-powered actuaries are in underwriting and risk analysis—domains that have not traditionally been the responsibility of an actuary but which they now have the capacity to focus on. The addition of one skill—Machine Learning—utterly transforms both what the worker can do, and what is asked of them.

College preferred: Emerging skills haven't disrupted degrees. As discussed above, workers don't need tons of experience to land these roles. Opportunity abounds for early career workers. But many of these roles do require a college degree.

Bachelor's degrees have powerful salience in the high-demand skill sets, as the charts below—for AI/ML and Social Media—illustrate.

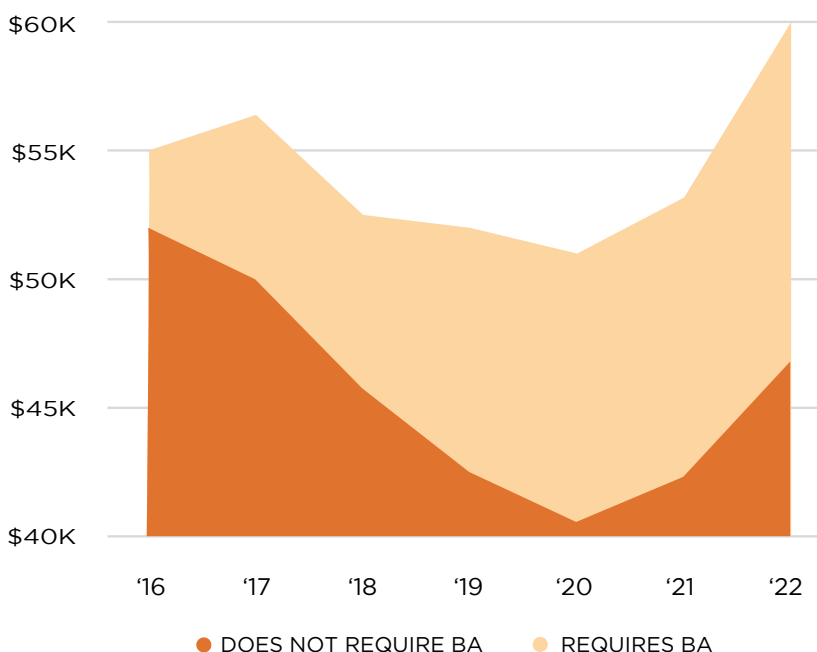
EDUCATION REQUIREMENTS BY OCCUPATION



Source: Burning Glass Institute analysis of Lightcast job postings data.

In Social Media, the degree wage premium persists

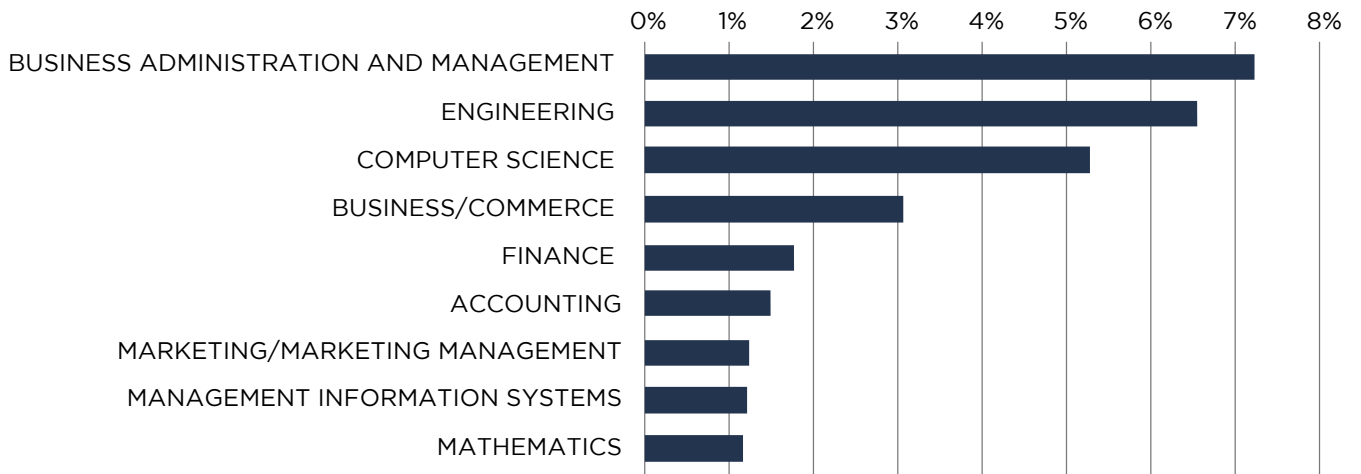
BA SALARY PREMIUM PERSISTS POST-PANDEMIC



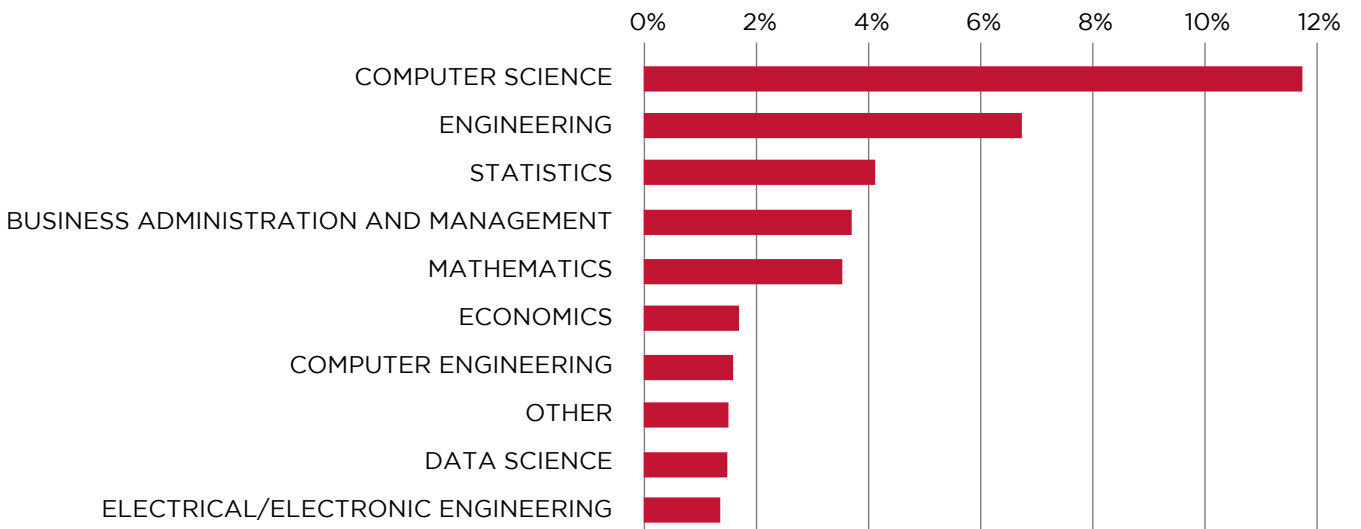
Source: Burning Glass Institute analysis of Lightcast job postings data.

Some fields of study are more likely to train people in high-demand skills. A review of more than 40 million career histories reveals where those working with disruptive technologies get their start. That insight can help institutions know where to invest, enable employers to seek out relevant graduates more efficiently, and empower learners to pick majors aligned to high-value careers. For institutions of higher education, a key challenge will be to balance instruction around these high-demand, fast-growing skills, along with the highly durable foundational skills needed across a wide range of occupations; for all learners, the path to success lies in a mix of both categories of skills.

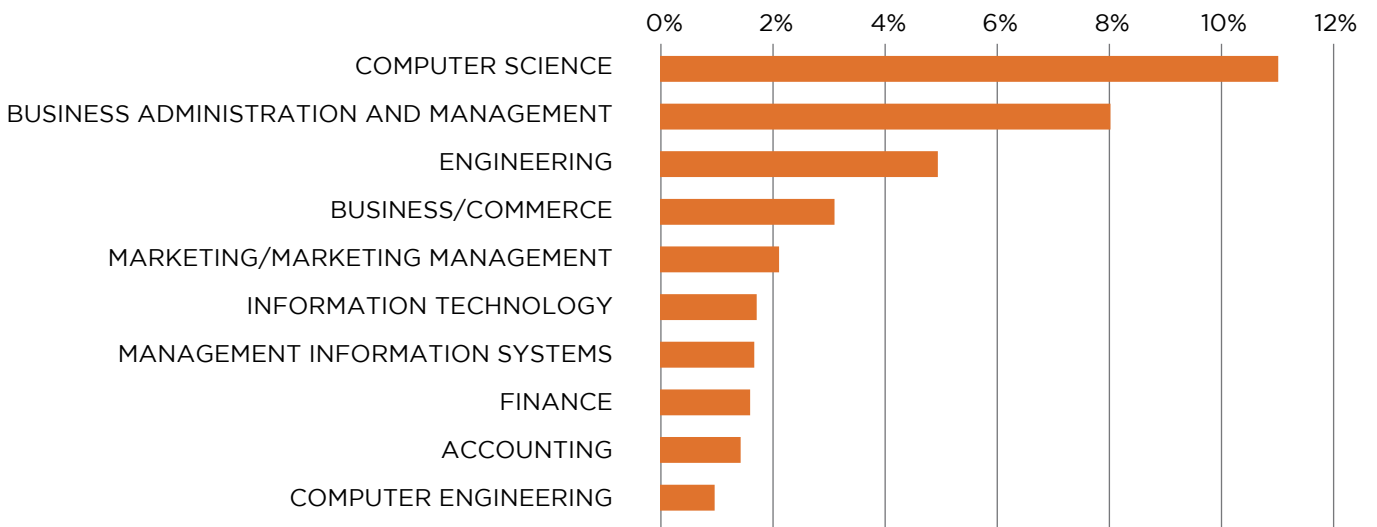
TOP PRODUCT MANAGEMENT MAJORS



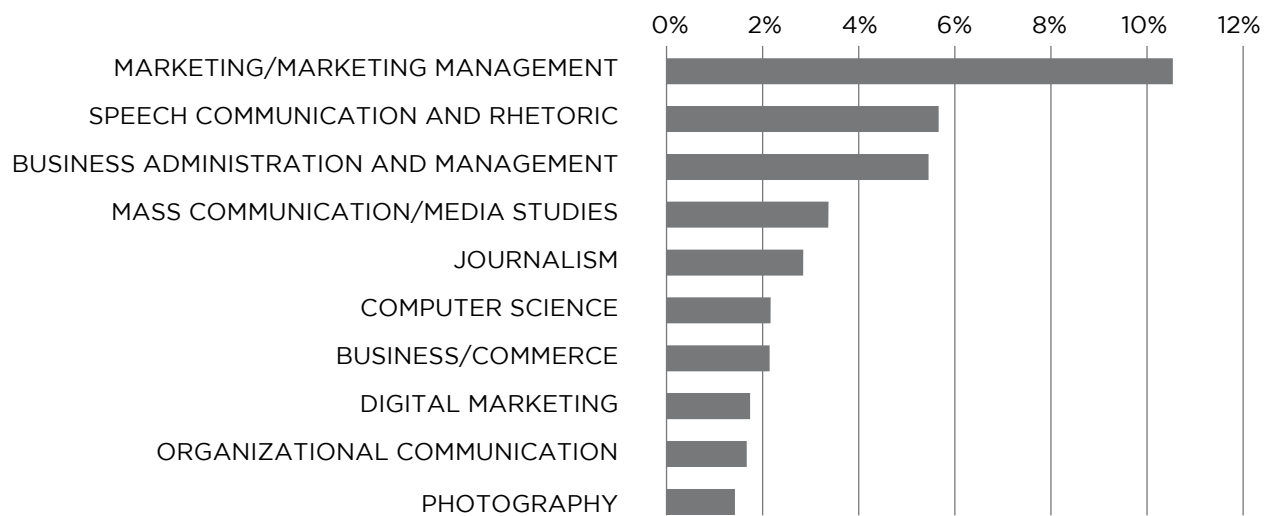
TOP AI/ML MAJORS



TOP CLOUD MAJORS



TOP SOCIAL MEDIA MAJORS



Source: Burning Glass Institute analysis of Lightcast job postings data.

Implications: What Is Required to Build an Emerging Skills Workforce

Emerging skills are invaluable, but they are not well understood, and with few exceptions they are not being anticipated or planned for in an effective way. On the one hand, businesses consistently rely on people with emerging skills to do their most pressing work, while workers with these skills enjoy access to high-value roles, and educators want their institutions to be core sources of learning about emerging skills. On the other hand, emerging skills are inherently agents of change and unpredictable: They alter the status quo, destabilizing even those occupations and sectors that they advance. As drivers of a future that cannot be predicted with certainty, they defy easy categorization or precise prediction. If business, higher education, workers, and others want to leverage and deploy emerging skills with intention and positive impact, each will have to make commitments to new ways of teaching, learning, and working that recognize and account for this complex dynamic and the uncertainty that it embodies.

For higher education: There is significant opportunity to create programs of study that are focused on emerging skills. Building such programs will require careful tracking of developments in the labor market, and colleges will need to increase their predictive capacity to anticipate skills evolutions. Higher education will need to continue to engage with business leaders and subject matter experts to understand the changing nature and function of skills in the workplace. Educational institutions at every level will thrive when they can demonstrate the agility to develop and launch new curricula fast, and the flexibility to adapt continuously over time.

Students and incumbent workers are not the only ones with learning to do: Faculty and instructional leaders can face skills acquisition challenges of their own. Like the future jobs of their learners, the roles of college professors and other instructors are often being comparably disrupted by skills transformations and changes. It is hard to teach a skill you do not yourself possess. Higher education should be anticipating and responding to the diversity of learning needs within its instructional workforce.

Educators will also need to make sure that they are building coursework for a full portfolio of skills, across a variety of pathways and opportunities for students and incumbent workers. Because certain majors are critical conduits for careers demanding these skills, courses in these majors must provide rigorous training in these areas. But majors and college degrees are not the only route to success: Four-year institutions have ample opportunity to establish more transfer pathways by partnering with community colleges and working with business as partners for lifelong learning, upskilling, and reskilling.

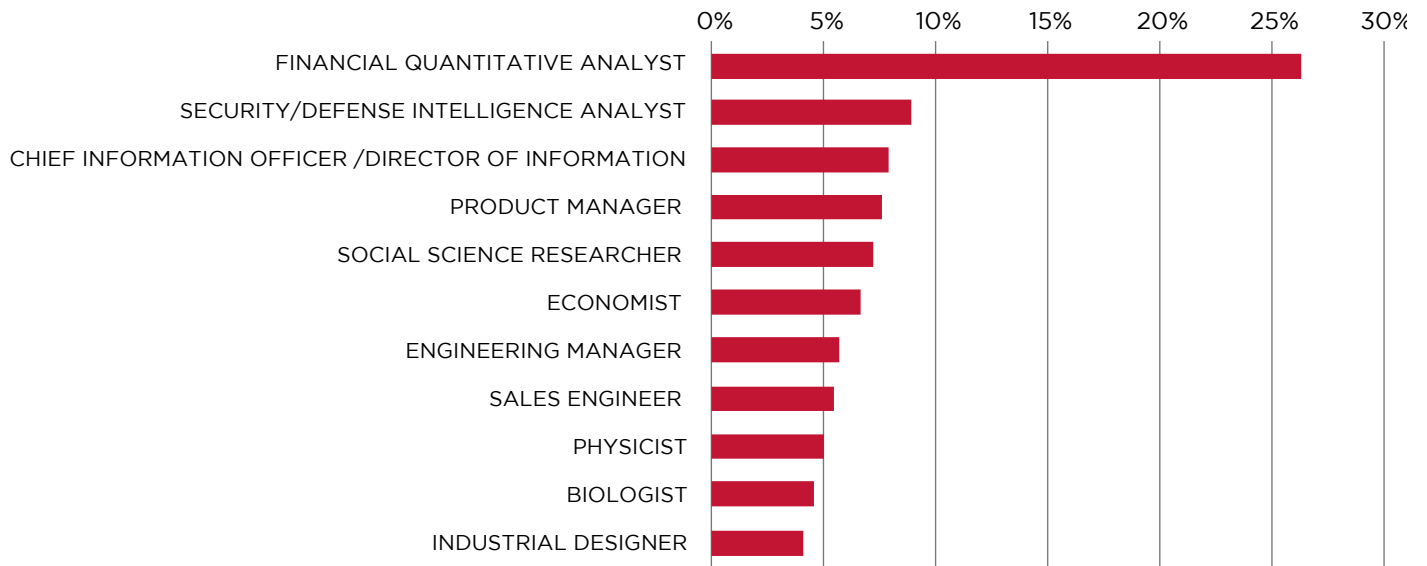
Finally, the foundational skills of communication and teaming are in demand, durable, and critical to the careers of those in leadership roles. These skills should be taught across all curricula and programs: Everyone can make good use of them in the workplace. Currently, these skills are less commonly taught in certain STEM programs, yet the evidence is clear that those learners will make good use of them when they enter the workplace, and that their future employers will highly value those skills. Additionally, higher education can better signal to business both how and where learners are acquiring foundational skills—and seek feedback from employers to ensure they concur.

For business: For virtually all businesses, there is a gap between the skills of current workers and the skills needed for the future. Facing the challenges posed by emerging skills, business must abandon the traditional on-demand model of talent acquisition. Waiting until talent is needed and then hoping that people with the right skills will apply is no longer an adequate strategy. Jobs that require these skills are already hard to fill. Their rate of growth compounds the problem, and the limited supply of people with the most in-demand skills requires another approach. Companies need to plan ahead, leveraging data-driven analyses to anticipate the nature of the talent they are likely to require and then investing in effective internal and external pipelines for growing and tapping those talent pools. Business should also acknowledge that many emerging skills are hard to learn and develop strategies for supporting incumbent workers and students in pipeline programs to accrue a set of skills that build on one another, over time. In particular, firms should consider partnering closely with higher education institutions to develop direct pathways, sharing specifications, working together to shape curriculum, and building bridges for advanced students, interns, recent graduates, and incumbent workers.

Coming Soon to a Job Near You: How Emerging Skills Are Spreading Beyond the World of Tech

Skills are moving from Silicon Valley to Main Street. From the tech sector to every sector, there is now broad demand across industries for the four skill sets we've laid out. One in five manufacturing jobs and one in ten government jobs are being affected by these sets of skills. In fact, these four skill sets are experiencing some of the biggest declines in sector concentration of any skill set we have studied—a key measure of how many industries a skill touches and how widely the skill is spreading. As an example, the figure below shows demand for AI/ML skills across non-technology roles.

TOP NON-TECH JOBS REQUIRING AI/ML BY SHARE OF SKILL DEMANDS



Source: Burning Glass Institute analysis of Lightcast job postings data

Skills are spreading across the country, not only throughout occupations and sectors, but also geographically. This reflects a fundamental shift in adoption, from niche technologies used only in specialized contexts to broad acceptance across fields. Increasingly, these skills are central to how American industry works. As a result, substantial dispersion of opportunity is now underway across the U.S.

AI/ML Job Share by State - 2015 to 2021

The geographic concentration of people with AI and ML skills decreased by 42% between 2015 and 2021; people with skills in Cloud Computing decreased their concentration within states by 32% in the same period. Declines were less dramatic in Product Management (10%) and Social Media (8%), which were already well on their way to being broadly integrated into the workplace, but the trend is consistent: A huge volume of occupations and skill sets are no longer so concentrated in the traditional locations of California, Texas, and coastal hubs of tech-driven innovation, and many more jobs for people with these skills are available across the country. While the post-pandemic shift toward remote work played a part in accelerating this trend, the key driver of geographic redistribution of jobs and skills remains the explosion of demand and the deeper integration of these skills into the core of everyday work.

Implications of the Spread of Skills

For higher education: Since emerging skills—which are often but not always digital—are becoming core skills essential for worker success, it will be important to ensure that these skills become staples in a wide array of courses and curricular areas. Everybody should have access to them, and people should be encouraged to acquire them regardless of their perceived or historic relevance to their program of study. For example, AI/ML courses should be tailored to a broad array of majors, rather than conforming to historical norms of a narrow swath of students learning these skills. These can take the form of minors or micro-credentials. In some cases, these can be integrated into required coursework through project- or work-based learning, while in others they can be offered as electives. Either way, such instructional access to emerging skills should not be the exclusive domain of specialized masters programs.

Further, it is not enough simply to offer new or strengthened courses: Schools must ensure that learners are aware of the importance of emerging skills to virtually all career paths. Educational institutions can accomplish this by allowing relevant courses and experiences to apply to a broader range of majors. Another challenge that higher education faces is to continuously assess and reassess the relative importance of key skills in the labor market, so that those skills with the greatest impact, utility, and salience are given greatest emphasis. Such work lends itself to close collaboration with local and regional businesses, and with other industries or sectors which learners and graduates aspire to enter, and for which the new emerging skills may well prove qualifying.

For business: Across many occupations, and perhaps soon, most existing workers will need a set of emerging skills. In a time when skills are in high demand, businesses have the opportunity to make skill development less about attracting talent, and more about building a deep capacity to ensure that existing talent can learn and excel. Businesses must adopt the expectation that the workforce will best succeed when it is constantly acquiring new skills. They should center learning in the entire enterprise, facilitating the ongoing upskilling and reskilling of individuals, teams, departments, and entire companies. To do this, companies must understand the skills their employees possess, track pressing skill needs and relevant skill adjacencies, and use this information to identify or build effective talent pipelines internally. They can also partner with higher education institutions and others to deliver high-quality, just-in-time learning for existing and entering employees, either inside their companies or in higher education or other settings.

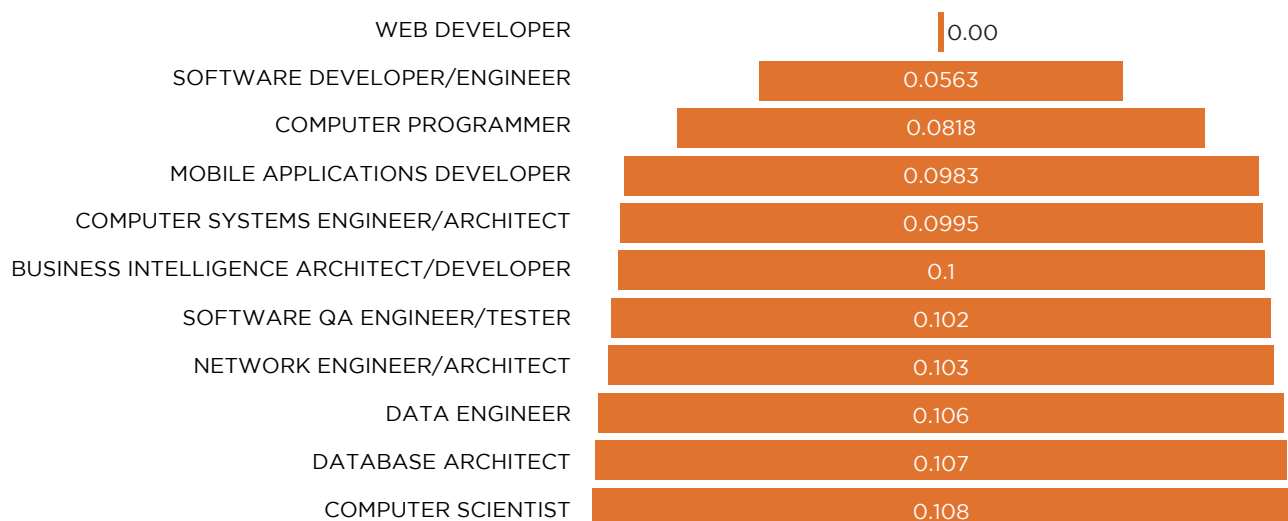
How Emerging Skills Unlock Better Jobs and Open Access to Untapped Talent Pools

Emerging skills measure the distance between people and opportunity. As emerging skills reshape a range of roles across the economy, they also increasingly define the transition path between where workers are today and the jobs that will power the future.

Using emerging skills to chart a path from a declining occupation to a job that is in demand. The role of Web Developer illustrates a common set of market dynamics and demonstrates how to map pathways forward. Once a thriving occupation, Web Development has stalled in recent years, becoming a far less skill-rich occupation. In fact, demand for jobs in Web Development is below pre-2019 levels, with demand for the skills of a Web Developer also declining. Only half a decade after its period of ascendancy, this occupation is one from which many will need to exit over the coming years. The challenge is to map a pathway from Web Development to other occupations that leverage a Web Developer's existing skills and lead to higher pay and greater long-term opportunity.

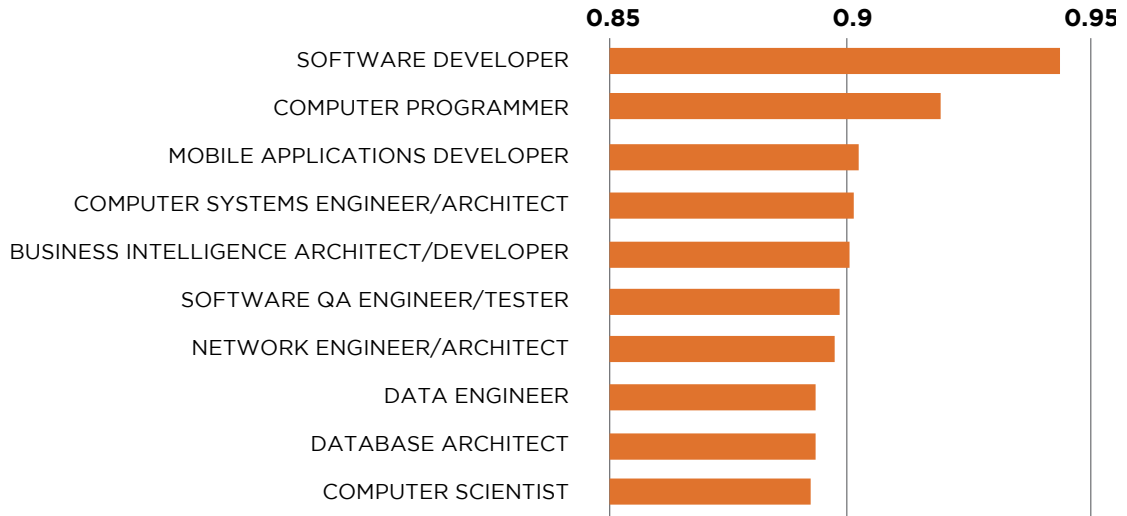
Burning Glass Institute analysis shows that a Web Developer has considerable skill overlap with a Network Engineer/Architect, a core job in the Cloud skill area. This skill adjacency creates the opportunity for making a transition from a job with dimming prospects to one with ample promise.

DISTANCE FROM WEB DEVELOPER SKILLSET



Source: Burning Glass Institute analysis of Lightcast job postings data.

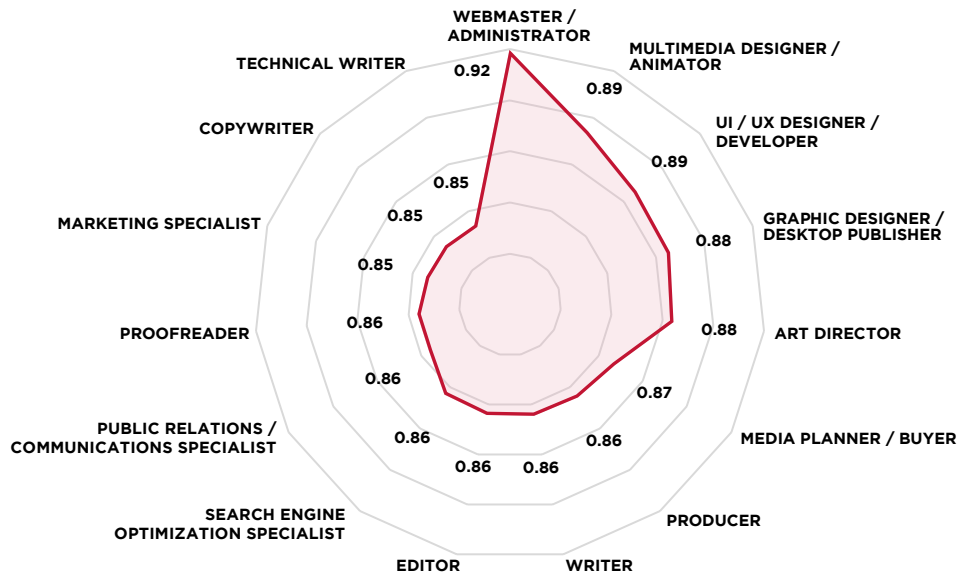
OCCUPATIONAL SIMILARITY TO WEB DEVELOPERS



Source: Burning Glass Institute analysis of Lightcast job postings data.

In thinking about transitioning to another, more advantageous occupation, Web Developers can consider occupations with the greatest similarities.

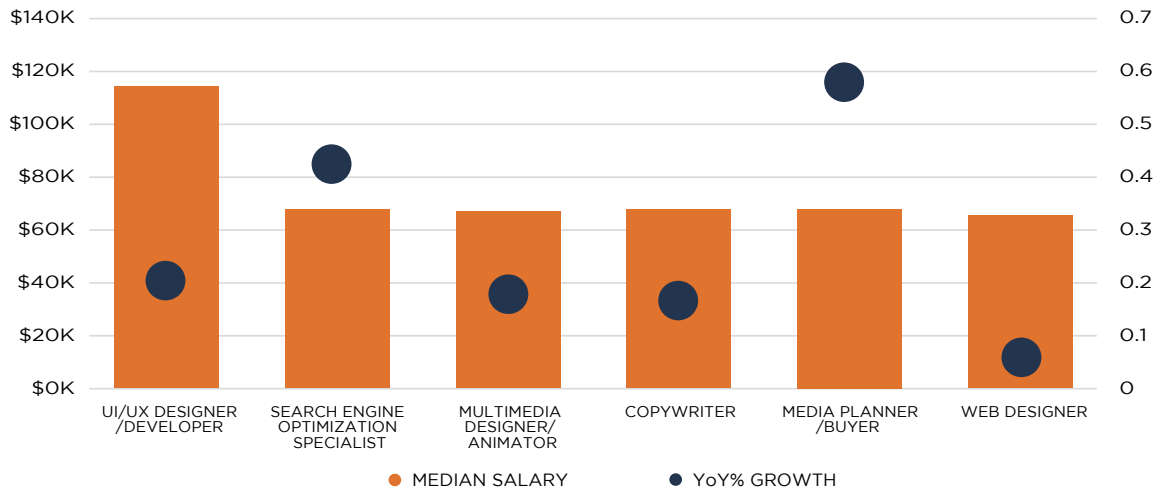
MOST SIMILAR OCCUPATIONS TO WEB DEVELOPERS AS TRANSITION OPPORTUNITIES



Source: Burning Glass Institute analysis of Lightcast job postings data.

Web Developers hoping to improve their prospects by securing a new job should seek out occupations that are highly similar but that pay higher wages and are in greater market demand. They would also want to evaluate comparability in educational requirements and degree of work experience. An analysis shows that in late 2022, for a Web Developer seeking advancement, the highest paying occupation with these qualities is a UI/UX Designer/Developer.

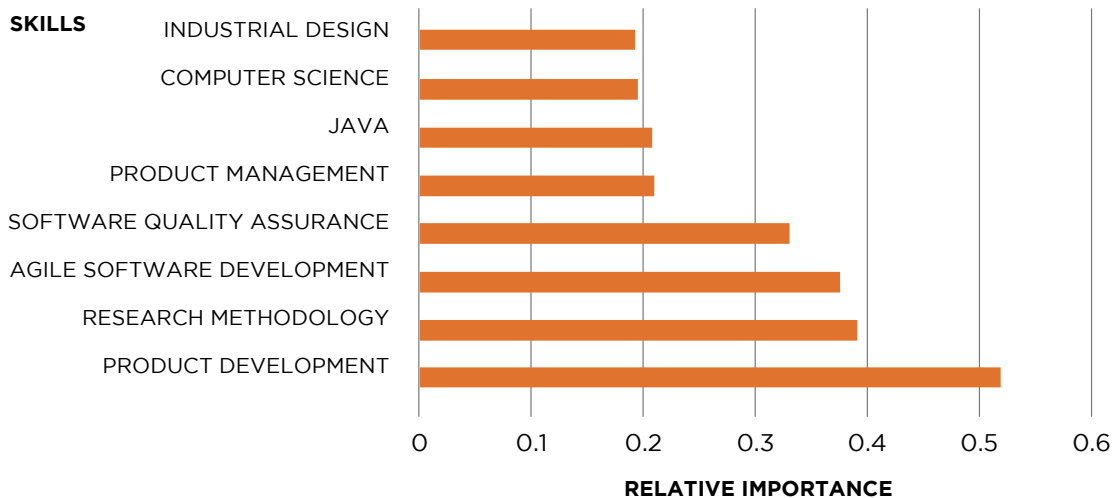
MOST SIMILAR OCCUPATIONS TO WEB DESIGNERS THAT HAVE HIGHER DEMAND, HIGHER MEDIAN SALARY, AND WITHIN 2 AVERAGE YEARS OF EXPERIENCE



Source: Burning Glass Institute analysis of Lightcast job postings data.

After setting UI/UX Designer/Developer roles as a target, the next step is to understand the skills required for the role.

MOST IMPORTANT UI/UX DESIGNER TOP 20 SKILLS MISSING FROM WEB DESIGNER TOP 20 SKILLS



Source: Burning Glass Institute analysis of Lightcast job postings data.

Web Developers are by no means alone. Many occupations are contending with declining demand, atrophying skills, and diminishing compensation. Across the U.S. economy, such occupations abound.

Workers, employers, and higher education can respond effectively, but only if they have a strategy. The first step in helping a person to move out of a job in decline is to understand the skills requirements of that job, which is information that is readily available in the data. With those details, one can begin to identify and target prospective new occupations with similar skill sets or skills adjacencies. What one is looking for in these “target” jobs are occupations that need similar skills, require comparable education and experience, are in demand, and pay better. These qualities offer strong incentives to workers to do the difficult work of transitioning out of one occupation and into another. Such jobs will have their own set of skills requirements, and the next step is to identify the most important of those skills, and then set about learning them. In this way, one both identifies a target occupation and seeks out the things needed to obtain it.

To support these steps, institutions can build out a resource with data on a range of jobs that are facing decline—sometimes called “feeder” jobs—and jobs that are in high demand, require similar and additional skills, and pay well—these are the “target” jobs. Businesses as well as educational institutions can access tools that permit the construction of such databases and will facilitate the development of strategic retraining and programs for skills building. Competitive colleges and universities will tailor new programs specifically to these skill sets or unbundle them from full programs of study to deliver high-quality, time- and cost-effective training.

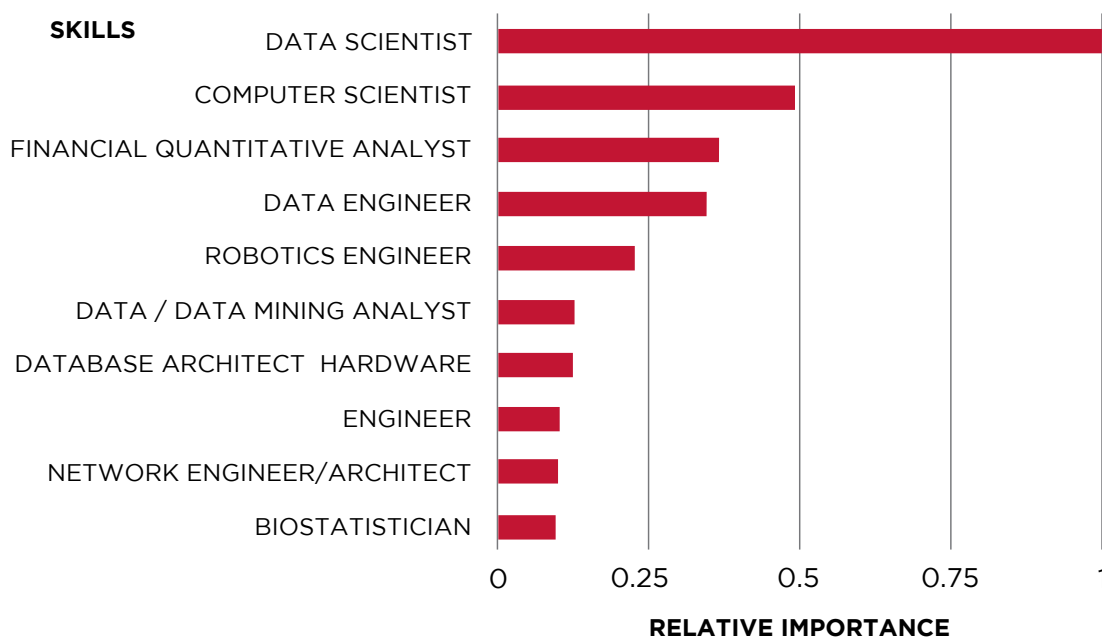
Applying this approach to growing workforce diversity in high-value roles

The approach described above is powerful not only for its ability to connect displaced or at-risk talent with opportunity but also for its ability to uncover “hidden” workers. Across industries, there are workers who have many of the skills they would need to make a transition to a better job yet are not. Often, these underleveraged talent pools are disproportionately comprised of people of color and women. Building an effective pathway—sometimes called a skill bridge—helps move people forward and places them in hard-to-fill jobs. It can also build equity in the workplace by pulling diverse workers up into jobs to which they historically have lacked access.

We will use the AI/ML skill set and the way it functions within occupations as a case study for how, by mapping a pathway to an increased supply of people with these skills, it is possible to advance women and workers of color and increase diversity of the AI/ML and data science workforces.

In the figure below we show that of the occupations for which AI/ML skills are the most critical, by far the most affected is the role of Data Scientist.

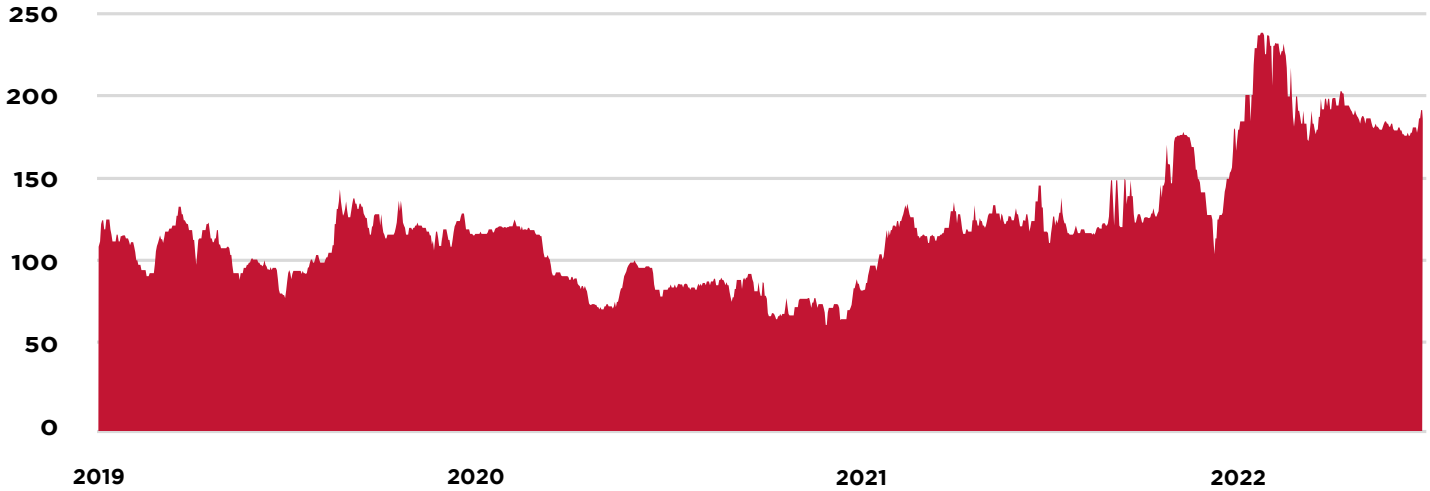
AI/ML RELATIVE IMPORTANCE WITHIN JOBS



Source: Burning Glass Institute analysis of Lightcast job postings data.

Data Scientist is an occupation experiencing high and growing labor demand with a severe shortage of workers. AI/ML skills are increasingly critical for Data Scientists and, like Data Scientists themselves, these skills are in short supply.⁶

DATA SCIENTIST DEMAND FROM 2019-2020 60-DAY MOVING MEDIAN OF POSTING VOLUME

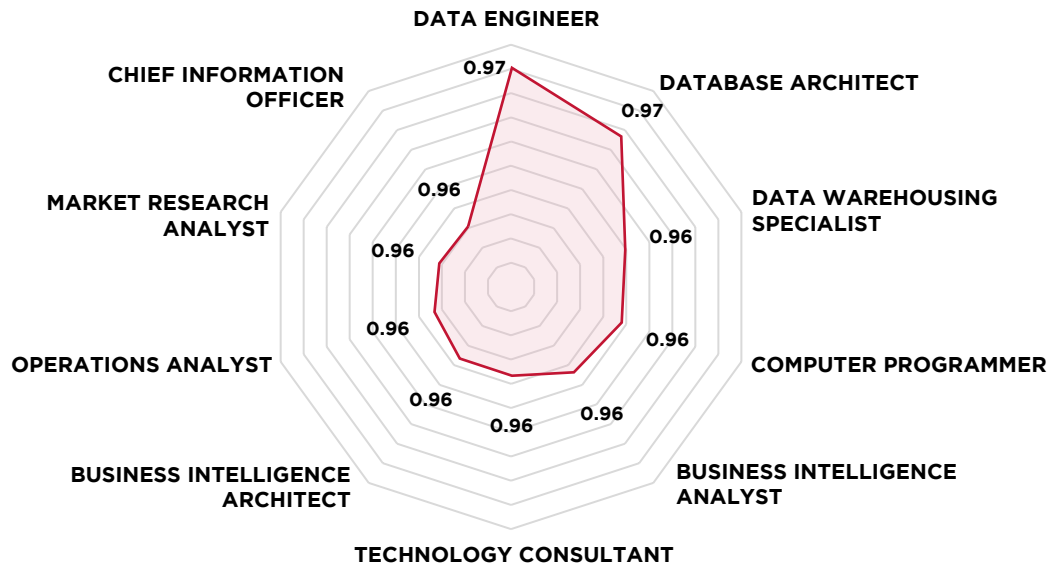


Source: Burning Glass Institute analysis of Lightcast job postings data.

Among the jobs whose skills are most similar to those of a Data Scientist, one or more may prove to be an ideal “feeder” job to fill these unmet demands.

Among the 10 jobs most similar to Data Scientist, the field of Operations Analysts has a 30% larger proportion of Black and Hispanic workers. In addition, Operations Analysts are 51% female, compared with Data Scientists, who are 18% female. A substantive transition of people from this occupation into data science would not only result in the wage, advancement, and career impacts detailed above, but also begin to alleviate the racial and gender imbalances in the Data Scientist occupation.

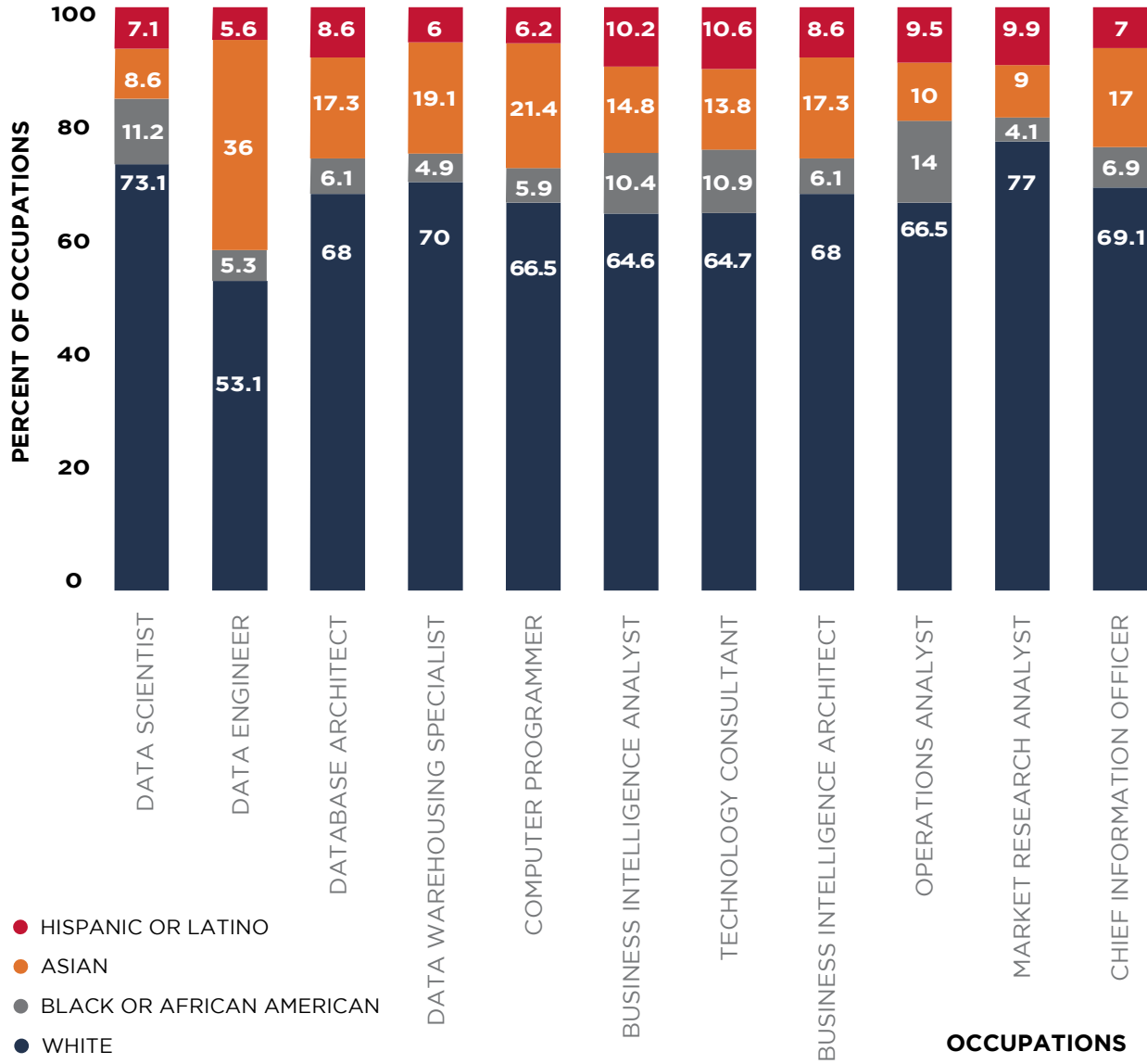
OCCUPATIONS MOST SIMILAR TO DATA SCIENTIST



Source: Burning Glass Institute analysis of Lightcast job postings data.

⁶According to a survey from Upwork, released Aug. 25, 2022, of the 1,000 U.S. hiring managers who responded, nearly two-thirds (60%) of hiring managers said data science and analytics roles will be the hardest to fill, followed by architecture and engineering (58%), and IT and networking (58%). These are the most difficult roles to fill, according to respondents <https://www.upwork.com/press/releases/upwork-report-finds-u-s-businesses-increasingly-turn-to-independent-talent-as-a-key-workforce-strategy>

RACIAL DISTRIBUTION OF OCCUPATIONS MOST SIMILAR TO DATA SCIENTIST



Source: Burning Glass Institute analysis of Lightcast job postings data.

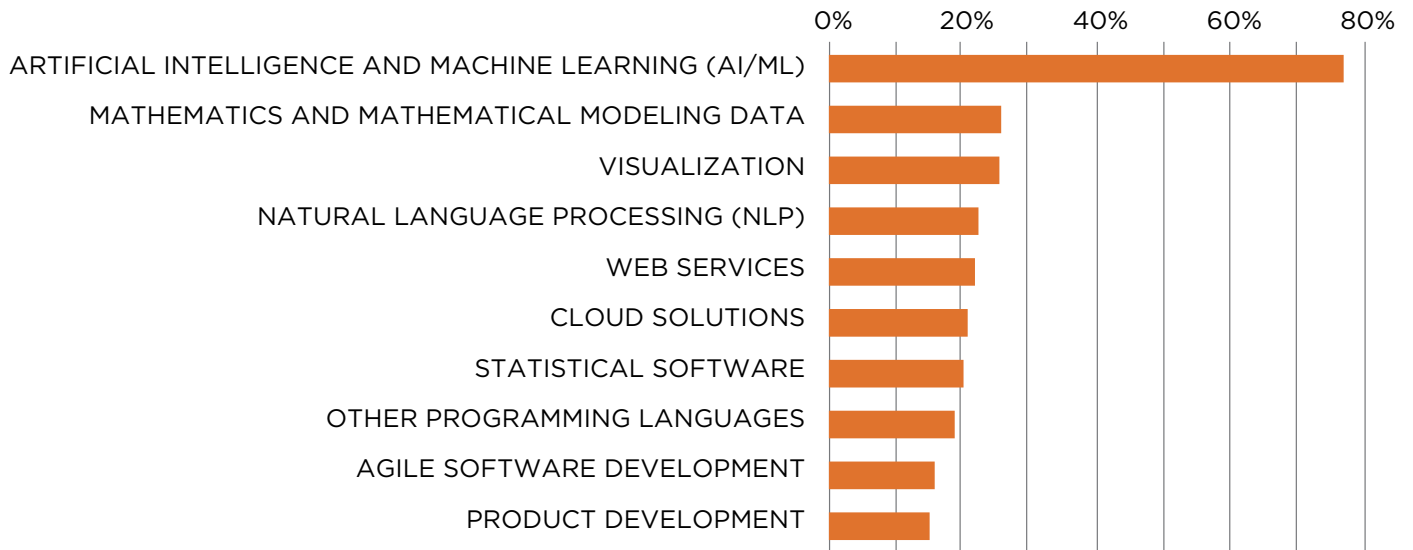
How to make the leap? Operations Analysts already have many of the skills needed to make the leap—31 of the top 50 skills for Operations Analysts are in the top 50 skills for Data Scientists. However, a few other skills lie in the gap, including Mathematical Modeling, Data Visualization, and Natural Language Processing. In fact, AI/ML is an excellent skill set for an Operations Analyst to prioritize. AI/ML does not appear among the top 10 skills of greatest importance to an Operations Analyst, so it is highly likely that most Operations Analysts would need to develop these skills in order to make the transition to Data Scientist.

OPERATIONS ANALYST SKILL IMPORTANCE

SKILL NAME	SKILL IMPORTANCE
BUSINESS OPERATIONS	0.859
COMMUNICATION	0.710
INITIATIVE AND LEADERSHIP	0.669
OFFICE AND PRODUCTIVITY SOFTWARE	0.498
BUSINESS MANAGEMENT	0.485
DATA ANALYSIS	0.472
PROCESS IMPROVEMENT AND OPTIMIZATION	0.469
PERSONAL ATTRIBUTES	0.456
PROBLEM SOLVING	0.454
RESEARCH METHODOLOGY	0.362

Source: Burning Glass Institute analysis of Lightcast job postings data.

SKILL IMPORTANCE TO DATA SCIENTISTS



Source: Burning Glass Institute analysis of Lightcast job postings data.

Implications of Emerging Skill Transition Pathways

For higher education: How can workers learn critical emerging skills? Helping those already in the workforce acquire needed skills is uncharted territory for most educational institutions. Yet colleges and universities have a big role to play here because they can create new learning structures, such as certificate programs, specifically for working learners. Nearly all colleges and other higher education institutions had to adapt and build capacity during the pandemic—they should not cede this learning challenge and opportunity to online providers and boot camps. In a time of shrinking enrollment, there is a real opportunity to extend the community of learners by creating programs that help incumbent workers acquire just-in-time, high-demand skills in a concentrated and focused way. Institutions will need to depart from past practice, and structure and bundle coursework into “right-shaped” programs—for example, a certificate program specifically for Operations Analysts transitioning into data science, rather than for a full-time data science major. Through such programs, institutions can support returning or incumbent workers—and workers of color and women in particular—to build on their existing skill base and map the pathways to acquiring far more competitive and compelling skills.

For business: In addition to reskilling and upskilling workers to stay current in their existing roles, companies should also consider ways of creating and incentivizing transitions to new jobs, especially from jobs that are at risk of disruption or decline. For example, a firm that projects a declining need for one occupation but is struggling to fill other roles can identify the emerging skills that lie between them and provide the training to resolve the gap. The result will be a higher value workforce. Businesses must also make greater and more sophisticated use of the predictive power of data, work to understand where skill sets, occupations, and industries are heading, and calculate the likely consequences of those developments. Their focus on training should emphasize to all employees that acquiring new skills is valuable to the company’s success, and can directly impact workers’ future earning power and job mobility. Companies should also signpost learning opportunities frequently, so that employees see very clearly that acquiring these skills represents a means to get ahead.

Businesses that invest in the continued learning of their workers create powerful advantages. Proactive companies committed to diversity, equity, and employee mobility can benefit from growing known talent. This approach will often be quicker and more reliable than competing for limited talent pools on the open market. More significantly, the long-term impact of this approach can create a very strong culture within companies: Employees place high value on company investments in their development and demonstrate loyalty in response.⁷

⁷“Bridging the advancement gap: What frontline employees want—and what employers think they want”, Bhaskaran, Davis, Desbrière, Wasserteil. McKinsey, 2022.

Rising to the Moment: Case Studies in How Higher Education Institutions and Employers are Embedding Emerging Skills into Their Training Programs

Cloud

San Diego State University

San Diego State University's Cloud Security and Governance Certificate, offered through its recently launched Cyber Tech Academy, trains emerging and advanced cyber professionals to identify and manage risk in an increasingly cloud-dependent world. Through fully online, asynchronous 14-week courses, the program allows professionals to quickly gain fundamental knowledge and specialized skills they can immediately apply to their own jobs. With constantly evolving examples and real-world projects based on the latest cyber crimes, completing the Cloud Security and Governance Certificate ensures learners are poised to grow in the cloud security field, where nearly 20,000 new and often high-paying jobs are expected to open within the next five years.⁸

Website: <https://info.cyberonline.sdsu.edu/online-cyber-security-certificate/>

Product Management

Accenture

Accenture is the largest agile transformation provider globally. Agile methodology embraces iterative, cross-functional collaboration to improve product development quality and efficiency that meet a customer's evolving needs. In a hypercompetitive and ever-changing business environment, Accenture's clients need to innovate faster, better, and more frequently to improve customer satisfaction and return on investment. To support clients with agile transformation, the Accenture Training Center offers short, customized training and certificates in Scaled Agile Framework, Inc. (SAFe), which is a framework for enterprises to achieve an agile way of working at scale.

Accenture has been a SAFe provider since 2015 and has trained over 61,000 people both internally and externally in SAFe programs. Among its offerings, the SAFe 5.0 Agile Product Management four-day course teaches product leaders how to continuously explore markets and drive strategy with market segmentation, use design-thinking to accelerate the product life-cycle and obtain fast feedback to quickly deliver products and solutions, and recognize how continuous exploration fuels innovation and helps to better define a vision, strategy, and roadmap. Accenture has 33,523 certified SAFe associates, over 546 active SAFe program consultants actively engaged with customers, and 1,500 trained agile coaches globally. Accenture is also a leading provider of SAFe Certification and Training courses, providing over 4,000 courses taught worldwide.

Website: <https://www.accenture.com/nl-en/services/about/in-company-training>

⁸"Skills of Mass Disruption: Pinpointing the 10 Most Disruptive Skills in Tech", Will Markow and Rachel Sederberg. Burning Glass Technologies, December 2020

University of Maryland

The University of Maryland offers an online Master of Professional Studies in Product Management that provides students with the skills and experience to lead the product lifecycle from customer discovery to delivery. Students major in marketing, business, or engineering, and often end up in a product management role. The digitalization and sophistication of this growing business area requires additional skills training.

The University of Maryland's unique 30-credit curriculum, designed to be completed in 15 months, has five terms that align with product design, development, and launch.

TERM I

Customer Discovery explores if the problem is worth solving by engaging in proven customer discovery and validation techniques.

TERM II

Product Discovery focuses on creating a product that customers love, delivers value, and works for the business through rapid prototyping and product discovery techniques.

TERM III

Product Delivery examines how to enable business agility using design thinking and DevOps, empowering product teams to scale product innovations, delight customers, and capture market share.

TERM IV

Gain Traction and Influence focuses on actively managing the customer journey while influencing stakeholders and negotiating business partnerships that drive growth.

TERM V

Managing Products at Scale covers how to lead product portfolios and innovations at scale with tailored product frameworks, lean budgeting, empowered teams, aligned objectives, and key results.

With a curriculum attuned to in-demand skill sets, project-based learning, and faculty with industry experience, graduates of the program build a professional network and gain real-world experiences to grow their careers.

Website: <https://mppm.umd.edu>

Social Media/Marketing

Google

The pandemic accelerated the need for digital tools, and during this period, digitally advanced small businesses have been more financially resilient and have [hired at twice the rate](#) compared with their less digitally advanced peers. To ensure businesses of all sizes can use digital marketing and e-commerce to unlock growth opportunities – and that they have access to talent with digital know-how – Google launched a new [Digital Marketing & E-commerce certificate in May 2022](#). This [certificate program](#) teaches the skills needed for an entry-level job in digital marketing or e-commerce, with no previous experience required. The seven-course program is taught fully online and hosted on Coursera. Learners gain in-demand skills like using e-mail marketing and analytics to manage digital marketing campaigns, attracting and engaging customers virtually, and selling products online. By using tools such as Canva, Constant Contact, Hootsuite, HubSpot, Mailchimp, Shopify, and Twitter, certificate learners will develop an online portfolio of artifacts to demonstrate their skills to future employers. In addition, the American Association of Advertising Agencies (4A's) and the American Advertising Federation (AAF) endorses the certificate.

[Google Career Certificates](#) are flexible, online training programs designed to help people develop job-ready skills in high-growth fields. Combined, these certificates provide job seekers with access to more than 1.5 million in-demand jobs in the U.S. Graduates of the program gain access to an [employer consortium](#) which includes more than 150 companies – such as Crate & Barrel, Infosys, Shopify, Verizon, Walmart, Wayfair and Google – who are committed to considering skilled certificate graduates for entry-level roles. To date, 75% of certificate earners report improvement in their career trajectory within six months.

Increasingly digital skills like digital marketing and e-commerce cut across industries. In addition to the Google Career Certificates, Google is working with universities like Columbia and the University of Michigan to [create industry specializations](#): university-built specializations that build on the core of Google Career Certificates by providing learners with additional expertise and skills for jobs in some of the fastest-growing industries.

Website: [Digital Marketing & E-Commerce Certificate and Industry Specializations](#)

West Virginia University

In 2019, West Virginia University (WVU) established the online graduate certificate in Digital and Social Media. This certification is a twelve-credit asynchronous program and is also offered in the online master's degree in Integrated Marketing Communications. WVU offers similar programs including an online master's degree in Digital Marketing Communications and a course in influencer marketing. The Digital and Social Media graduate certificate is aimed at tackling the growing demand for “digital storytelling” through the lens of social media (Tik Tok, Instagram, Facebook), web, and video production. As the demand for a digital presence and brand spans industries, WVU alumni successfully work in a variety of roles such as a campaign specialist at the National Sexual Violence Resource Center, a manager of operations and production at John Deere, a chief digital officer at W2 Communications, and others. The WVU Reed College of Media was one of 35 institutions named to the 2022 PRNEWS Education A-List for career advancement in public relations and marketing communications.

Website: http://catalog.wvu.edu/graduate/graduatecertificates/digital_and_social_media/

Conclusion: An Invitation to Innovate



It is not unreasonable, initially, to consider skills disruption a threat. The challenges are real. Whole occupations and even some industries are vulnerable to sweeping, unplanned changes, including obsolescence, through the power of this phenomenon. Yet because of the subtle, under-the-hood nature of its creative destruction, it has largely escaped notice. Companies in a wide array of fields, learners seeking to make a strong launch or acquire skills to get ahead, and communities who historically have lacked access to high-growth jobs are all facing challenges from skills disruption, but many are unaware of its power and prevalence. Business and education leaders are hard pressed to anticipate and recognize this new force in the economy and respond to the rapid changes it unleashes.

But it is far more useful to recognize the creative opportunities posed by skills disruption, and to make the most of them. Our research confirms that, over time, the labor market becomes more dynamic, not less, and that emerging skills will continue to spread widely across sectors, occupations, and geographies, ultimately becoming core to the labor market and the workforce. In this context, colleges, companies, and workers will all do well to view skills disruption as offering evidence of what works, highlighting what is needed, and providing a chance to chart a new, more fruitful course for all stakeholders. As they flourish, emerging skills offer us all an invitation to new ways of working.

Students and workers seeking to advance will need the leadership and guidance of schools and employers in navigating the unfamiliar terrain created by skills disruption. Empowered by big data analysis and some of the skills profiled here, businesses and educational institutions can inform their efforts to support workers and students in acquiring the skills that the future is going to require of them. The data already allows us

to see what's ahead, so rather than wait for developments to unfold, it is imperative that all stakeholders anticipate, plan, and act.

Innovations currently underway prove that such approaches are well within our grasp. The San Diego State University Cloud Security and Governance Certificate and the Digital and Social Media graduate certificate at West Virginia University, profiled on pages 35 and 37 of this report by the Business-Higher Education Forum (BHEF) respectively, are examples of approaches based on insights about the Cloud and Social Media emerging skill sets featured elsewhere in this paper. These ventures give students and workers access to an array of rapidly growing occupations that are spreading across industries. The work by Accenture to create a training resource in agile methods, profiled by BHEF on page 35 of this report, illustrates how another of our four skill sets, Product Development, can be taught and learned across a sweeping continuum of occupations, sectors, and applications.

There is more to learn about skills disruption, both as a global phenomenon and as it plays out community by community, and business and education leaders and data scientists are keen to dive deeper. How are workers currently learning—or not learning—the new skills required of them in their current jobs? Where are the best examples of schools or businesses matching people in declining “feeder” occupations to high-growth, high-demand “target” jobs? What works to open up high-growth, high-demand jobs to people who have historically lacked access? What are the implications of the burgeoning remote economy for the nexus of opportunity in an age of skills disruption? Who, if anyone, is harnessing skills disruption for large-scale transformations of workplaces or educational institutions, and how are they going about it?

One thing is clear from this early study of skills disruption: Those who labor in, train for, employ within, or study the U.S. workforce are being called upon to make concrete changes.



A Call to Action from BHEF

By understanding, anticipating, and harnessing skill disruption, we can create strategies that go beyond mitigation and craft a disruptive skill economy in which many more businesses, educational institutions, students, and workers can thrive. Real solutions require real responses from higher education, business, and other stakeholders. BHEF is leading the way with a concerted approach to building a workforce that is equipped with the fastest growing, highest demand skill sets—skills that are most disruptive. BHEF will use *How Skills are Disrupting Work: The Transformational Power of Fast Growing, In-Demand Skills* as a way of understanding that disruption and working with business and education leaders to prepare leaders for the future.

As the leading organization for C-suite executives and college and university presidents to jointly address talent challenges, BHEF and its members will take three strategic actions:

- 1.** Launching new business-higher education partnerships on closing newly researched skills gaps, such as those outlined in this report;
- 2.** Developing efficient and accessible pathways between higher education and the workforce for both new entrants to the workforce and incumbent workers; and
- 3.** Setting bold organizational targets and annually measuring impact.

BHEF will launch its call to action as a companion to this report, where it will serve as a framework and a resource for readers. We enthusiastically invite you to join us in this effort, so that business, education institutions, and other stakeholders can close skill gaps and empower more students and workers to grow and prosper in their careers.



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