

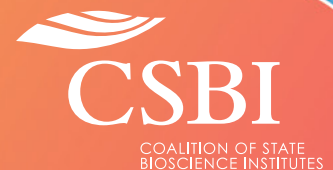


2021 Life Sciences Workforce Trends Report:

Taking Stock of Industry Talent Dynamics
Following a Disruptive Year

Prepared for: Coalition of State Bioscience Institutes (CSBI)
Prepared by: TEconomy Partners, LLC

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Introduction

The disruption and turmoil of 2020—from the tragic health and painful economic challenges of a global pandemic to national social and racial justice movements—demands taking stock in 2021.



The life sciences industry has been asked to play the lead role in delivering innovative solutions to the world’s pandemic challenges; but like other sectors, is not insulated from these disruptive societal and workplace impacts. And while far from finished, the industry is meeting the moment—delivering on biomedical innovations to mitigate and ultimately end the global pandemic; continuing its role as economic stalwart countering economic downturns with hiring and continued growth; adjusting to the turmoil of remote operations; advancing varied and creative diversity and inclusion initiatives; and partnering with educators to advance the science, technology, engineering, and math, or “STEM” talent needs of the industry as well as enhancing its diversity. This is a daunting agenda for any industry, let alone in a single year, and this report works to take stock of the industry’s position and strategic priorities in 2021, with a primary focus on its demands for workforce and talent, arguably the most critical ingredient for addressing this bold agenda.

The preceding themes have emerged from this update to the biennial *Life Science Workforce Trends* Report, conducted and led by the Coalition of State Bioscience Institutes (CSBI). The CSBI represents the collaboration and coming together of 42 state bioscience organizations with a common goal and focus “to ensure America’s leadership in bioscience innovation by delivering industry-led life science education, workforce development, and entrepreneurship programs through a nationally coordinated effort.”¹ The Coalition focuses on and promotes education and workforce training programs that the industry is uniquely positioned to deliver, are replicable and scalable across the nation, can be extended to other “STEM”-driven industries, and are aligned with K-12 standards.

In this edition of the *Workforce Trends* report, TEconomy Partners, LLC (TEconomy) has collaborated with CSBI to take stock of the industry’s demand for talent and the related themes emerging from a disruptive year using both quantitative and qualitative assessment approaches. The analysis and assessment herein leverage intelligence from three primary sources, supplemented with other data-related insights:

- Details from 2.5 million unique (non-duplicative) job postings of life sciences companies over the last four years, including through 2020 for insights into the effects on demand of a pandemic year and the resulting economic and operating challenges.
- A national life sciences industry hiring survey, conducted across 18 states and Puerto Rico in early 2021 and completed by nearly 700 companies. The survey was designed to capture data and information on recent and anticipated hiring and related workforce dynamics including difficult-to-fill positions, impacts of the COVID-19 pandemic, workforce diversity initiatives, and more.²
- Interviews with nearly 200 life sciences industry executives across the same 18 states and Puerto Rico, conducted in early 2021 and designed to capture high-level perspectives from corporate leaders on the same broad set of talent dynamics and related issues addressed in the industry hiring survey.³

1 CSBI website, see: <https://www.csbioinstitutes.org/about-csbi>.

2 For more information on the industry hiring survey, see the Appendix to this report.

3 For more information on the executive interviews, see the Appendix to this report.



This report is organized across the following trends and themes emerging from the assessment:

- The Life Science Industry’s Continued Economic Resilience: Increasing Hiring and Talent Demand Despite the Challenges of a Global Pandemic
- The Pandemic Forced a Seismic Shift to Remote Work, the Industry has Adapted and is Largely Embracing the New Dynamic
- Life Sciences Companies are Elevating Commitments to a More Diverse and Inclusive Industry as a Strategic Priority
- Life Sciences Industry-Academic Partnerships Remain Vibrant, Critical to Meeting the Talent Challenge and Industry Inclusion Goals

This report has been produced in collaboration with and with support from InnovATEBIO, a National Advanced Technology Education Center supporting biotechnology education in community colleges and in close collaboration with the life sciences industry. InnovATEBIO has partnered on this effort to help in highlighting the importance and understanding of educating and training the skilled technical workforce in the U.S.

Defining the Life Sciences Industry

TEconomy’s principals have worked closely in partnership with the Biotechnology Innovation Organization (BIO) for nearly two decades on biennial bioscience/life sciences industry reports on the state of the industry. These efforts have yielded an accepted, comparable definition of the life sciences industry using federal NAICS industrial classifications to include the following five major industry subsectors:

**Agricultural
Feedstock
& Industrial
Biosciences**

**Drugs &
Pharmaceuticals**

**Medical Devices &
Equipment**

**Research, Testing
& Medical
Laboratories**

**Bioscience-Related
Distribution**

Both the quantitative and qualitative data and information collection and resulting analyses presented in this report align with this industry definition and concept. For a list of detailed industries that make up each subsector, see the Appendix to this report.

This report uses the “life sciences” industry terminology reflecting the preferences of CSBI and its state partner organizations. This terminology is synonymous with the “biosciences” used by TEconomy/BIO in its biennial national reports.

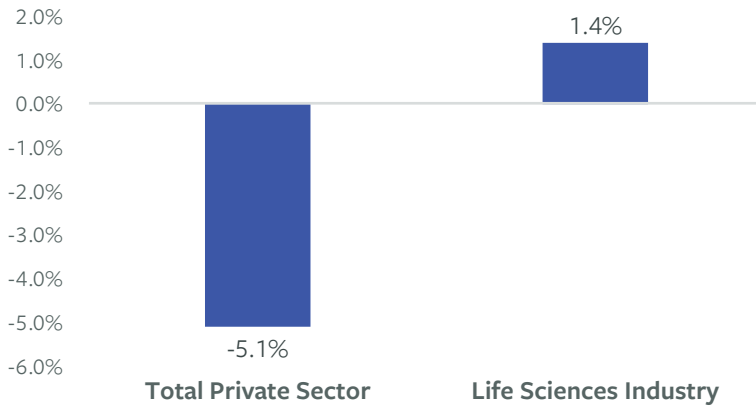
The Life Science Industry's Continued Economic Resilience:

Increasing Hiring and Talent Demand Despite the Challenges of a Global Pandemic



The life science industry represents a steady economic growth driver, bolstering state, regional, and national economies even during economic recessions.⁴ While this has held true during the last two recessions, 2020 was perhaps the ultimate test of the industry’s resilience. Despite the challenges of a global pandemic and the resulting economic shutdowns that led to a recession, and facing a corresponding seismic shift to remote operations, the industry has continued to hire and grow its employment base. In 2020 the industry managed to grow its employment base by 1.4% while the overall private sector saw a 5.1% decline (Figure 1).

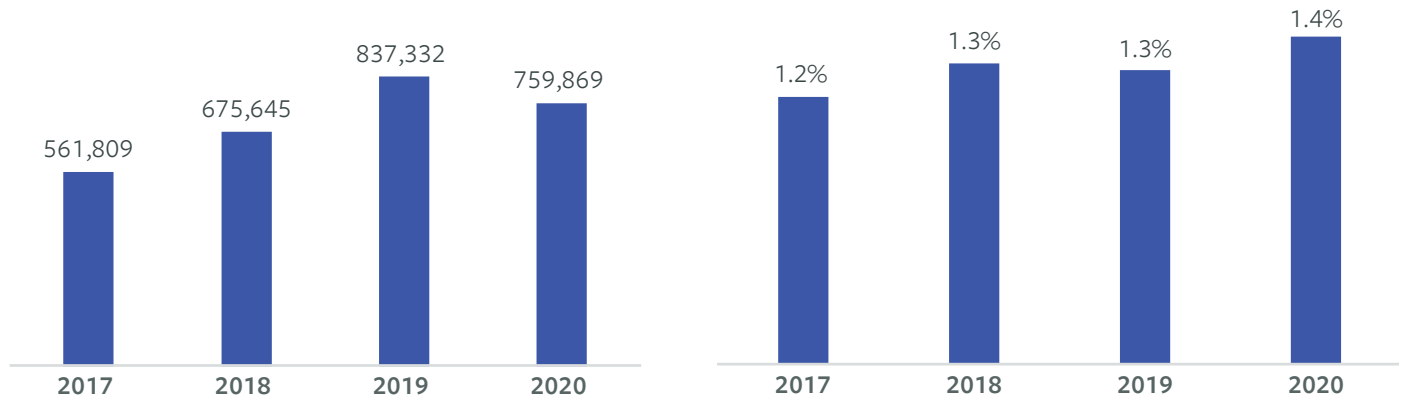
Figure 1: Employment Change in the U.S. Life Sciences Industry vs. Total Private Sector, 2019-20



Source: TEconomy Partners’ analysis of Emsi 2021.2 data set.

Industry job postings reflect this resilience and stability. While the total number dipped in 2020, the industry’s share of overall national job postings actually rose due to the steep drop off in hiring activity across all industries. Over the 2017 through 2020 period, U.S. life sciences companies published a total of 2.53 million “unique” (non-duplicative) job postings across all job titles/ occupational groups.

Figure 2: Life Science Industry Job Postings, Totals and as a Share of All Industries, 2017-20



Note: The individual years presented in the trend analysis will not sum to cumulative totals due to unique job postings that span across individual years.

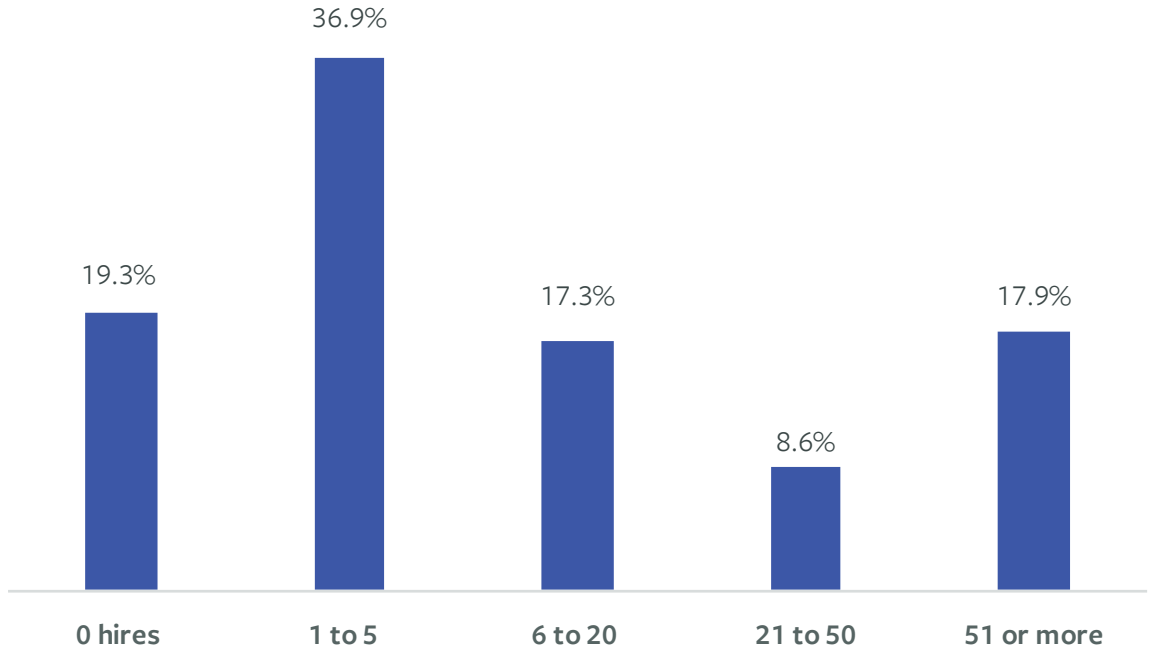
Source: TEconomy Partners’ analysis of Emsi, JPA Database, 2021.1 data set.

⁴ TEconomy/BIO, “The Bioscience Economy: Propelling Life-Saving Treatments, Supporting State & Local Communities,” 2020. See pages 5-6 for discussion of industry’s performance during recessions.



A majority of U.S. life science companies surveyed by CSBI and TEconomy report adding hires during the last two years (Figure 3). Just over 80% of companies had at least some hiring activity. A majority of surveyed companies report that hiring was not negatively impacted by the pandemic, with 57% noting the pandemic had either little to no impact on hiring, or they have increased their hiring as a result of the pandemic (Figure 4). While it is important to acknowledge that not all companies saw positive impacts or emerged in 2021 unscathed, the industry overall fared well during the pandemic as it was asked to deliver on critical biomedical innovations.

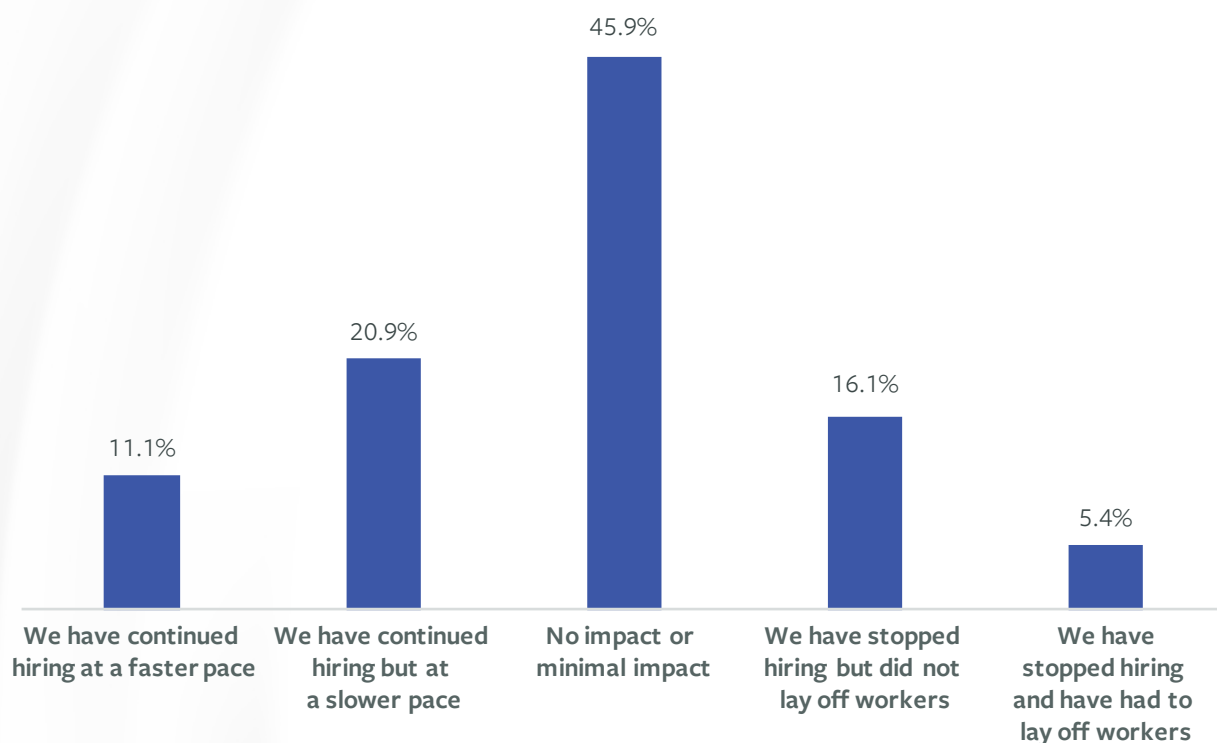
Figure 3: Share of Life Science Companies Surveyed by Level of Hiring Last Two Years



Note: the two-year reference period spans hiring from January 2019 through December 2020.

Source: CSBI and TEconomy Partners Life Sciences Industry Hiring Survey.

Figure 4: The Impact of the COVID-19 Pandemic on Hiring



Source: CSBI and TEconomy Partners Life Sciences Industry Hiring Survey.

Life Sciences Industry Executives Comment on 2020 and Seizing Growth Opportunities

“We continue to grow our team through the pandemic and we have seen an increased pool of talented candidates due to pandemic-driven disruption in businesses over the past year.”

“2020 was a better year than years before for employment and hiring. It allowed us to fill positions to address growth that we’ve seen since 2019. So 2020 allowed us to be more aggressive and attract more people for that growth.”

“This has been one of best years ever for our company. We hired over 100 new people and 80% we have never met face-to-face. We have been able to hire people who will continue to work remotely and sometimes come to the office.”

Who's Hiring in the Life Sciences?

The following represent the leading life sciences companies hiring in the U.S. during the last four years. Each of these companies published 30,000 or more unique job postings during this period. The list, presented in descending order by the number of job postings, spans a breadth of industry subsectors and provides a lens into the industry's wide-ranging activities and innovations, including large and leading multinational companies in drugs and pharmaceuticals (Pfizer, Johnson & Johnson, Abbott, Merck, and others); medical devices (Thermo Fisher Scientific, Medtronic, Stryker); contract R&D (IQVIA, Covance); and bioscience-related distribution (McKesson, Cardinal Health).

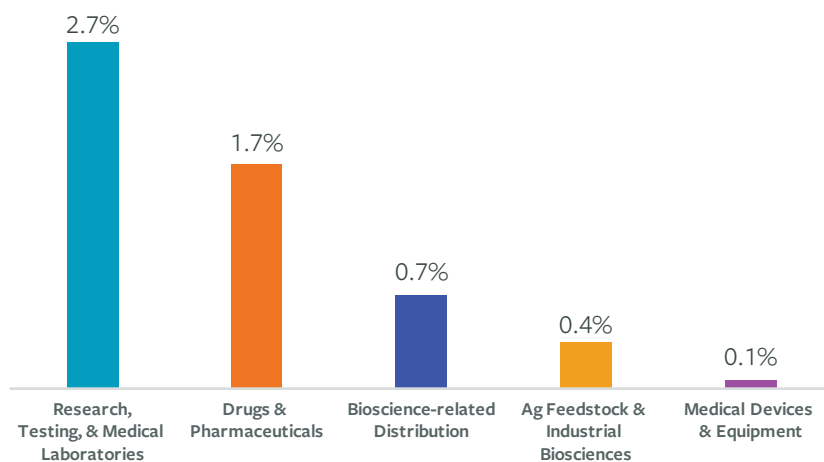
- Thermo Fisher Scientific Inc
- Laboratory Corporation of America
- Pfizer Inc.
- Quest Diagnostics Incorporated
- Medtronic, Inc.
- IQVIA
- Johnson & Johnson
- Abbott Laboratories
- McKesson Corporation
- Stryker Corporation
- Merck & Co., Inc.
- Physician Services Inc
- Danaher Corporation
- Grifols Biologicals Inc.
- Cardinal Health, Inc.
- AbbVie Inc.
- Covance Inc.
- Bristol-Myers Squibb Company

Source: TEconomy Partners' analysis of Emsi JPA Database, 2021.1 data set.

Life Sciences Industry Subsectors Reflect Breadth, Resilience of Industry Hiring

Net job growth in the drugs and pharmaceuticals or research and testing subsectors in 2020 may come as little surprise during a global health crisis calling for immediate innovation in diagnostics, vaccines and therapeutics and rapidly pivoting to R&D, large-scale clinical trials, regulatory approval, and scaling-up manufacturing and specialized distribution. However, the other three major industry subsectors held steady in their employment levels as well, demonstrating broader resilience across the life sciences (Figure 5).

Figure 5: Employment Change by Industry Subsector, 2019-20

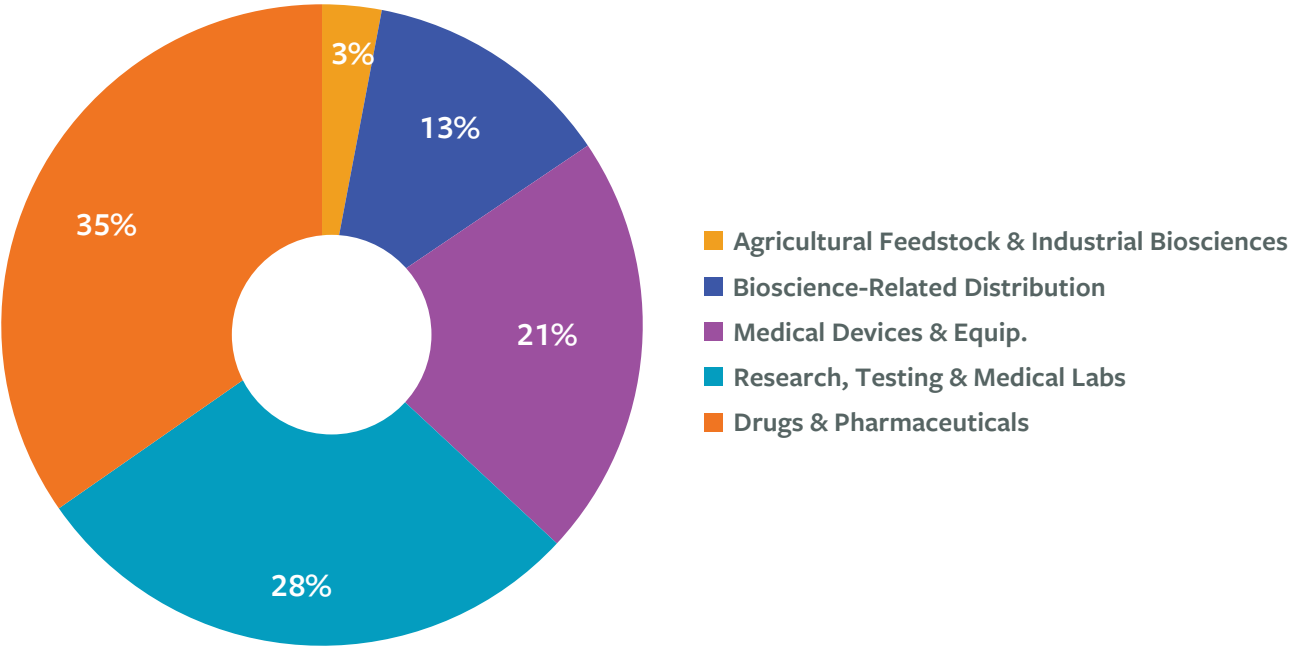


Source: TEconomy Partners' analysis of Emsi 2021.2 data set.



The breakdown of industry job postings into the five major subsectors finds recent hiring predominantly focused in three: drugs and pharmaceuticals; research, testing, and medical labs; and medical device manufacturing. Two of these subsectors—drugs and pharmaceuticals and medical devices—represent an outsized share of industry hiring activity relative to their current employment makeup within the industry. Pharmaceutical companies, for example, account for 16% of industry jobs but represent 35% of industry job postings in the last four years (Figure 6). The top companies hiring within each subsector are highlighted in Figure 7.

Figure 6: Share of Industry Job Postings by Major Life Sciences Subsector, 2017-20



Source: TEconomy Partners' analysis of Emsi, JPA Database, 2021.1 data set.

Figure 7: Leading Life Science Companies in Job Postings by Major Industry Subsector, 2017-20



Source: TEconomy Partners' analysis of Emsi, JPA Database, 2021.1 data set.

Characterizing Life Sciences Talent Demand: Job Titles and Skill Sets

Setting the Talent Demand Context for the Life Sciences: The Industry's Skill Mix Today

The life science industry employs a more highly skilled, STEM-intensive workforce compared with all industries nationally reflecting its role as a leading knowledge-based, science-driven industry working toward innovative solutions to global challenges in health, energy, sustainable industrial products, and feeding the world. The industry's occupational mix, revealed in industry "staffing patterns" data, is tilted heavily toward those roles that can be considered either high-skilled or middle-skilled based on their typical entry-level requirements. High-skilled jobs typically require a bachelor's or higher degree for entry, whereas middle-skill jobs most typically require education and/or training beyond a high school diploma, but less than a bachelor's degree.⁵

In 2020, nearly half (47%) of life science industry employment was in high-skilled occupations compared with 27% for all other industries (Figure 8). These include the vast majority of scientist, engineering, IT, and data sciences roles, or "STEM"-related talent and reinforce the critical need for robust national postsecondary education degree programs to meet industry talent needs.

At the same time, about one-in-three life science industry jobs fall in the middle skills categories, again well above the share for all industries. As a leading advanced manufacturing industry, life science companies rely heavily on the skilled technician workforce, both in engineering and scientific domains; production workers with varied skills; transportation and material moving occupations; installation, maintenance, and repair; and more. These workers are operating in increasingly digital and automated manufacturing environments, a shift represented by "Industry 4.0" with significant and important implications for community colleges and other training providers.

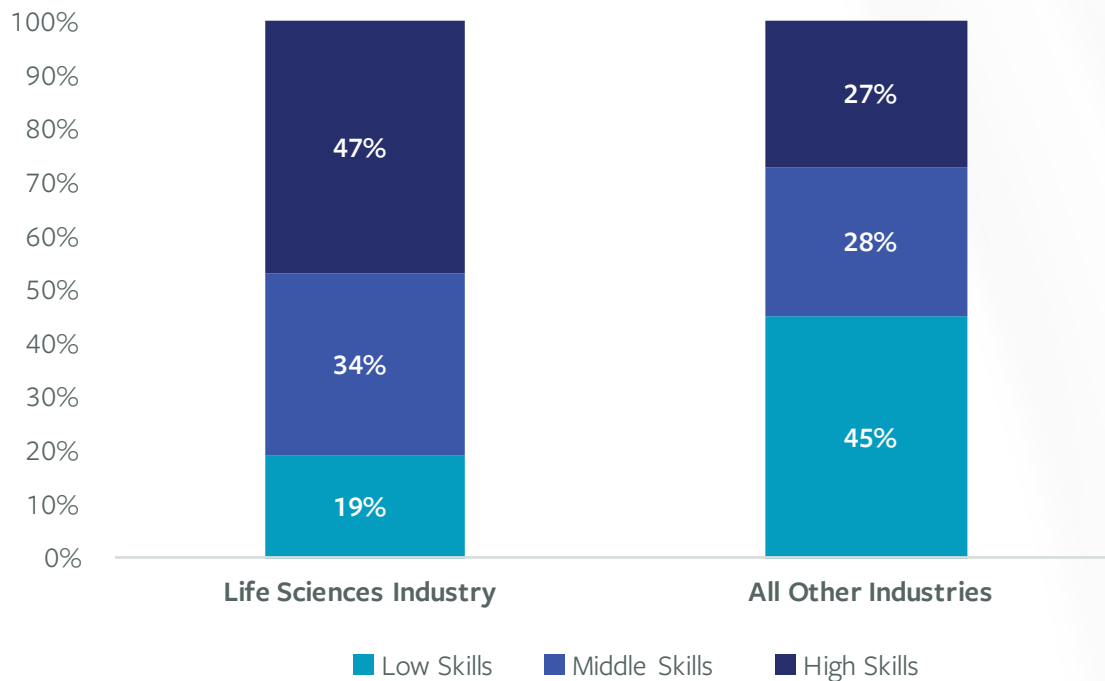
Since 2010, this industry skills makeup has largely held steady though there has been some growth in high-skilled workers' share of life sciences industry employment from 43% in 2010 to 47% today. Gains in the high-skilled workforce have come at the expense of low-skilled occupations, which have lowered their share of industry employment. Middle-skilled workers' share has held steady over the last decade.

⁵ Workforce skills analyses typically utilize three broad categories of occupations by typical entry-level educational/ experience requirements as set out by the U.S. Bureau of Labor Statistics and customized by TEconomy Partners: "High-Skilled" occupations generally requiring bachelor's and higher degrees; "Middle-Skilled" occupations requiring significant education, experience, and/or training beyond high school but less than a bachelor's degree; and "Low-Skilled" occupations generally requiring less than a high school diploma or a diploma and only short-term training.

"In terms of skills, the elements of digital manufacturing (smart factories, Industry 4.0 knowledge, IoT) are becoming increasingly critical within the disciplines of Automation Engineering, Process Development, Science, and Information Systems. This is in addition to inspection and packaging systems mechanics and technicians. Compliance experience in a regulated environment is and will always be a cornerstone skill necessity."

-Life Science Industry Executive

Figure 8: Skills Composition of Entry-Level Occupational Requirements in the Life Sciences Industry, 2020



Source: TEconomy Partners’ analysis of Emsi 2021.2 data set.

“We need a broad range of people depending on position from all levels of education: from high school (for shipping and some lab work) to PhD people for other levels of work. We need people with good interpersonal skills and ability to multitask because [we are] a small organization.”

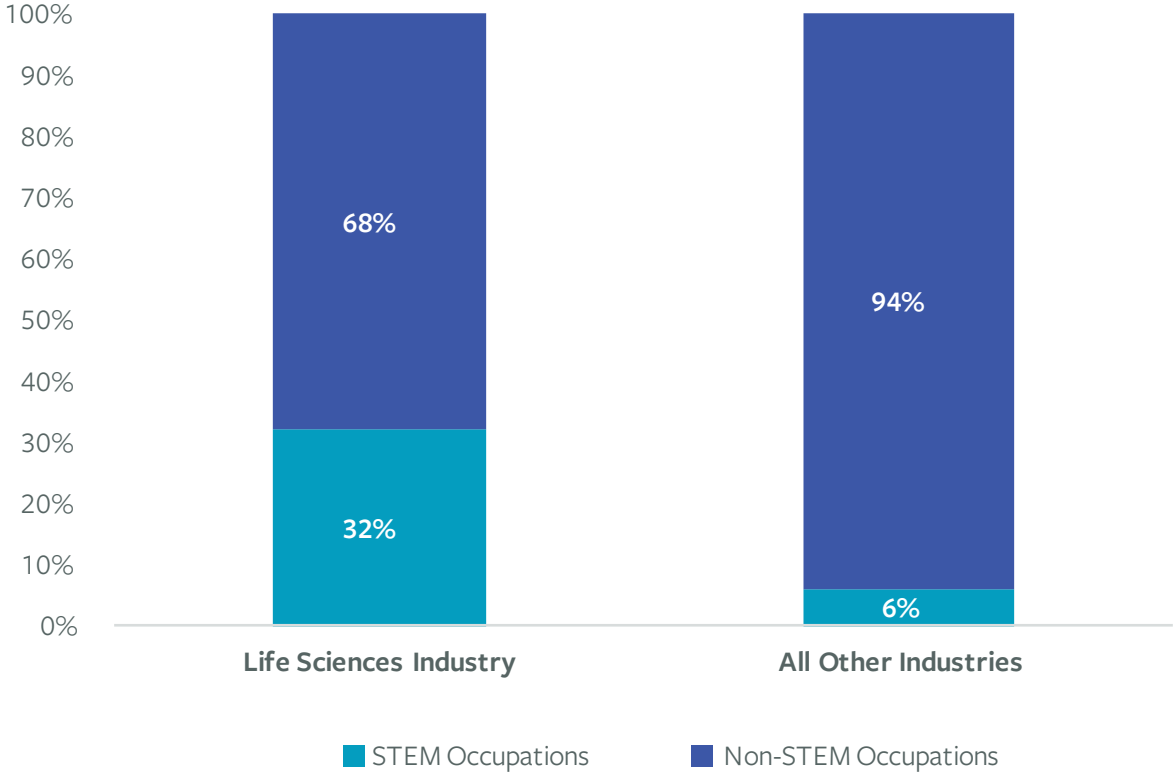
-Life Science Industry Executive

“We need technicians as well as people with PhDs.”

-Life Science Industry Executive

The life sciences are among the most intensive in their deployment of STEM talent—nearly one-in-three industry workers is employed in a STEM occupation, a concentration five times that of all U.S. industries (Figure 9).⁶ Competition for STEM talent and their rigorous technical skill sets and training is fierce, and the life sciences must compete with numerous other sectors and ensure an awareness and orientation toward the industry to attract talent. This is particularly true for “secondary” industry talent—those fields where the primary focus is not necessarily the life sciences, for example in engineering, IT, or data sciences disciplines.

Figure 9: Share of Employment in STEM Occupations, Life Sciences vs. All Industries, 2020



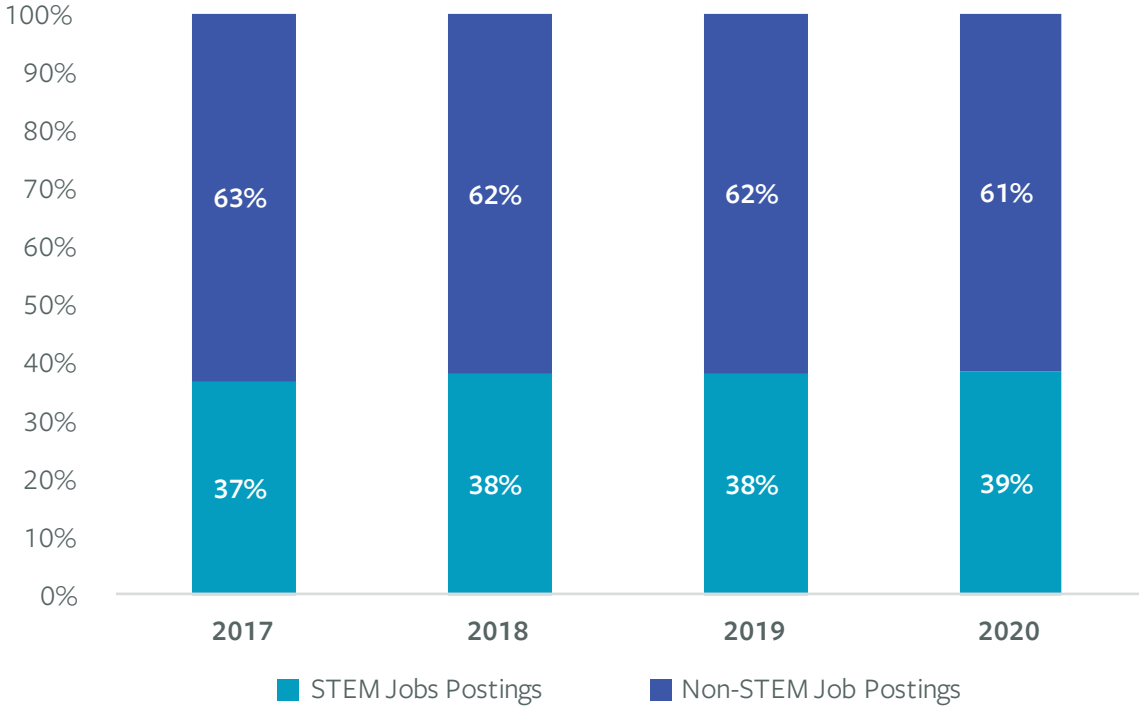
Source: TEconomy Partners’ analysis of Emsi 2021.2 data set.

6 While definitions can vary, STEM occupations generally include computer and math; architecture and engineering; life and physical sciences; as well as managerial and postsecondary teaching related to these areas. Selected sales occupations requiring technical STEM expertise are also included. TEconomy is utilizing the STEM occupational definition adopted by the U.S. Bureau of Labor Statistics (BLS) for analyses presented herein.



The industry’s demand for STEM talent is consistent with job postings by life sciences employers where, on average, 38% of job postings over the latest 4-year period have been for STEM occupations (Figure 10). This share is just above the industry’s current base composition and has increased slightly since 2017.

Figure 10: Composition of Life Science Industry Job Postings—STEM vs. Non-STEM Positions, 2017-20



Source: TEconomy Partners’ analysis of Emsi 2021.1 data set.

Life Sciences Industry Staffing: The Occupational Makeup of the Sector Today

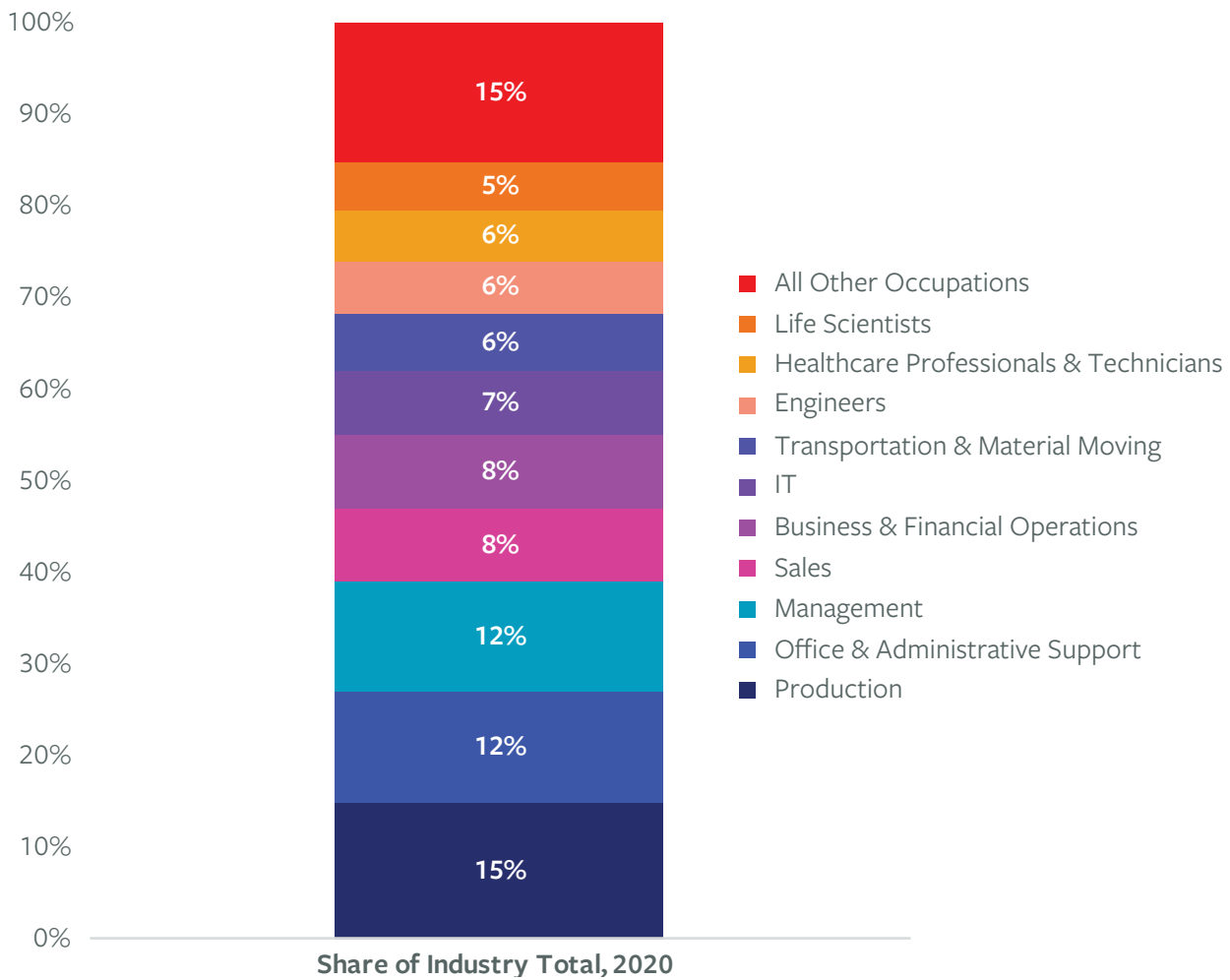
The industry's deployment of STEM talent and its blend of skilled talent needs are reflected in the staffing mix across key occupational groupings in Figure 11. Since 2017, several key STEM occupations and technical domains in which CSBI and its state and regional partners work most closely to develop industry-specific talent have seen impressive increases within the life sciences industry, including:

- **Data Scientists**—at the increasingly important intersection of science, computing, Big Data, and advanced analytics and AI—have increased their employment in the industry by 32% since 2017. Statisticians and data scientists have seen significant employment increases in the life science industry by 18% and 153%, respectively, since 2017.
- **Life Scientists** account for 5% of industry employment and have increased their intra-industry employment base by 21% since 2017, reflecting high-growth, high-volume demand among medical scientists, and biochemists and biophysicists. Reflecting demand from agricultural biosciences companies are additional smaller, high-growth scientific occupations including animal scientists and soil and plant scientists.
- **Scientific Technicians** have seen a 17% increase in employment across the life sciences since 2017, with high growth among biological technicians and agricultural and food science technicians.
- **Information Technology** talent demand is rising in the life sciences industry, increasing in employment among industry companies by 17% over the last three years. The single largest IT occupation within the life sciences is software development, where employment has increased in the industry by an impressive 26% since 2017. Other sizable IT areas with recent rapid rates of hiring in the life sciences include network architects; web developers; database administrators; information/cyber security analysts; and user support specialists.

“We need expert scientists that have had decades of experience in diagnostic startups. They are hard to come by. I can pull people out of larger companies in [this state], but those core leaders who understand startup culture in diagnostics with experience are hard to come by. And it’s more difficult to find this level of individuals in [this state].”

-Life Science Industry Executive

Figure 11: The Occupational Employment Makeup of the Life Sciences Industry, 2020



Source: TEconomy Partners' analysis of Emsi 2021.2 data set.

While not the primary focus of this report, the CSBI, or its partner organizations, it is important to recognize the vast hiring volume and recent high growth trends among several additional categories that reflect key needs of the life sciences. These segments span numerous business and operational functions including management, business and financial operations, and sales professionals. In a science- and innovation-based industry, many of these functions require a STEM background and highly technical knowledge and expertise.

Life Science Industry Job Postings

Beyond estimates of industry-occupational staffing, employer job postings in the life sciences reinforce the strong recent demand for life and data scientists, IT professionals, and medical and lab technicians. In addition, job postings illuminate several areas of specialized talent needs in the life sciences, such as quality assurance and control as well as regulatory affairs.

Job postings by life science employers have the benefit of shifting away from the formal, and often dated “Standard Occupational Classifications” (SOC) used by the federal statistical system and into the specific job titles used in the marketplace. With that acknowledged, given the sheer number of industry job postings and the different ways in which employers title similar positions,⁷ Figure 12 utilizes groupings of leading job titles for summary purposes. Some granularity and specificity of demand can be lost, however, within the groupings and so the following works to unpack some of the leading, high-demand areas within groupings where differentiation can inform the work of the CSBI and its state and regional partners in workforce and talent development.

Figure 12: Leading Technical and Production-Related Job Titles in Life Science Industry Job Postings*, 2017-20



Source: TEconomy Partners’ analysis of Emsi, JPA Database, 2021.1 data set.

Note: Emsi limits information on job titles and corresponding numbers of postings to the top 1,000, limiting the ability to provide comprehensive totals by categories.

***Note:** This table reflects leading job titles in technical and production and distribution-related roles in the life sciences job postings, it excludes large segments of the industry workforce in managerial, sales, and other business functions to focus on more actionable intelligence for life sciences-specific education and workforce development.

⁷ For example, a general research “Scientist” might be referred to among different companies as Scientists, Principal Scientists, Associate Scientists, Research Scientists, Applications Scientists, etc. so for summary analytical purposes these examples have been grouped into a “Scientists – General Research” classification.

- Job postings for **Data Scientists** have been combined to include a range of ways in which employers refer to these professionals and their expertise. Examples of leading job titles identified and grouped include Biostatisticians, Statistical Programmers, Bioinformatics Scientists, Analytics Managers, Data Scientists, and Computational Biologists.
- **Medical Scientists** includes an array of specializations focused in varied disease and human health areas engaged in clinical investigations and R&D. Examples of leading U.S. job titles in this grouping include Pharmacologists, Immunologists, Infectious Disease Specialists, Oncologists, Neuroscientists, Toxicologists, and Diagnosticians.
- **Medical Technicians** include a very large and leading focus on hiring Phlebotomists among both medical labs focused on diagnostic testing and biopharmaceutical companies focused in blood plasma-based products. Other examples of leading job titles include Flow Cytometry Specialists, Histotechnologists, Medical Lab Technicians, Cardiovascular Technicians, and Ophthalmology Assistants.
- The industry deploys and is hiring an **Engineering** workforce with varied expertise and specialization. While the category of “general” engineers rises near the top, along with a large base of industrial engineering positions, several others are included outside of the Top 15 groups featured in Figure 12 and combine to form a sizable occupational segment. From the job postings, these include Field Service Engineers (largely hired in the medical devices subsector); Mechanical Engineers; Electrical Engineers; Product Development and Design Engineers; and Systems Engineers.

In the industry hiring survey, life science companies were asked to rate the degree to which they have had difficulty finding and hiring qualified candidates within several key occupational categories in the last two years. Figure 13 presents the results, with the share of companies rating hiring across each occupational group as “very difficult.” The occupational areas with the greatest difficulty cited, on average, include Regulatory Affairs; Research Scientists; Computational Biology/Statistics; and Engineering. These areas most typically require advanced degrees and companies are searching for candidates with industry experience.

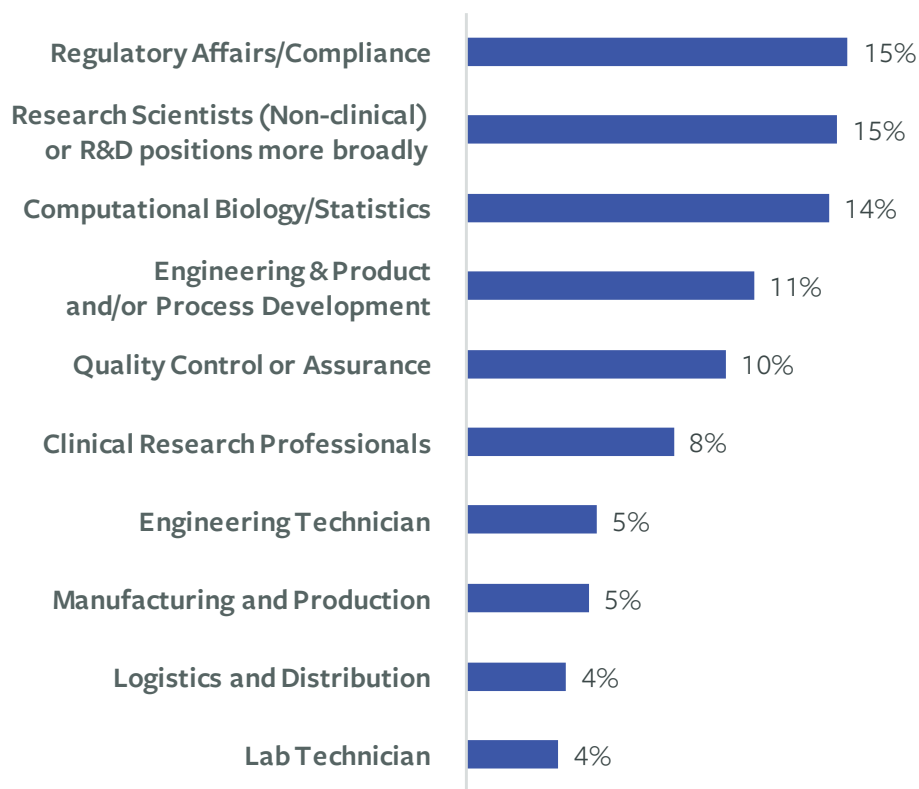
“The company has recently gone public, and we’re moving into this new phase. There’s now a big push to bring in positions at the professional level, such as medical affairs, regulatory affairs, and marketing. Also, it’s important that we find people for these positions that have experience in the pharmaceutical industry and that have been with a company from pre-launch to launch, reflecting [our company’s] experience.”

-Life Science Industry Executive

“Our biggest need and challenge is finding agile learners who possess a depth of expertise in computing, data, and bioinformatics that also have experience in the clinical, scientific, and healthcare industries. It is hard to find this intersection of expertise, so there is often a learning curve for people that we’re bringing into [the company].”

-Life Science Industry Executive

Figure 13: Share of Life Sciences Companies Rating “Very Difficult” to Hire in Selected Occupations



Source: Coalition of State Bioscience Institutes and TEconomy Partners 2021 Hiring Survey.

The Business of Biotech and Industry Maturation Leading to Strong Demand for Managerial, Sales, and Other Business Functions in the Life Sciences

In addition to the demand for technical STEM-related as well as production-related positions, the industry has significant demands for managerial, financial, sales, and other business functions—areas in which the CSBI and its partner organizations are less directly focused, but which often require a STEM background or promotion from STEM positions. The business of biotech and life sciences and the maturation of the industry has led to a high-volume, high-growth demand in these areas:

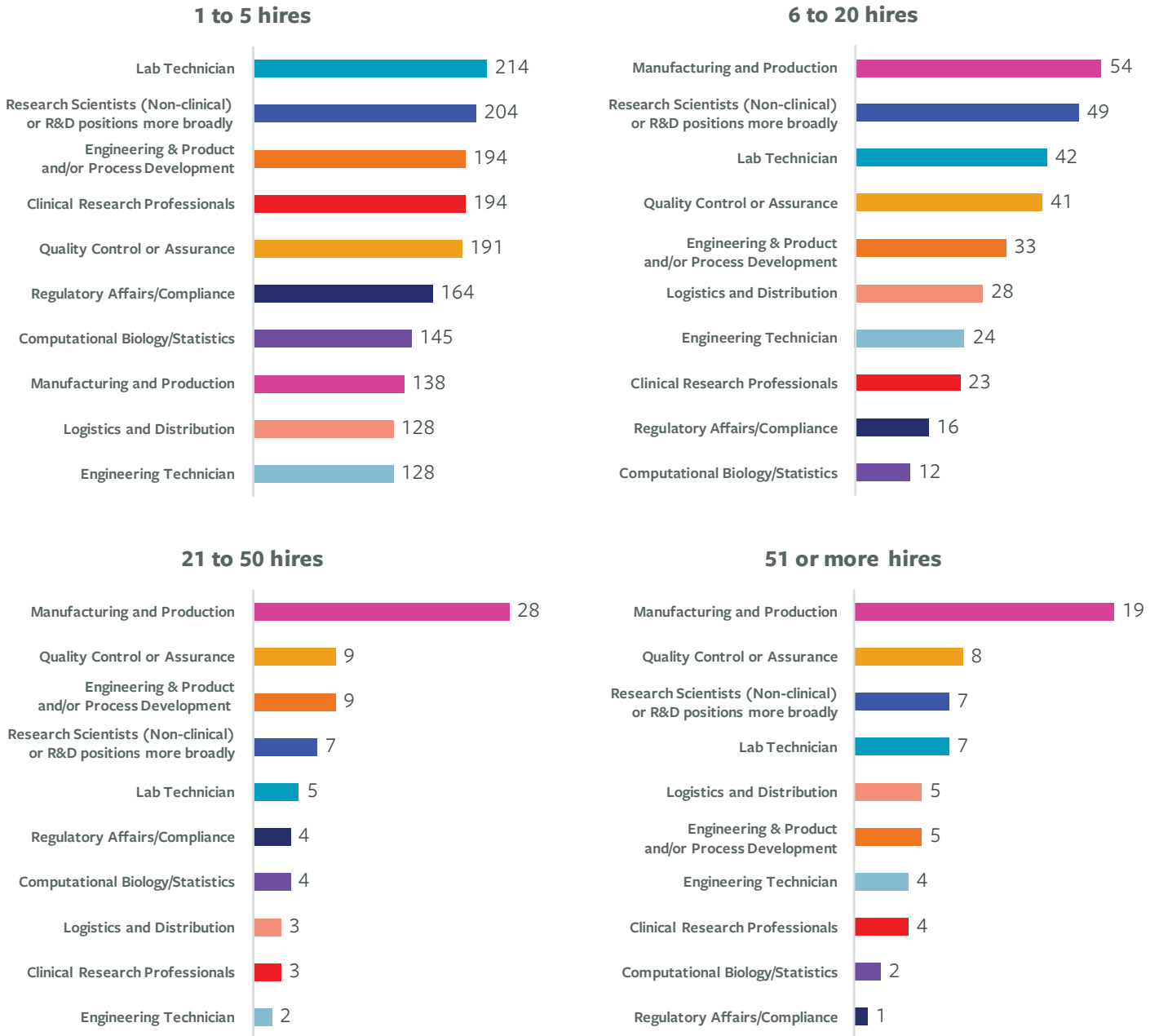
- **Sales and Account Representatives** made up the leading combined area of job postings the last four years exceeding 187,000 unique postings and their employment base has risen by 14% in the life sciences since 2017 based on the industry staffing patterns analysis.
- **Managerial positions**, either general or in business functions such as human resources, marketing, or financial, account for just over 100,000 industry job postings. The managerial segment of the industry workforce has grown by 33% since 2017.
- **Business and Financial Operations** also make up a large segment of the workforce, reflected in job postings that totaled just over 70,000 from 2017 through 2020, and have seen 25% overall employment growth within the life sciences since 2017.

Source: TEconomy Partners’ analysis of Emsi JPA Database, 2021.1 data set.

Looking Forward: Expected Hiring and Emerging Technology Areas

Companies were asked in the hiring survey to look ahead at anticipated hiring over the next 12 months across several functional areas. Figure 14 shows the expectations for high-volume hiring over the next year are focused in manufacturing and production, quality control/assurance, and research scientist positions.

Figure 14: Anticipated Hires Over Next 12 Months by Number of Hires and Number of Life Sciences Companies



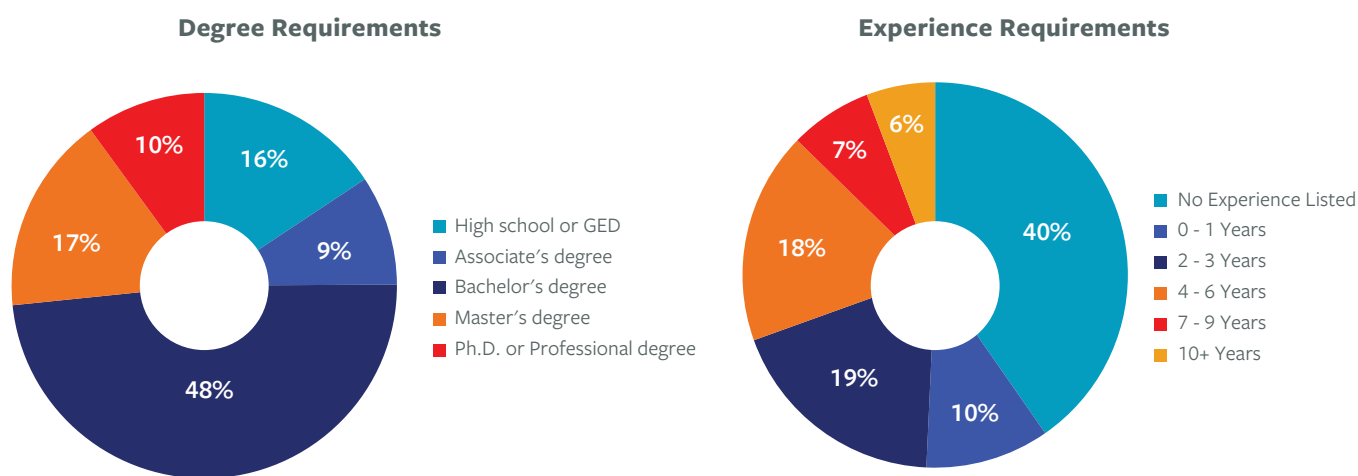
Source: Coalition of State Bioscience Institutes and TEconomy Partners 2021 Hiring Survey.

Interviews with life sciences executives point to several emerging technology areas that are expected to take on increasing importance and have implications for talent needs both immediately and into the near future. While far from universal, the technology and innovation areas most cited include data analytics and data sciences, automation of production and other processes and related robotics, and artificial intelligence.

Education and Experience Requirements in Job Postings Signal Strong Demand for High-Skilled, Experienced Talent

Corporate job postings reflect an outsized demand for high-skilled talent in the life sciences industry, with 75% of postings reflecting a preference for hires with a bachelor’s or higher degree (Figure 15). These same job postings signal preferences by life sciences companies toward meaningful work and industry experience when recruiting and assessing qualified candidates. Among job postings that mention experience preferences, 37% emphasize between two and six years of experience and 13% request seven or more years.

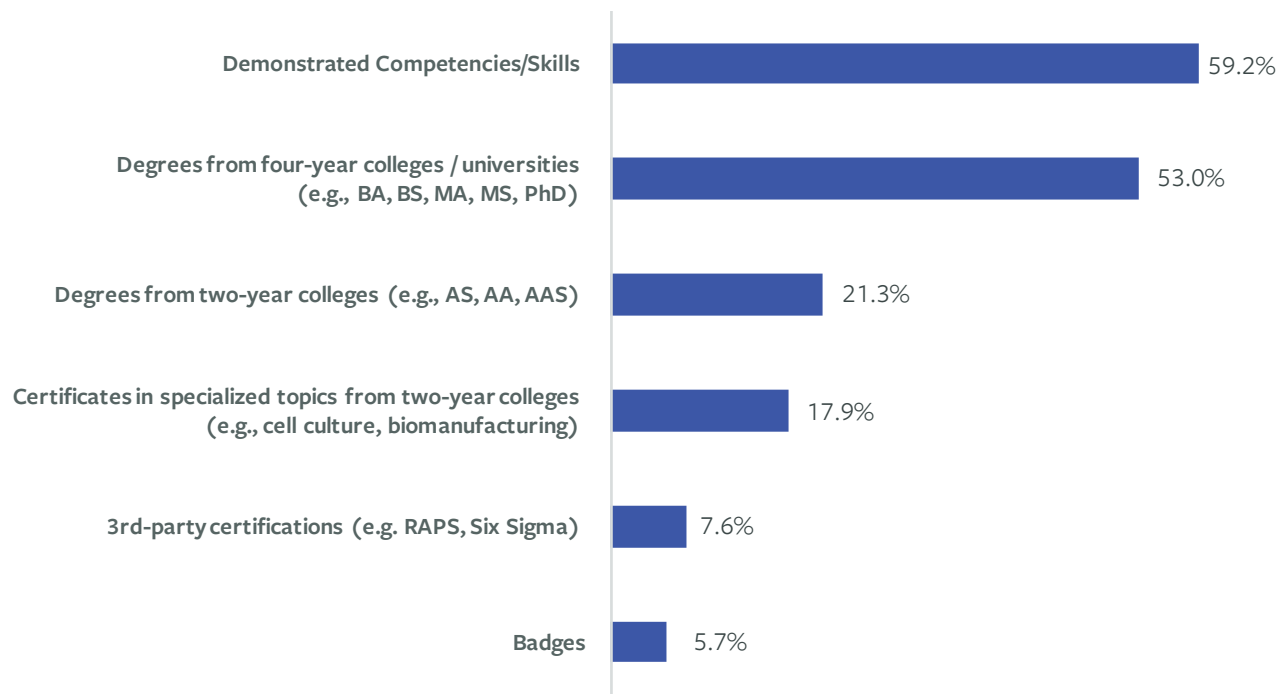
Figure 15: Life Science Industry Education and Experience Requirements Reflected in Job Postings, 2017-20



Source: TEconomy Partners’ analysis of Emsi, JPA Database, 2021.1 data set.

Despite this leading focus in job postings on bachelor’s and higher degree level talent, the industry employs one-third of its workforce in jobs typically requiring more training or education beyond a high school diploma but less than a bachelor’s degree—the important middle-skills workforce. In discussions with industry executives, they emphasize the importance of middle-skilled talent developed by the nation’s community colleges. From the perspective of HR hiring managers, a varied set of credentials and competencies, including associate’s level degrees and certificates in specialized topics from 2-year colleges are considered “very important” when recruiting and assessing qualified candidates (Figure 16).

Figure 16: Share of Companies Surveyed Ranking Various Credentials as “Very Important”



Source: Coalition of State Bioscience Institutes and TEconomy Partners 2021 Hiring Survey.

“Google and other tech companies increasingly are bringing in employees that don’t have college degrees. There is no reason we shouldn’t be doing the same; looking at skill rather than just educational credentials. Life Science companies should have a more hybrid view of qualifications.”

-Life Science Industry Executive

“Recognize that a college degree is not a requirement to a good job in biotech. Many jobs require some training, but not a 4-year degree, and alternative programs should be developed and embraced.”

-Life Science Industry Executive

The Pandemic Forced a Seismic Shift to Remote Work, the Industry is Adapting and Largely Embracing the New Dynamic

The pandemic forced a seismic shift to remote work for many industry employees, and after facing daunting initial hurdles, many companies are embracing the change and finding advantages in remote or hybrid operations.



Remote Work in the Life Sciences is on the Rise

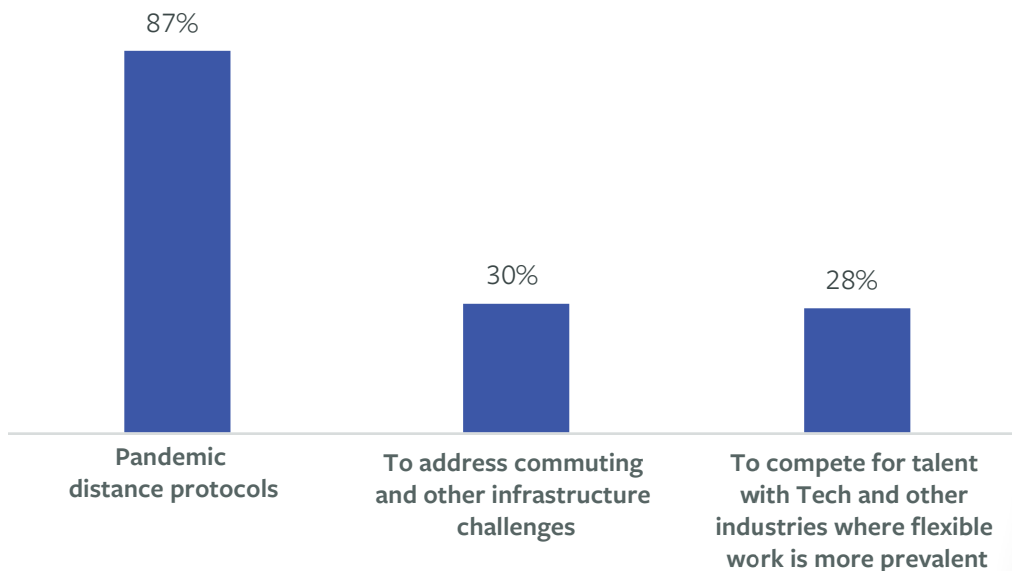
In the national hiring survey, 75% of Life Sciences companies indicate they are implementing, expanding, or considering implementing remote work options.

Corporate leaders report the transition to remote work was a major challenge, with some executives interviewed commenting on the initial “shock” and “turmoil”. Ultimately, however, most of those surveyed report having persevered and finding an effective balance. While remote work represents a major upheaval, it has forced firms to consider and re-think longer-term space needs and plans for more permanent remote and flexible work arrangements (e.g., hybrid work-from-home and office models).

The remote work dynamic is having implications for hiring dynamics and recruiting for the human resources function, namely enabling companies to widen recruiting approaches beyond local candidates while at the same time spurring innovation in recruiting, on-boarding, and retention tactics. In the hiring survey, life sciences HR professionals were asked to identify reasons for the shift to remote work. Pandemic distance protocols were, by far, the largest reason cited, though others—such as addressing commuting challenges and competing for talent with other tech-based industries where remote work is more prevalent—were also highly cited (Figure 17). And while several companies responded that accessing non-local talent pools was at least partly behind the shift in the open-ended option for the survey question, the interviews with corporate executives consistently revealed this as a perceived benefit from a workforce and talent recruitment perspective (see the sample of quotes provided).

The notable and sizable exceptions to the remote work dynamic are the “essential” on-site workers and teams operating manufacturing facilities and production operations; conducting work in laboratories; and in R&D functions where work-from-home is not an option. This has created a dual dynamic for life science companies to work through as a leading R&D industry and advanced manufacturing sector going forward.

Figure 17: Reasons Cited by Life Science Companies for the Shift to Remote Work



Source: CSBI and TEconomy Partners Life Sciences Industry Hiring Survey.

Remote Work is Expanding Talent Recruitment Pools for Life Sciences Companies Beyond Local Candidates

"If anything, remote work has opened opportunities to hire the best people from around the globe as long as they are in desk-based positions. They will be able to continue working remotely as long as they want to. We would not have been so flexible before."

-Life Science Industry Executive

"The pool for recruiting and retaining talent expanded by allowing remote work. We are now more open minded to non-local talent. Location is no longer as big an issue for all roles. Opening the talent geographic net allowed us to attract higher levels of talent that weren't there previously."

-Life Science Industry Executive

"It's been a challenging year to say the least, but these very different disruptions have had a net positive impact on our organization. It's challenged us in way to think about how work gets done and whether we all need to be physically located in an office environment to be productive, efficient and innovative. As we transitioned to a remote setting and adjusted/adapted to the new setting, it's opened up hiring manager's receptiveness to managing remote teams. Thusly, we've been able to cast a much wider net as we seek to fill open positions."

-Life Science Industry Executive

Life Sciences Companies are Elevating Commitments to a More Diverse, Equitable, and Inclusive Industry as a Strategic Priority



In interviews with nearly 200 life science executives nationally, 65% confirm that advancing a more diverse, equitable and inclusive workforce has been elevated as a strategic priority for their organization.

In the interviews with nearly 200 life science executives nationally, 65% confirm that advancing a more diverse, equitable and inclusive workforce has been elevated as a strategic priority for their organization. From those same discussions, 56% report having formal diversity initiatives in place. While many executives, particularly those leading smaller organizations, cite less formal initiatives to advance diversity, equity, and inclusion (DEI), the following were cited among multiple executives as proactive practices and approaches:

- Promoting and actively recruiting diverse corporate boards of directors;
- Establishing Chief Diversity Officers in C-level positions, particularly among larger companies;
- Ensuring a diverse slate of candidates for hiring interviews through an intentional DEI lens in talent recruiting, including from Historically Black Colleges and Universities (HBCUs) and utilizing DEI training for human resource professionals;
- Conducting DEI training, particularly among managers, supervisors, and corporate leaders; including training specific to unconscious bias;
- Holding forums on DEI topics, formalizing “Courageous Conversations” and “listening circles” around systemic racism and racial equity;
- Supporting and growing supplier diversity programs;
- Providing management development opportunities for employees from underrepresented demographic groups;
- Establishing formal groups and processes including Employee Resource Groups (ERGs) or affinity groups; racial equity teams and DEI councils;
- Engaging students at all education levels in STEM education and awareness initiatives targeted toward populations underrepresented in the life sciences and STEM disciplines more broadly;
- Measuring and benchmarking progress in advancing DEI, establishing performance metrics in key positions.

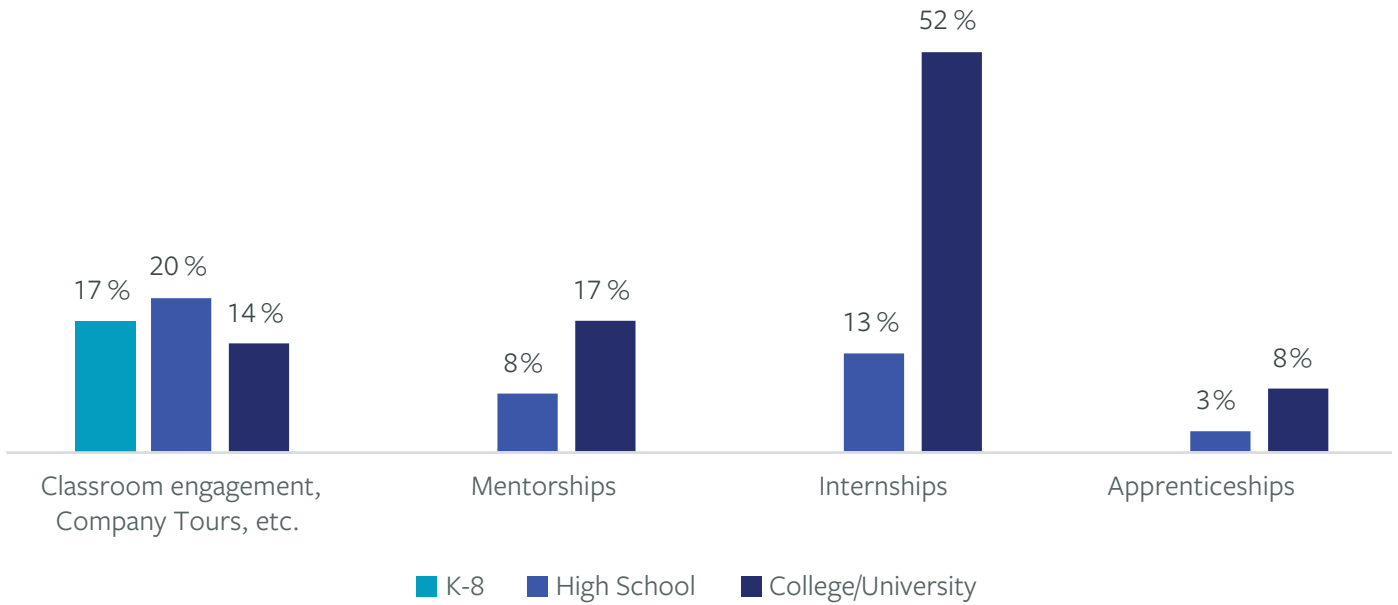
From the hiring survey, half of life sciences companies (49%) report supporting or offering Employee Resource Groups for a wide demographic of employees in the workplace.

“[Active ERGs] allow employee groups to identify potential deficits and bring them to management as a group. These groups provide support and help new employees. [Our ERGs are] very diverse with representation from across the world. Emphasize recruiting at colleges and universities that historically have high percentages of minorities to drive diversity.”

-Life Science Industry Executive

Life sciences companies are engaging with school districts, individual schools, and postsecondary institutions across the U.S. to advance a more diverse STEM talent pipeline at each major education level (Figure 18). Activities and initiatives take on several forms largely dependent upon the age and education level of students—from visiting classrooms and providing company tours to inform and excite students about career opportunities, to more in-depth engagement of students in mentorships, internships, and apprenticeships.

Figure 18: Share of Life Sciences Companies with Initiatives to Seek and Develop a More Diverse STEM Talent Pipeline, by Education Level and Type of Initiative



Source: CSBI and TEconomy Partners Life Sciences Industry Hiring Survey.

A number of companies admit they are at the nascent stages of DEI initiatives, but the overarching theme from the interviews and hiring survey is the elevation of these commitments now and going forward.



Life Sciences Executives Speak on Advancing Industry Diversity, Equity, and Inclusion

“Our company has formalized a Diversity and Inclusion leadership function that has laid forward a strategic roadmap to authentically recognize our challenges in understanding racial inequity not only in our company but in our communities. Furthermore, we are taking these insights and immediately putting them into action throughout all our company strategic efforts and particularly our talent program. We have defined specific talent goals to encourage a more diverse workforce to both be inclusive and to offer more diverse perspectives and insights to help us grow as a company.”

“We know we are better with diverse leadership and talent, and with them we are more adaptable and forward thinking as a company. We strive to be global and inclusive.”

“The experiences of the year really accelerated the focus on DEI. There was an internal push to raise awareness of how DEI benefits the business and impacts the organizational culture. The leadership organized listening sessions between leadership and employees with diverse perspectives to learn and open lines of communication. The organization has also moved to blinding of resumes, ongoing evaluation of the diversity of their workforce, and ways to recruit more diverse talent.”

Life Sciences Industry-Academic Partnerships Remain Vibrant, Critical to Meeting the Talent Challenge and Industry Inclusion Goals

78% of life sciences executives interviewed report their companies participate in formal partnership(s) with educational institutions.



As established at the outset of this report, the life sciences have a truly outsized demand for skilled talent, particularly in STEM disciplines. This reinforces the importance of the education and workforce development mission of U.S. K-12 education and postsecondary education and training institutions in meeting the life sciences talent challenge. The preceding demand analysis is intended to help guide the work of the CSBI and its state and regional partners in working with these institutions. At the same time, this effort included outreach to hiring professionals and industry executives about current efforts to partner with and advance a robust talent pipeline.

Seventy-eight percent of life sciences executives interviewed report their companies participate in formal partnership(s) with educational institutions. These span an impressive array of deep engagement activities cited by executives to include scholarship programs (often targeted to underrepresented demographic groups), classroom visits, company tours, student internships and teacher externships, apprenticeships, capstone or senior design projects, guest lecturing, guiding curriculum development, donating industry-grade equipment and more. Many of these activities and initiatives are strategically targeted toward engaging demographic groups typically underrepresented in the industry. Strategic engagements with community colleges and increasingly, high school interns, in particular are cited as leading to more diversity in hiring.

While the pandemic has disrupted internships, company tours, and other activities, life science companies have been creative on virtual approaches and many indicate plans to resume in-person connections once the pandemic ends.

Advancing exposure to and the development of STEM talent is a major focus and theme of the industry-academic initiatives. TEconomy, in partnership with PhRMA, has twice documented the U.S. industry-academic STEM talent initiatives at all educational levels supported by the nation's biopharmaceutical industry. The most recent study, released in 2020, surveyed and profiled companies and their corporate foundations and found biopharmaceutical companies have initiated and supported education programs across the U.S. that have reached 7.4 million students and 25,000 teachers.⁸ This STEM education support—which totaled more than \$200 million and substantial volunteering and “in-kind” contributions over a 5-year period—was proactive in its support for advancing diversity and inclusion in STEM, with more than half of the STEM education programming intentionally designed to engage population groups that are underrepresented in the nation's STEM education programs and workforce.⁹

When asked about what the educational system and institutions should do to facilitate building the talent pipeline needed for their organizations, life sciences executives emphasized the following themes:

- Emphasizing practical industry experiences and problem-solving/problem-based, hands-on technical learning in schools;
- Promoting STEM across-the-board, but especially at early ages (elementary school), particularly to engage and excite more girls and students of color to pursue STEM studies and careers;
- Building awareness of the varied opportunities for life sciences careers beyond medicine/healthcare;
- Emphasizing foundational skills—in some cases, still referred to as “soft” skills—including strong communication, including writing; leadership development; critical thinking; emotional intelligence; adaptability and resilience;
- Easing the ability of industry professionals and potential mentors to connect with K-12 schools; consider “bite-sized” engagements, “speed” mentoring, other avenues for greater interactions;
- Increasing exposure to modern computer and data sciences as well as computational sciences embedded in scientific curricula;
- Emphasizing skilled trades as viable options for students who are not interested in college; and
- Seizing on the pandemic as a gateway opportunity to student interest in science.

8 TEconomy Partners and Pharmaceutical Research and Manufacturers of America (PhRMA), “The Biopharmaceutical Industry's Sustained Commitment to Inspiring and Advancing Tomorrow's STEM Workforce,” October 2020.

9 Ibid.

Life Sciences Industry Executives on the Value and Dynamics of Academic Partnerships

"We see partnership [with academic institutions] as a holistic venture, not just a transaction."

"About a year ago, we started to engage with [a local community college] on their laboratory program to provide input for both education and training, and for talent recruitment. We have reviewed curriculum and have looked to them for their two-year degree in manufacturing. As we further execute on our manufacturing readiness, we will likely partner more with them to recruit individuals that might fit to be manufactur[ing] operators with basic familiarity in what we do."

"We have a strong history of internships but are pivoting that program to focus more on communities that are underrepresented."

"Our tech leaders sit on a number of boards that advise high school programs or other academic groups. Other leaders work with a local elementary school with a large homeless population to read, dream and talk with students..."

"We have really strong relationships with [a local community college]. We've got our apprenticeship program with [this college] and always amazes me the quality of the apprentices that come to our organization every year."

A Growing Demand for Skilled Technical Workforce in the Life Sciences

This report has emphasized the continuing strong demand for skilled talent in STEM and related fields, and the outsized demand among employers for those with 4-year and advanced degrees. What is emerging over the last few years, however, is a growing concern in the U.S. regarding the critical shortage of a “Skilled Technical Workforce” (STW)—what the National Science Board (NSB) defines as “the millions of men and women with STEM skills and knowledge who do not have a bachelor’s degree”¹⁰—who are needed in order to maintain U.S. competitiveness in advanced industries and life sciences innovation.

Noting that the National Academies expect 3.4 million skilled technical jobs to go unfilled by 2022, the NSB has elevated the emphasis on this talent pool, pointing to its overall strategic importance and the viable career opportunities these positions afford. This report echoes the NSB’s desire to “change the message” around these careers by recognizing the critical role they play in overall U.S. competitiveness, and supports the NSB’s recommendations to focus on developing high-quality data and information about the skilled technical workforce, leverage federal investments, and build partnerships to develop this critical talent.¹¹

These findings by the NSB are part of the rationale underlying CSBI’s and TEconomy’s desire to collaborate on this report with a crucial network of community college Advanced Technical Education programs that have been training a skilled technical workforce for careers in the life sciences—with the support and partnership of the life sciences industry—for over two decades.

InnovATEBIO: A National Network for Biotechnology Workforce Education

InnovATEBIO is a National Science Foundation- (NSF-) supported National Advanced Technology Education Center that serves to support community college biotechnology education and to enhance industry connections and participation with these programs. The central focus of InnovATEBIO is to address the industry’s need for highly skilled technicians through workforce development initiatives with industry.

The NSF helped launch InnovATEBIO in 2019 as a continuation and expansion of Bio-Link, its predecessor, which operated from 1998 to 2018. The InnovATEBIO National Center for Biotechnology Education, located at Austin Community College, continues to play a key role in education and workforce development across the biotechnology industry, especially by helping to educate underrepresented students in the skills and knowledge necessary for successful biotech/life sciences careers.

Impacts of InnovATEBIO

- Over 780 employers in 1,400 U.S. locales are tapping InnovATEBIO community college students for hire
- 17 of the InnovATEBIO community college programs provide incubators or related services, bolstering life sciences entrepreneurship and economic development
- The network has in place 51 articulation agreements with 4-year colleges and universities for students to continue their education

Impacts provided by InnovATEBIO via: InnovATEBIO.org, Biotech-Careers.org, NSF.gov.

Affiliated Education Programs

With a specific emphasis on preparing students for the biotechnology/life sciences workforce, InnovATEBIO serves 119 college programs across 38 states, offering 37 biotech-related degrees and certificates in areas such as Agricultural Biology, Computational Biology, Genomics, Medical Devices, and Regulatory Compliance, among many others. Community Colleges in the InnovATE network also offer a variety of program types, including certificates, one- and two-year degrees and, in some cases,

10 National Science Board, “The Skilled Technical Workforce: Crafting America’s Science & Engineering Enterprise,” September 2019.
11 Ibid.

bachelor's or master's degrees. Additionally, InnovATEBIO has partnered with 90 K-12 schools to increase students' knowledge and hands-on experience with potential biotech career pathways.

Industry Connectivity

To fully understand the evolving workforce needs of the biotech industry, InnovATEBIO and its affiliated community colleges maintain regular communication with biotech/life sciences companies through three main vehicles:

1. A National Industry and Workforce Advisory Council (NAC) comprised of members from industry and academic institutions who help ensure InnovATEBIO's initiatives align with the industry's current workforce needs;
2. Biotechnology trade associations, to better understand the workforce challenges of their local biotech companies; and
3. Industry Advisory Boards, 73 of which are active across the country, to provide guidance on curriculum.

"We work with the community college Biotech programs because they have consistently been a reliable, responsive partner that understands our current and future needs as a local employer. The community college Biotech programs have shown flexibility not only for future employees, but also supporting the career advancement for current employees looking to expand their education and careers. One of the key benefits we have seen in having a Biotech program that so closely mirrors our working environment is the improved (decreased) time to competency for those employees coming from the program."

-Life Science Industry Executive

Industry-Academic Win-Win Partnership: Austin Community College Biotechnology Program & Incubator

Austin Community College (ACC) not only serves as the InnovATEBIO National Center for Biotechnology Education, but is also home to a model program that supports future life science innovators, benefitting both students and startups. ACC's Biotechnology Program prepares high school and college students for skilled technical positions in biomanufacturing, research and development, quality assurance, instrumentation, cell culture, and molecular diagnostics. Fifty percent of the students in the program already have a bachelor's degree or higher and are working toward a post-baccalaureate certificate.

The life science industry plays a strong role throughout the ACC Biotechnology Program. Industry provides feedback and recommendations on curriculum; how students are taught and assessed; and the skill standards and performance outcomes for courses. In addition, by offering state-of-the-art space and equipment for startups, students get multiple opportunities to build their skills with young companies.

Students participate in each course as though they are working in a "company," so they quickly learn what it is like to work in a regulated laboratory environment. The laboratory exercises or projects they work on result in products they use later in the course or are actual projects sourced from area industry. A capstone internship is required of all students whether they end with an entry-level certificate in biomanufacturing, an AAS degree, or an ATC.

Evolution of the Bioscience Incubator at ACC

Having students work on company projects, particularly with startup companies, has led to the acceleration of product development for several companies, which helped to generate the funding to support the ACC Bioscience Incubator (<https://sites.austincc.edu/incubator/>). Students are now able to intern or work in tenant companies while finishing their degrees or certificates.

Conclusion

Through a difficult and challenging year, the U.S. life sciences industry has once again proven resilient—both from an innovation perspective in meeting the challenges of ending a global pandemic; and an economic perspective in growing high-quality jobs during the pandemic-induced economic downturn. Neither of these dual contributions would occur, however, without the industry’s hiring and deployment of its vital base of skilled talent. This report has sought to inform and direct the important work and focus of the CSBI and its partner organizations by assessing the demand for this talent, as well as the areas of emphasis and dynamics for organizations navigating remote work, academic partnerships, and the crucial need to advance industry diversity, equity, and inclusion.

Appendix:

Data Collection and Methodology

Table A-1: Defining the Life Sciences Industry—
TEconomy Partners/BIO NAICS-Based Industry Definition

Life Sciences Industry Subsector	NAICS Code	NAICS Description
Agricultural Feedstock & Industrial Biosciences	311221	Wet Corn Milling
	311224	Soybean and Other Oilseed Processing
	325193	Ethyl Alcohol Manufacturing
	325311	Nitrogenous Fertilizer Manufacturing
	325312	Phosphatic Fertilizer Manufacturing
	325314	Fertilizer (Mixing Only) Manufacturing
	325320	Pesticide and Other Agricultural Chemical Manufacturing
Drugs & Pharmaceuticals	325411	Medicinal and Botanical Manufacturing
	325412	Pharmaceutical Preparation Manufacturing
	325413	In-Vitro Diagnostic Substance Manufacturing
	325414	Biological Product (except Diagnostic) Manufacturing
Medical Devices & Equipment	334510	Electromedical and Electrotherapeutic Apparatus Manufacturing
	334516	Analytical Laboratory Instrument Manufacturing
	334517	Irradiation Apparatus Manufacturing
	339112	Surgical and Medical Instrument Manufacturing
	339113	Surgical Appliance and Supplies Manufacturing
	339114	Dental Equipment and Supplies Manufacturing

Life Sciences Industry Subsector	NAICS Code	NAICS Description
Research, Testing, & Medical Laboratories	541380*	Testing Laboratories
	541713*	Research and Development in Nanotechnology
	541714	Research and Development in Biotechnology (except Nanobiotechnology)
	541715*	Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)
	621511	Medical Laboratories
Bioscience-related Distribution	423450*	Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers
	424210*	Drugs and Druggists' Sundries Merchant Wholesalers
	424910*	Farm Supplies Merchant Wholesalers

***Note:** Includes only the portion of these industries engaged in relevant life sciences activities.

Industry Hiring Survey and Executive Interviews

Information and data collection from life science companies occurred primarily through the use of two instruments developed for this report: the Industry Hiring Survey and Executive Interviews. Most questions focused on the recent past of January 2019 through December 2020, with special emphasis on the effects of the COVID-19 pandemic. Respondents were also asked to provide insight into workforce dynamics one year out from the response date. Additional details of each instrument are provided below:

Industry Hiring Survey

The Industry Hiring Survey was designed to capture data and contextual information on recent and anticipated hiring and related workforce dynamics including difficult-to-fill positions, impacts of the COVID-19 pandemic, workforce diversity initiatives, and other challenges. The survey instrument was designed for data collection from human resource representatives at each company. Representatives from State and Regional Partner organizations distributed the survey on behalf of CSBI and TEconomy from late January through early March of 2021. Responses were received from nearly 700 organizations across the breadth of life sciences industry subsectors and company sizes (Tables A-2 and A-3).

Table A-2: Industry Hiring Survey – Count of Respondents by Major Life Sciences Industry Subsector

Industry Subsector	Companies	% of Total
Drugs and Pharmaceuticals	194	29%
Research, Testing & Medical Laboratories	186	28%
Medical Devices and Equipment	150	23%
Industrial Biotech	56	8%
Bioscience-related Distribution	36	5%
Agricultural Feedstock and Chemicals	10	2%
Other Biosciences	36	5%
Total	668	100%

Table A-3: Industry Hiring Survey – Count of Respondents by Employment Size

Employment Size	Companies	% of Total
1 to 25	323	48%
26 to 50	84	13%
51 to 150	87	13%
151 to 500	59	9%
501 to 1,000	19	3%
1,001 or more	85	13%
Did not provide	11	2%
Total	668	100%

Life Science Executive Interviews

The executive interview process was designed to capture high-level perspectives from executives on similar items and topics addressed in the Industry Hiring Survey. Interviews were conducted by State and Regional Partner organizations on behalf of CSBI and TEconomy from mid-January through late March of 2021. Executives from life science companies were interviewed by representatives from the partners organizations located in their respective states. The interviewers collected notes from each session and uploaded them to an online reporting tool to simplify and organize the information for analysis. Responses were received from nearly 200 organizations (Tables A-4 and A-5).

**Table A-4: Life Science Executive Interviews –
Count of Respondents by Major Life Sciences Industry Subsector**

Industry Subsector	Companies	% of Total
Drugs and Pharmaceuticals	67	36%
Research, Testing, & Medical Labs	57	31%
Medical Devices and Equipment	37	20%
Other Biosciences	13	7%
Industrial Biotech	6	3%
Agricultural Feedstock and Chemicals	3	2%
Bioscience-related Distribution	2	1%
Grand Total	185	100%

Table A-5: Life Science Executive Interviews – Count of Respondents by Employment Size

Company Size	Companies	% of Total
1 to 25	56	30%
26 to 50	25	14%
51 to 150	25	14%
151 to 500	30	16%
501 to 1,000	15	8%
1,001 or more	34	18%
Total	185	100%

For both instruments, individual responses have been maintained as confidential. Details provided by interviewees and respondents were used to distill broader themes raised across the U.S. related to industry talent dynamics. Any specific quotations included in this report have been de-identified to protect the confidentiality promised to each respondent company.

Table A-6: CSBI State and Regional Partner Organizations Participating in this Effort

Partner Organization	State/Territory
Arizona BioIndustry Association (AZBio)	Arizona
Biocom Institute	California
BioCT	Connecticut
BioKansas	Kansas
BioUtah	Utah
California Life Sciences Institute (CLSI)	California
Industry University Research Center (INDUNIV)	Puerto Rico
Maryland Tech Council (MTC)	Maryland
MassBioEd	Massachusetts
Medical Alley Association	Minnesota
MichBio	Michigan
Montana Bioscience Alliance (MBA)	Montana
North Carolina Biosciences Organization (NCBIO)	North Carolina

Partner Organization	State/Territory
New York Biotechnology Association (NewYorkBIO)	New York
New Mexico Biotechnology & Biomedical Association (NMBio)	New Mexico
Oregon Bioscience Association (Oregon Bio)	Oregon
South Dakota Biotech Association (SDBIO)	South Dakota
Texas Healthcare and Bioscience Institute (THBI)	Texas

