Skills of Mass Disruption:

Pinpointing the 10 Most Disruptive Skills in Tech

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burningglass®
TECHNOLOGIES

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Introduction and Executive Summary

Across the literature on technology and the future of work, buzzwords abound. There is no shortage of reports discussing new and disruptive technologies that are years from being commercially viable, or rankings of the top skills in a small, nascent domain.
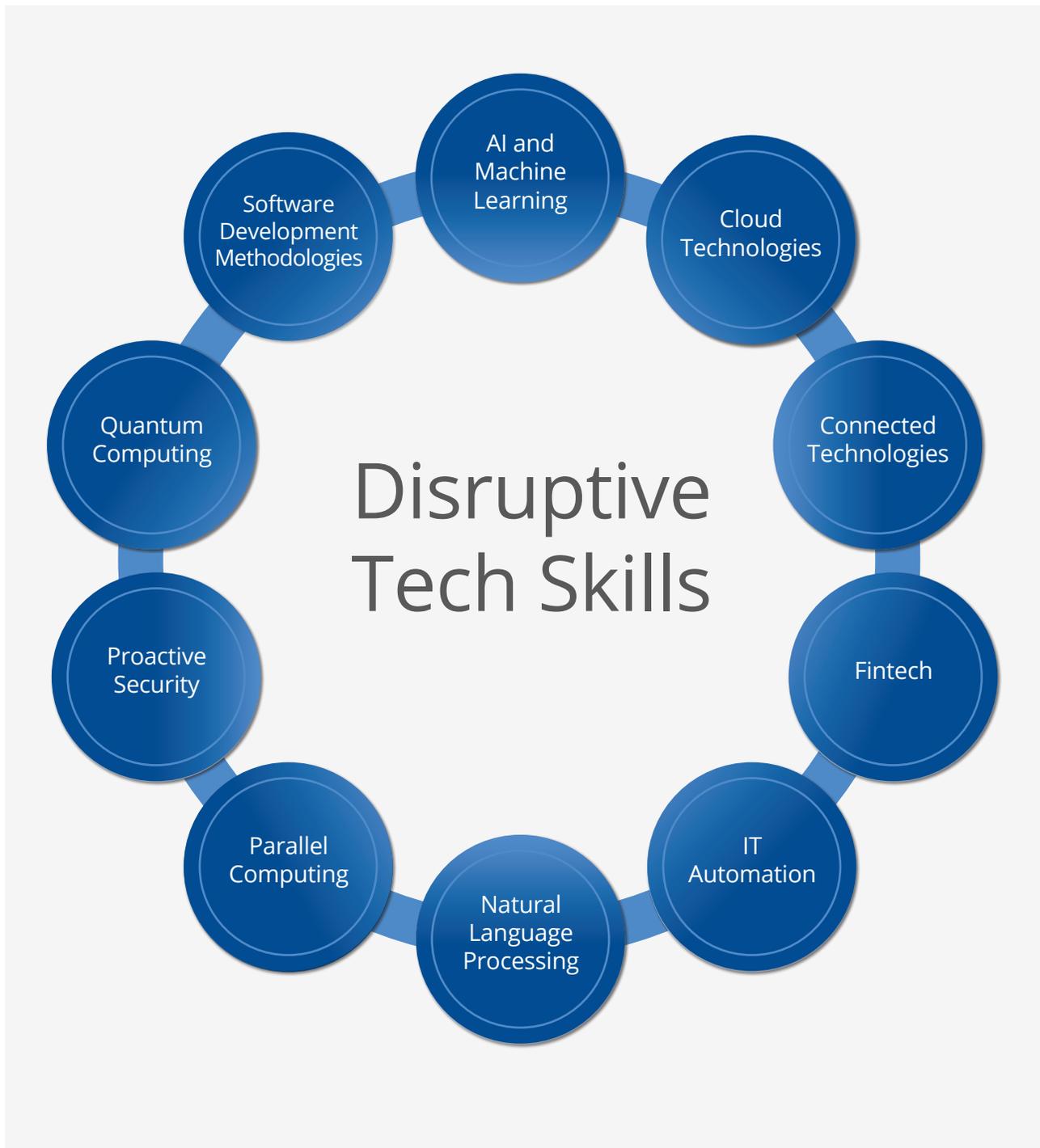
However, this prevalence of hype often gives way to a dearth of detail. Organizations and technology executives know they must adopt new technologies to remain competitive, and they know this requires their workforce to constantly evolve and adopt the emerging skills needed to keep pace with changes in their industry. There is minimal guidance, however, on how to spot the emerging skills that will have the most disruptive impact on an organization's workforce. Nor is there much discussion devoted to the concrete steps an organization can take to adopt emerging

skills within their teams. This leaves many organizations grasping in the dark as they try to build a future-ready workforce.

To help organizations move past the buzzwords and pinpoint the disruptive technology skills they can begin building today, Burning Glass Technologies analyzed more than 17,000 unique skills demanded across our database of over one billion historical job listings. The analysis grouped similar technology skills into associated skill areas and assessed both the projected growth of each skill area over the next five years, as well as each skill area's hardness to fill – a composite measure of the average time it takes to fill jobs requesting each skill and the average cost premium to fill each skill. Disruptive skill clusters can be defined as those that are projected to grow rapidly, are undersupplied, and provide high value.

The results identified the following 10 most disruptive skill areas in tech:

Figure 1: The 10 Most Disruptive Skill Areas in Tech

AI and Machine Learning

Software Development Methodologies

Cloud Technologies

Quantum Computing

Connected Technologies

Disruptive Tech Skills

Proactive Security

Fintech

Parallel Computing

Natural Language Processing

IT Automation

Key Findings:

+ **Many disruptive tech skills are already in demand and growing fast.** In the past 12 months, there were 1,714,483 U.S. job openings requesting at least one of the disruptive skill areas. Over the next five years, they are projected to grow between 17% and 135%. The skill areas projected to grow the fastest include Quantum Computing and Connected Technologies, with forecasted growth rates of 135% and 104%, respectively.

+ **These skill areas are spreading across many different occupations and industries.** Eight of the 10 skill areas are already commonly requested in over 30% of occupations. None of the skill areas except Quantum Computing have more than 40% of demand concentrated within one industry. This diffusion of skills across different jobs and industries is hybridizing many roles and teams, requiring employers to be thoughtful in determining which roles are best-suited for embedding these skills.

+ **Organizations with future-ready skills create future-ready solutions.** The most disruptive organizations are more likely to request the disruptive tech skills. Across all IT and R&D occupations, Unicorn employers – i.e., startups valued at $1 billion or more –are 33% more likely to request disruptive tech skills than legacy firms in the Fortune 100. This underscores a key maxim: Future-ready teams create future-ready solutions.

+ **Employers have to pay more to hire workers with these skill areas.** The average salary premiums for the disruptive skills areas range between $4,200 to $25,000. The two skill areas with the greatest average salary premiums – IT Automation and AI and Machine Learning – are both focused on automating existing tasks to become more efficient. This means many employers face a Catch-22: They need disruptive skills to remain future-ready and gain efficiencies, but they may not be able to afford hiring individuals from a limited pool of existing workers with these skills.

+ **But employers have realistic options for upskilling current workers to meet the need.** By identifying existing employees in "adjacent roles" that have similar skill sets, employers may be able to strategically reskill and upskill to meet the need at less cost. For all but two of these skill areas, there are at least 200 occupations that represent strong candidates for upskilling. The two remaining skill areas, Parallel Computing and Quantum Computing, are both highly technical fields, but there are still numerous adjacent roles that can be upskilled for each.

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Methodology

In order to identify the most disruptive skills in tech, we analyzed over 17,000 unique skills demanded across Burning Glass's database of over one billion historical job listings. We grouped similar technology skills into related skill areas and assessed both the projected growth of each skill area over the next five years as well as each skill area's hardness to fill — a composite measure of the average time it takes to fill jobs requesting each skill, as well as the average cost premium to fill each skill. This allowed us to plot skills within Burning Glass's disruptive skills matrix — a methodology previously developed for *Quant Crunch: How the Demand for Data Science Skills is Disrupting the Job Market,* a joint report with IBM and the Business-Higher Education Forum.
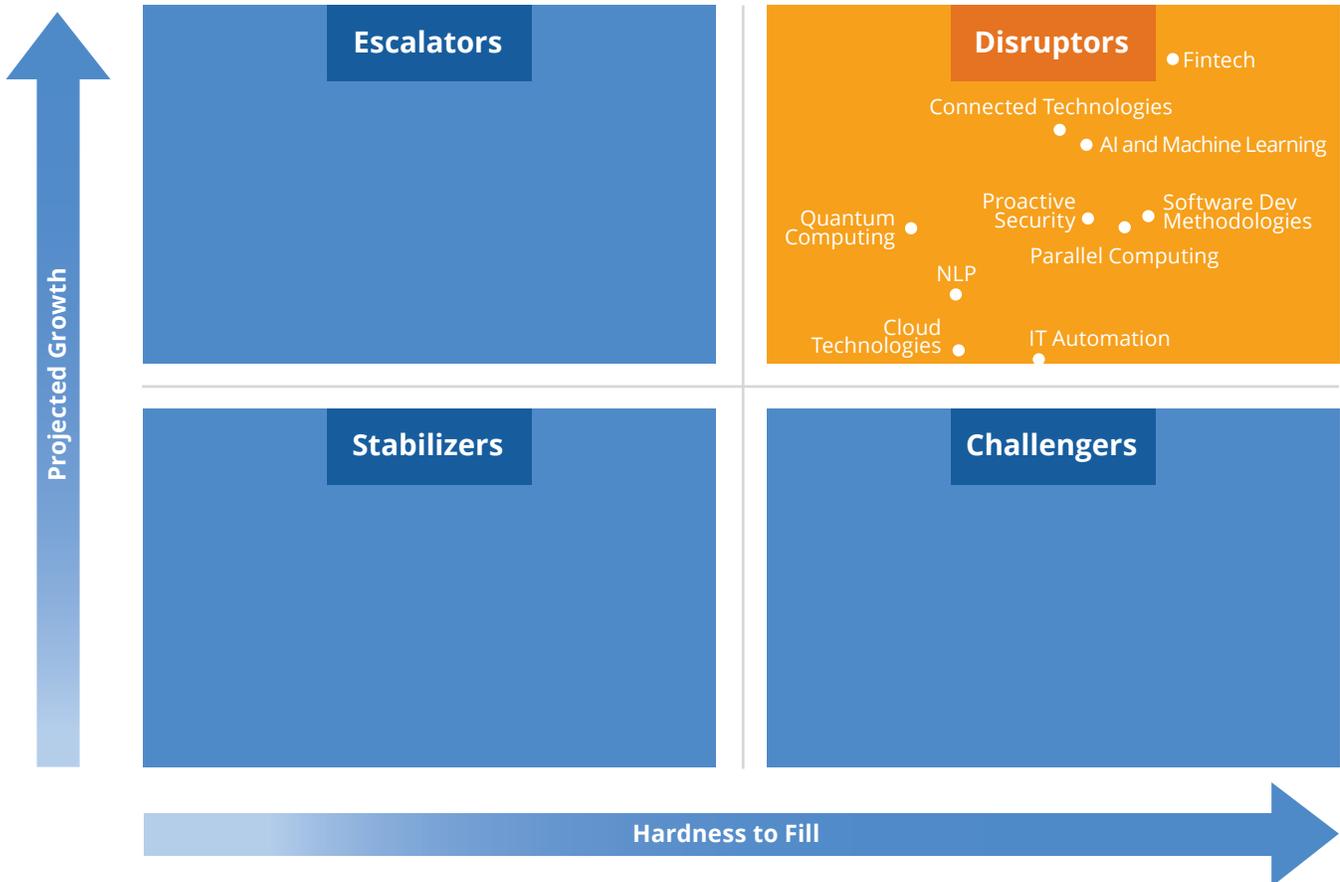

The disruptive skills matrix classifies skills within one of the following four quadrants:

+ **Stabilizers** are skills with low projected growth and low hardness to fill. These skills are typically plentiful across the market but may still be important to key roles.

+ **Escalators** are skills with high projected growth but low hardness to fill. These are high-growth skills that are important to building a future-ready workforce but are typically common across the job market.

+ **Challengers** are skills with low projected growth and high hardness to fill. These are skills associated with established fields that provide strong value, but there is a limited pool of talent.

+ **Disruptors** are skills with high projected growth and high hardness to fill. These are high-value skills that help firms differentiate their workforce and become future-ready – but are also the hardest for employers to find in the job market.

This report focuses exclusively on tech skills falling in the Disruptors category, as shown in Figure 2.

Figure 1: Disruptive Skills Matrix

Projected Growth

Escalators

Disruptors

● Fintech

Connected Technologies
●
● AI and Machine Learning

Quantum
Computing ●

Proactive
Security ●

Software Dev
Methodologies
● ●

Parallel Computing

NLP
●

Cloud
Technologies ●

IT Automation
●

Stabilizers

Challengers

Hardness to Fill

To narrow the list down to the top 10 most disruptive skill areas in tech, we then ranked each skill in the Disruptors category by summing their normalized projected growth, average salary premiums, and average time to fill. The 10 skills with the highest aggregate scores were selected as the 10 most disruptive skills in tech. These skills include the following:

+ **AI and Machine Learning:** Skills related to developing and utilizing programs, tools, and solutions powered by algorithms and other technologies that automatically respond and improve based upon prior experience or data.

+ **Cloud Technologies:** Skills related to developing, implementing, and securing cloud computing infrastructure and strategy.

+ **Connected Technologies:** Skills related to the Internet of Things and connected physical tools, as well as the telecommunications infrastructure needed to enable them, such as 5G.

+ **Fintech:** Skills related to technologies such as blockchain and others aimed at making financial transactions more efficient and secure.

+ **IT Automation:** Skills related to automating and orchestrating digital processes and workflows.

+ **Natural Language Processing (NLP):** Skills related to developing solutions and technologies build upon machine-enabled processing of natural language.

+ **Parallel Computing:** Skills related to a form of computation where many calculations, or the execution of computational processes, are carried out simultaneously.

+ **Proactive Security:** Skills related to proactively securing and protecting digital infrastructure from cybercriminals and preventing cyberattacks before they occur.

+ **Quantum Computing:** Skills related to building and utilizing quantum computers and their applications.

+ **Software Development Methodologies:** Skills related to Agile, DevOps, and related approaches to developing software more rapidly, effectively, and securely.

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Key Findings

Many disruptive tech skills are already in demand and growing fast

In the past 12 months (December 2019-November 2020) there were 1,714,483 job postings requesting at least one of the disruptive skill areas. This already represents sizable demand throughout the market, and this level of sustained employer need is especially impressive given the market-wide decline in postings due to the COVID-19 pandemic. But these skills are still maturing and are poised to continue growing at a rapid pace. Over the next five years, each skill is projected to grow at least 17%, and some are projected to grow considerably faster. The skill areas projected to grow the fastest include Quantum Computing and Connected Technologies, with forecasted growth rates of 135% and 104%, respectively.

Table 1: **Job Openings and Growth by Disruptive Skill Area**

Skill Area	Total Job Openings (Last 12 Months)	Projected 5-Year Demand Growth
Software Dev Methodologies	634,660	35%
Cloud Technologies	462,963	28%
Proactive Security	373,123	39%
IT Automation	282,380	59%
AI and Machine Learning	197,810	71%
Connected Technologies	68,313	104%
NLP	36,941	41%
Fintech	35,667	96%
Parallel Computing	11,056	17%
Quantum Computing	2,718	135%

These skill areas are spreading across occupations and industries

The disruptive skill areas are not just clustered in a handful of roles: Most of these skill areas are spreading to many different corners of the job market, both in tech and beyond. Since 2015, most of the skill areas have seen strong growth in the number of roles in which they are frequently requested. This is creating hybridized roles that combine emerging skills with more traditional skill sets. Most of these skill areas are already commonly requested in at least 30% of all occupations, although some highly technical skills — such as Parallel Computing and Quantum Computing — are more heavily concentrated in a handful of specific roles. Nonetheless, this diffusion of skills across different jobs is hybridizing many roles, requiring employers to be thoughtful in determining which positions are best-suited for developing these skills, and to what level of proficiency in each skill area employees across different roles should strive.

Table 2:

Share of All Occupations Commonly Requesting Disruptive Skill Areas

Skill Area	Share of Occupations Commonly Requesting Skill Area: (Dec. 2019-Nov. 2020)	Share of Occupations Commonly Requesting Skill Area: 2015
Proactive Security	64%	57%
Cloud Technologies	58%	55%
Software Dev Methodologies	57%	53%
AI and Machine Learning	56%	37%
Connected Technologies	41%	25%
NLP	35%	27%
IT Automation	34%	16%
Fintech	33%	13%
Parallel Computing	10%	12%
Quantum Computing	4%	1%

Similarly, these skill areas are spread across a range of industries. With the exception of Quantum Computing, which is heavily concentrated in the professional services sector, none of the disruptive skill areas have more than 40% of total demand concentrated within one industry. Some of the disruptive skill areas that are most dispersed across sectors include AI and Machine Learning, Cloud Technologies, Parallel Computing, and Proactive Security. Just as the spread of these skills across occupations is creating hybrid jobs, the spread of these skills across industries is also creating hybrid teams. This requires organizations in all sectors to adopt these skills within their organization to remain future-ready.

Figure 3: Demand for Disruptive Tech Skills by Industry Sector

	AI and Machine Learning	Cloud Technologies	Connected Technologies	Fintech	IT Automation	NLP	Parallel Computing	Proactive Security	Quantum Computing	Software Dev Methodologies
Professional Services	25%	31%	29%	40%	32%	28%	22%	28%	76%	31%
Finance and Insurance	17%	14%	4%	30%	18%	22%	5%	24%	3%	20%
Information / IT	13%	19%	26%	11%	17%	14%	10%	7%	6%	12%
Manufacturing	15%	8%	14%	3%	11%	7%	26%	11%	2%	12%
Retail Trade	8%	7%	6%	3%	4%	7%	10%	3%	2%	5%
Adminstrative Services	3%	6%	3%	6%	6%	4%	3%	5%	0%	5%
Educational Services	5%	2%	1%	1%	2%	5%	7%	3%	8%	1%
Health Care and Social Assistance	5%	3%	11%	1%	2%	4%	3%	4%	0%	3%
Public Administration	3%	3%	1%	2%	3%	3%	2%	8%	1%	3%
Transportation and Warehousing	2%	2%	1%	1%	1%	1%	2%	1%	0%	2%
Other Industries	4%	6%	4%	2%	4%	6%	10%	5%	1%	5%

Organizations with future-ready skills create future-ready solutions

The most disruptive organizations are more likely to request the disruptive tech skills. Within one of the most rarified classes of disruptors, Unicorns valued at $1 billion or more, demand for these skills within tech and R&D jobs is surging compared to their legacy counterparts. The share of tech and R&D job openings requesting at least one of these skills at Unicorns is 40%, compared to only 30% of tech and R&D jobs at Fortune 100 firms. Stated another way, Unicorns are 33% more likely to request disruptive tech skills than legacy firms in the Fortune 100. This underscores a key maxim: Organizations with future-ready skills build future-ready solutions.

Figure 5: **Share of Openings Requesting at Least One Disruptive Tech Skill**

Fortune 10	**30%**
Unicorns	**40%**

0% 5% 10% 15% 20% 25% 30% 35% 40% 45%
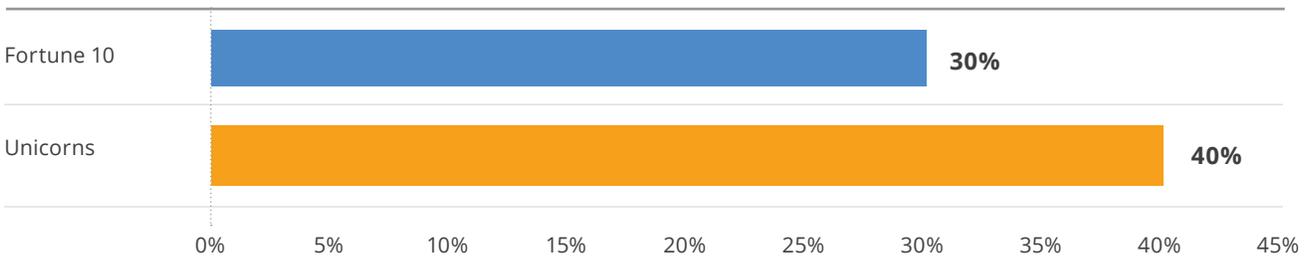
Employers have to pay more to hire workers with these skill areas

Disruptive skills are disruptive for a reason: They are high value and not everyone has them. Not surprisingly, this puts significant upward pressure on salaries. On average, the disruptive skill areas come with salary premiums ranging between $4,200 and $25,000. The two skill areas with the greatest average salary premiums – IT Automation and AI and Machine Learning – are both focused on automating existing tasks to make them more efficient. This means many employers face a Catch-22: They need disruptive skills to remain future-ready and gain efficiencies, but they may not be able to afford hiring individuals from a limited pool of existing workers with these skills.

Table 3: Average Salary Premium by Disruptive Skill Area

Skill Area	Average Salary Premium
IT Automation	$24,969
AI and Machine Learning	$14,175
Fintech	$13,799
Software Dev Methodologies	$13,762
Connected Technologies	$10,873
Cloud Technologies	$10,588
Proactive Security	$8,851
Parallel Computing	$7,797
NLP	$6,368
Quantum Computing	$4,204

But employers have realistic options for upskilling current workers to meet the need

To combat the increased cost and difficulty of filling positions with the disruptive skill areas, employers can build these skills within their workforce more efficiently by strategically reskilling and upskilling existing employees who already perform work using similar skills. For all but two of these skills, there are at least 200 occupations that represent strong candidates for upskilling in these fields, as determined by analyzing roles in which each skill can both align with existing responsibilities and typically comes with a significant salary premium. The two remaining skill areas, Parallel Computing and Quantum Computing, are both highly technical fields, but there are still numerous roles that can be upskilled in each skill area. Organizations can, therefore, more rapidly and effectively integrate these disruptive skills into their teams by upskilling existing employees, rather than relying solely on new hires to fill gaps in their capabilities.

Table 4: Upskilling Opportunities by Disruptive Skill Area

Skill Area	Number of Occupations Representing Strong Upskilling Candidates*
Proactive Security	598
Software Dev Methodologies	544
Cloud Technologies	524
AI and Machine Learning	512
Connected Technologies	313
Fintech	311
IT Automation	282
NLP	226
Parallel Computing	67
Quantum Computing	10

Includes occupations in which a skill area is commonly requested and has an average salary premium of at least 5%.

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Implications and Recommendations

Employers

+ **Make Developing Disruptive Skills a Priority, Based Upon Your Strategic Goals.** Teams with future-ready skills build future-ready solutions. Therefore, it is imperative for organizations to determine which disruptive skills are most important for them to integrate into their teams to support their current and future strategic priorities. Firms can also take inspiration from disruptive newcomers – such as Unicorns – to understand how these skills can help them build next-generation solutions.

+ **Break Down Silos to Build a Future-Ready Workforce.** Many roles are hybridizing and demand emerging tech skills, even when on non-technical teams. This requires leaders across teams to collaborate on developing a workforce with the skills needed to thrive. Since tech is often the driver of workforce hybridization, the IT and HR departments make natural bedfellows in many strategic workforce planning endeavors.

+ **Invest in Your Workers with Targeted Upskilling.** Hiring workers who already have disruptive skills is costly and can take a long time. Upskilling and reskilling workers in adjacent roles can reduce the cost and time it takes to build a future-ready team, while also supporting employee retention and advancement.

Students and Job Seekers

+ **Identify and Learn High-Value Disruptive Skills.** The disruptive tech skills are growing rapidly and can lead to significant salary boosts. Individuals who identify and develop these future-ready skills – and continuously update their skill sets as new needs emerge – will be best-positioned to enhance their career prospects, both in tech and beyond.

Training Providers

+ **Incorporate Disruptive Skills into Existing Programs.** The job market is changing much faster than most curricula. Students who graduate with future-ready skills are best positioned to thrive in the job market, and training providers can ensure they leave school with these skills by incorporating them into existing programs. This

includes both tech programs and other disciplines, where workers in non-technical fields can benefit by building a hybrid skill set combining emerging tech skills and other competencies.

+ **Build Short-Term Programs to Teach Disruptive Skills to Working Learners.** Many existing workers will be looking to continuously upskill in emerging fields. Training providers can support them by building short-term training programs specifically tailored to workers and individuals looking to enhance their abilities in new fields in order to improve their employment prospects.

+ **Communicate the Value of Disruptive Skills.** The disruptive tech skills can be highly lucrative for individuals who possess them. Training providers can motivate students to learn these skills by communicating the value they confer, in terms of both increased salaries and increased employment opportunities. This will also encourage students to enter and remain within programs dedicated to teaching these emerging, high-value skills.

Technology Vendors

+ **Build a Community of Disruptors.** To build a large user base for a disruptive solution, you need to educate workers in the skills needed to use it. Communicating the value of learning these disruptive skills to students and workers – while also providing the resources needed to help them build these skills – can dramatically expand your pool of potential users.

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Appendix:
Skill Drill Downs

AI and Machine Learning

		Top Occupations
Posting Count	197,810	
Five Year Growth	71%	+ Data Scientist
Skill Premium	$14,175	+ Software Developer / Engineer

Posting Count 197,810

Five Year Growth 71%

Skill Premium $14,175

Top Occupations

+ Data Scientist
+ Software Developer / Engineer
+ Network Engineer / Architect
+ Data Engineer
+ Senior Data Scientist

AI and Machine Learning

Top Industries

+ Professional Services
+ Finance and Insurance
+ Manufacturing
+ Information
+ Retail Trade

Sample Reskilling Target Roles:

+ Software Developer / Engineer
+ Data Analyst (General)
+ Network Engineer / Architect
+ Research Associate
+ Systems Engineer

Cloud Technologies

Posting Count	**462,963**
Five Year Growth	**28%**
Skill Premium	**$10,588**

Top Occupations

+ Software Developer / Engineer
+ Network Engineer / Architect
+ Systems Engineer
+ Devops Engineer
+ Cloud Architect

Cloud Technologies

Top Industries

+ Professional Services
+ Information
+ Finance and Insurance
+ Manufacturing
+ Retail Trade

Sample Reskilling Target Roles:

+ Systems Administrator
+ Software as a Service (SaaS) Account Executive
+ Technical Support Engineer / Analyst
+ Application Support Engineer / Analyst
+ Computer Support Specialist

Connected Technologies

Posting Count	**68,313**
Five Year Growth	**104%**
Skill Premium	**$10,873**

Connected Technologies

Top Occupations

+ Software Developer / Engineer
+ Network Engineer / Architect
+ Satellite Technician
+ Senior Software Developer / Engineer
+ Systems Engineer

Top Industries

+ Professional Services
+ Information
+ Manufacturing
+ Retail Trade
+ Finance and Insurance

Sample Reskilling Target Roles:

+ Satellite Technician
+ General Engineering Technician / Technologist
+ Senior Data Scientist
+ Repair / Service Technician
+ Software Architect

Fintech

Posting Count	**35,667**
Five Year Growth	**96%**
Skill Premium	**$13,799**

Fintech

Top Occupations

+ Software Developer / Engineer
+ Senior Software Developer / Engineer
+ Network Engineer / Architect
+ Technical Consultant / Analyst
+ User Experience (UX) Designer

Top Industries

+ Professional Services
+ Finance and Insurance
+ Information
+ Administrative Services
+ Manufacturing

Sample Reskilling Target Roles:

+ Software Developer / Engineer
+ Network Engineer / Architect
+ Senior Software Developer / Engineer
+ Customer Service Representative (General)
+ Systems Engineer

IT Automation

Posting Count	**282,380**
Five Year Growth	**59%**
Skill Premium	**$24,969**

Top Occupations

+ Software Developer / Engineer
+ Devops Engineer
+ Senior Software Developer / Engineer
+ Systems Engineer
+ Java Developer / Engineer

IT Automation

Top Industries

+ Professional Services
+ Finance and Insurance
+ Information
+ Manufacturing
+ Administrative Services

Sample Reskilling Target Roles:

+ Software Developer / Engineer
+ Technical Support Engineer / Analyst
+ Engineering Manager (General)
+ General Engineering Technician / Technologist
+ Application Support Engineer / Analyst

Natural Language Processing (NLP)

Posting Count

36,941

Five Year Growth

41%

Skill Premium

$6,368

Top Occupations

+ Data Scientist
+ Software Developer / Engineer
+ Senior Data Scientist
+ Network Engineer / Architect
+ Senior Software Developer / Engineer

Natural Language Processing (NLP)

Top Industries

+ Professional Services
+ Finance and Insurance
+ Information
+ Retail Trade
+ Manufacturing

Sample Reskilling Target Roles:

+ Senior Data Scientist
+ Research Associate
+ Computer Scientist / Researcher
+ Security / Defense Intelligence Analyst
+ Cyber Security Consultant

Parallel Computing

Posting Count	**11,056**
Five Year Growth	**17%**
Skill Premium	**$7,797**

Top Occupations

+ Software Developer / Engineer
+ Data Engineer
+ Senior Software Developer / Engineer
+ Data Architect
+ Network Engineer / Architect

Parallel Computing

Top Industries

+ Manufacturing
+ Professional Services
+ Retail Trade
+ Information
+ Educational Services

Sample Reskilling Target Roles:

+ Systems Engineer
+ Network Engineer / Architect
+ General Engineering Technician / Technologist
+ Application Developer / Engineer
+ Performance Engineer

Proactive Security

Posting Count

373,123

Five Year Growth

39%

Skill Premium

$8,851

Top Occupations

+ Cyber Security Engineer
+ Cyber Security Analyst
+ Software Developer / Engineer
+ Network Engineer / Architect
+ Cyber Security Manager / Administrator

Proactive Security

Top Industries

+ Professional Services
+ Finance and Insurance
+ Manufacturing
+ Public Administration
+ Information

Sample Reskilling Target Roles:

+ Cyber Security Consultant
+ Technical Support Engineer / Analyst
+ Cyber Security Specialist / Technician
+ Network Engineer / Architect
+ Application Support Engineer / Analyst

Quantum Computing

Posting Count	**2,718**
Five Year Growth	**135%**
Skill Premium	**$4,204**

Top Occupations

+ Software Developer / Engineer
+ Research Associate
+ Senior Data Scientist
+ Network Engineer / Architect
+ Data Scientist

Quantum Computing

Top Industries

+ Professional Services
+ Educational Services
+ Information
+ Finance and Insurance
+ Retail Trade

Sample Reskilling Target Roles:

+ Research Associate
+ Research Scientist
+ Computer Scientist / Researcher
+ Research & Development Engineer
+ Systems Analyst

Software Development Methodologies

Posting Count	**634,660**
Five Year Growth	**35%**
Skill Premium	**$13,762**

Software Development Methodologies

Top Occupations

+ Software Developer / Engineer
+ Devops Engineer
+ Senior Software Developer / Engineer
+ Technical Manager / Director
+ Systems Engineer

Top Industries

+ Professional Services
+ Finance and Insurance
+ Manufacturing
+ Information
+ Retail Trade

Sample Reskilling Target Roles:

+ Computer Support Specialist
+ .NET Developer / Engineer
+ Application Support Engineer / Analyst
+ Project Manager (General)
+ Repair / Service Technician

Burning Glass Technologies delivers job market analytics that empower employers, workers, and educators to make data-driven decisions. The company's artificial intelligence technology analyzes hundreds of millions of job postings and real-life career transitions to provide insight into labor market patterns. This real-time strategic intelligence offers crucial insights, such as which jobs are most in demand, the specific skills employers need, and the career directions that offer the highest potential for workers. For more information, visit burning-glass.com.