



2023 Life Sciences Workforce Trends Report:

A Rapidly Evolving Industry and its Impact on Talent Dynamics

Prepared for: Coalition of State Bioscience Institutes (CSBI)

Prepared by: TEconomy Partners, LLC

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Introduction

The U.S. life sciences workforce is a constantly shifting target—continuously evolving to meet the demands of a rapidly growing and highly innovative, science- and technology-driven industry. Despite—and, in part, because of—the global pandemic and resulting economic challenges, the life science industry defied national economic trends, growing through 2020 and continuing to outpace the overall private sector in recent years as it has for two decades.

The industry’s outsized demand for “STEM” expertise and skills, along with its high concentrations of roles demanding postsecondary-educated workers, continue to necessitate close relationships and collaborations with the nation’s colleges and universities. These unique growth and advanced industry dynamics call for regular updates and refreshed intelligence on the industry’s talent demand and underlying workforce dynamics—a mandate of this report for the last decade.

In this sixth edition of the *Workforce Trends* report, it is also important to take stock of key trends that have gripped the life sciences in recent years and that continue to evolve, including the industry’s emphasis on advancing diversity, equity, and inclusion (DEI); how the industry has embraced and adapted to remote and hybrid work arrangements; the implications of technology investments and deployment for talent, and more.

TEconomy Partners, LLC (TEconomy) has again collaborated with the Coalition of State Bioscience Institutes (CSBI) to assess the industry’s demand for talent and the related themes that have emerged over the last two years using both quantitative and qualitative assessment approaches. 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.

The findings presented herein leverage intelligence from three primary sources, supplemented with other data-related insights:

- Details from nearly 2.8 million unique (non-duplicative) job postings of life sciences companies over the last four years.
- A national life sciences industry hiring survey, conducted across 18 states and Puerto Rico in early 2023 and completed by nearly 700 companies. The survey was designed to capture data and information on recent and anticipated hiring and related workforce dynamics; wage and salary increases; remote work policies; difficult-to-fill positions; future hiring plans; workforce diversity initiatives, and more.²

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

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

- Interviews with 185 life sciences industry executives across the same 18 states and Puerto Rico, conducted in early 2023 and designed to capture high-level perspectives from corporate leaders on a similar set of talent dynamics and related issues addressed in the industry hiring survey.³

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

1. The U.S. life sciences industry continues to hire at a rapid pace, fueling an ongoing intense competition for talent over the last two years, with significant implications for corporate costs, recruitment and hiring.
2. High-demand skills and subject matter expertise continue to evolve across the life sciences, with strong growth in manufacturing and production-related roles indicating major operational and talent investments by companies, as well as continued strong demand for scientist, engineering, IT, technician, and other roles. Looking ahead, much of this evolution will be driven by emerging industrial automation, AI, data sciences, and other disruptive technology investments and implementation.
3. A strong commitment by life sciences employers to advancing Diversity, Equity, and Inclusion (“DEI”) remains and is maturing, though there continues to be a divide between mid- and larger-sized employers’ formal initiatives versus smaller companies for which formal programs and initiatives are less prevalent.
4. Industry-academic partnerships remain a cornerstone to targeted talent solutions but must continue to evolve and deepen to tackle outsized demand.
5. Remote and hybrid work arrangements appear to be here to stay; however, there is an underlying “push-pull” dynamic between employers who are often reluctant to fully embrace remote or hybrid arrangements, versus employees who resoundingly prefer these alternative arrangements.

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 highlight the importance and awareness of educating and training the country’s skilled technical workforce.

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

Defining the Life Sciences Industry

TEconomy’s Principals have worked closely in partnership with 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:



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.

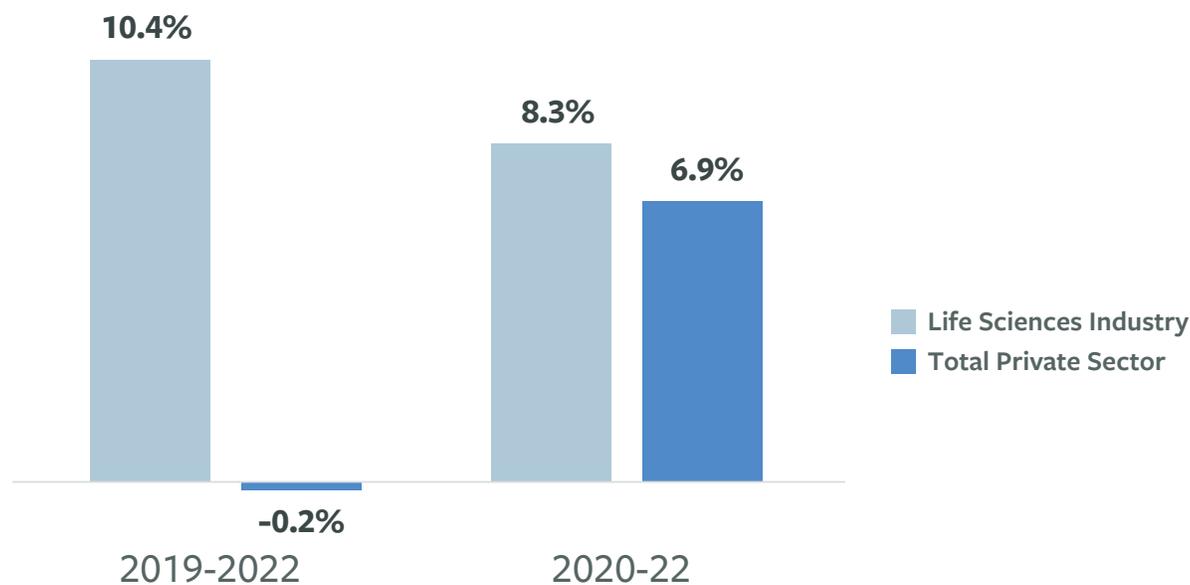
This report uses the “life sciences” industry terminology reflecting the preferences of CSBI and its state partner organizations. This terminology is synonymous with the “biosciences” used by TEconomy/BIO in its biennial national reports.

Theme: The U.S. life sciences industry continues to hire at a rapid pace, fueling an ongoing, intense competition for talent over the last two years, with significant implications for corporate costs, recruitment and hiring.

Hiring activity has been steady and strong in the life sciences, even through the pandemic. During the last two years, the U.S. life sciences industry has increased employment by just over 8%, outpacing the nation’s private sector growth (6.9%, see Figure 1) and continuing a two-decades long trend of faster growth for a resilient industry that has been an outsized driver of the U.S. economy.

Stepping back just one year further, however, to 2019 reveals an important insight—the life sciences industry continued to add jobs and to grow, even during the depths of the pandemic-induced shutdowns and recession in 2020. At the same time, the overall private sector in 2022 was just returning to pre-pandemic 2019 levels.

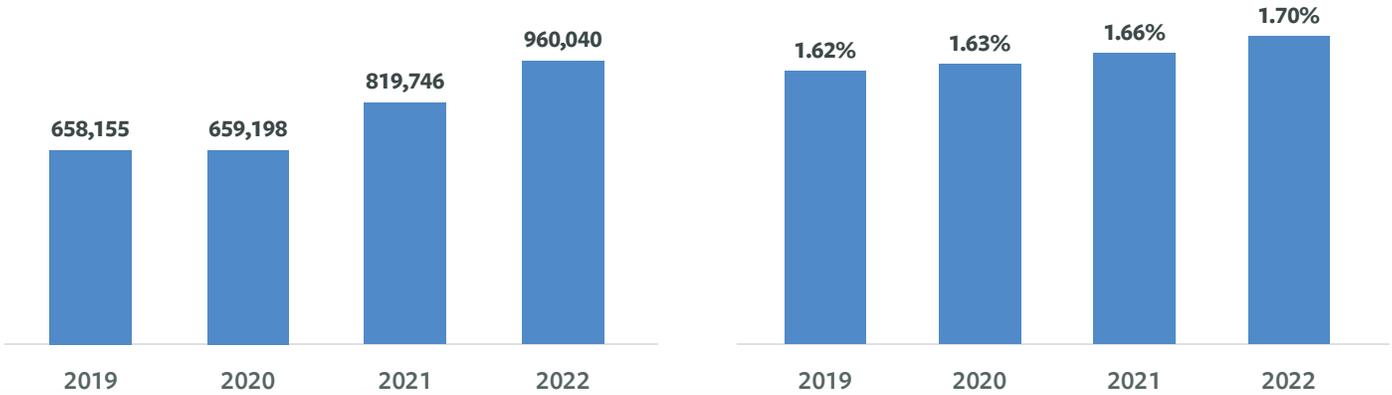
Figure 1: Employment Growth Trends—U.S. Life Sciences Industry vs. Total Private Sector, 2019-22



Source: TEconomy Partners’ analysis of Lightcast 2023.1 data set.

This strong hiring activity is captured in a sizable recent upward trend in job postings, reflecting both net new hiring and overall growth as well as the industry’s characteristic and sizable underlying “churn” and subsequent need for replacement workers (Figure 2). The life sciences industry today employs 2.2 million people and has expanded its labor force by a net 169,000 workers since 2020. Notably, during an average month throughout 2021 and 2022, there were nearly 199,000 unique industry job postings for open positions spanning all roles and business functions, compared with an average monthly job postings figure of 141,000 throughout 2019 and 2020. In 2022, the industry represented 1.7% of all U.S. job postings, matching its share of total industry employment.

Figure 2: Trends in Life Sciences Industry Job Postings—Totals and as a Share of All Industries, 2019-22



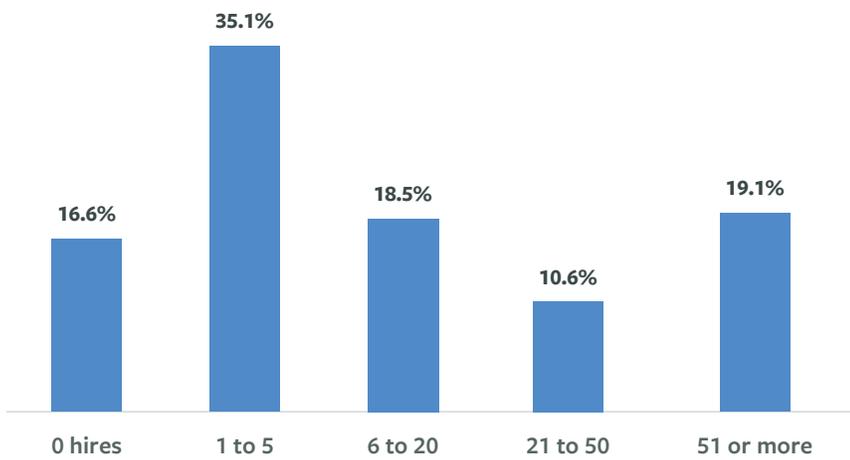
Note: The individual years presented in the trend analysis will not sum to cumulative totals due to unique job postings that span across individual years. Data for overlapping years presented in prior CSBI reports will not match due to methodological changes and updates, due, in part, to the recent merger of Emsi and Burning Glass and establishment of Lightcast.

Source: TEconomy Partners’ analysis of Lightcast JPA Database, 2023.1 data set.

The hiring survey of U.S. life sciences companies corroborate these findings and reports strong, broad-based hiring activity, with 83% of companies surveyed having hired employees at some level during the last 2 years. Nineteen percent (19%) of companies reported hiring 51 or more employees during this period and, in total, 30% of companies report hiring more than 20.



Figure 3: Share of Life Sciences Companies Surveyed by Level of Hiring During the Last 2 Years



Note: the 2-year survey reference period spans January 2021 through December 2022.

Source: CSBI and TEconomy Partners Life Sciences Industry Hiring Survey 2023.

This strong hiring in life sciences has played out as the overall economy rebounded and ramped up hiring in the aftermath of the pandemic-induced economic shutdowns and brief recession that resulted in the steep job declines of 2020. The intense competition for talent in 2021, 2022 and into early 2023 extended to the life sciences as the nation’s overall unemployment rate reached 3.6% in 2022, with some industry executives citing an ongoing “war for talent”.

While largely benefiting employees, the life sciences' intense competition for talent is impacting employers on multiple fronts. Insights from Executive interviews and the Hiring Survey find:

Rising wages and bonuses

To attract and compete with other industries for talent, employers are raising wages, revisiting the competitiveness of benefit packages by benchmarking across the industry, and offering a host of bonuses including for sign-on, employee referral, and retention.

- The hiring survey finds that 37% of companies report increasing wages by 10% or more across all employees in 2022, with over 50% of these respondents citing both inflation and the intense competition for talent as contributors to significant wage increases (Figure 4). Among possible contributing factors, remote work was cited as the least important factor for wage increases last year.

Life Sciences Industry Executives on Rising Wages & Bonuses

“The effects of COVID and the economy and the current market have been challenging, it’s unlike anything I’ve ever seen in my 20 years in HR. From a frontline manufacturing standpoint, it’s really created a war for talent, especially around pay rates, because people will jump for 25, 50 cents [pay raises], they’ll jump for something closer to their home, there’s not a lot of stability especially with the frontline employees. It’s been difficult, especially when you’re trying to grow. You have to typically recruit twice what you need in order to get what you need, which creates internal challenges with the training, with trying to embed your culture, things of that nature.”

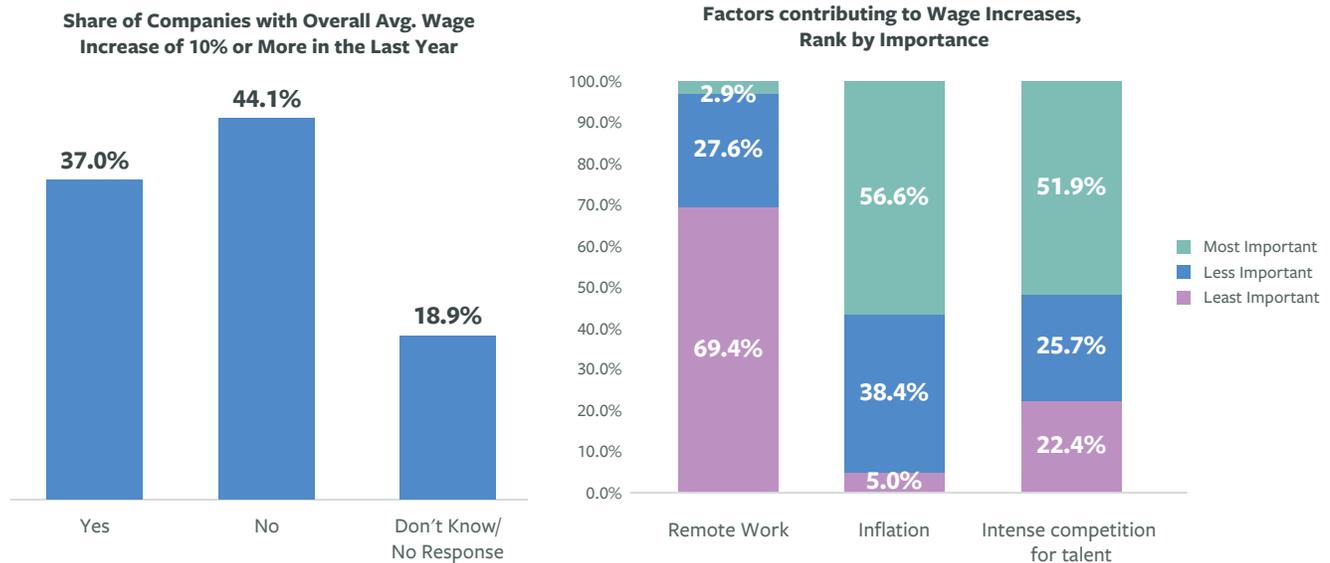
“It’s had about a 30% increase in the wages of those entry-level positions, and the quality of those entry-level positions has gone down. We’ve had a number of older, very highly capable people that just decided that they no longer wanted to work anymore.”

Some employers are responding to this competitive talent challenge by looking for candidates in other states or abroad or, worse, eliminating positions altogether:

“[T]he new CEO decided to move three of our production lines to [OTHER COUNTRY], so we eliminated 50 positions here in [STATE], just keeping the most productive and the most loyal.”

“From a professional talent standpoint, we’re importing a lot of talent from not only other states but other countries in order to be able to fill gaps because we can’t find it in the U.S. anymore.”

Figure 4: Shares of Companies Surveyed with Significant Overall Average Wage Increases in the Last Year Driving Factors for Rising Wages



Source: CSBI and TEconomy Partners Life Sciences Industry Hiring Survey 2023.

Altering recruitment approaches

Employers have leapt into “alternative,” though increasingly mainstream, approaches to connecting with potential job candidates, including greater use of social networks such as LinkedIn and Facebook, while also maintaining more traditional approaches, such as career fairs and on-campus recruiting, job boards, etc.

Life Sciences Industry Executives on Altering Recruitment Approaches

“We are exclusively doing proactive recruiting rather than reactive recruiting—really getting out there ahead of what we need so we can have a pool of people, especially if we know that there are some areas of our workforce where [there is] more turnover, and it’s often our entry-level positions.”

“Over the last couple of years, we’ve had to really be ready to move quickly. You’re ending up in situations where, when you’re at the offer stage—or even a little bit before you’re ready to go to offer—you’ve got candidates with multiple offers at the same time, so you have to be ready to move quickly. That’s definitely a change.”

“We’ve had this switch from the traditional methods that we used to use—like posting and even the job sites like Indeed and other things—to utilizing social media. LinkedIn, in particular, is the one that we use the most, but also Facebook as well. That’s had a dramatic impact and has significantly improved [our recruitment]. I think we were late in shifting ...and the companies that had shifted earlier to recruiting on those platforms have done well.”

Emphasizing talent retention

Employers are prioritizing retention of their existing workforce and talent, recognizing the industry's strong churn, particularly for those in manufacturing and production roles who often change jobs and industries for even modest wage increases. Among strategies being employed are retention bonuses and an emphasis on the value of employees' "total compensation" including broader benefit packages.

Life Sciences Industry Executives' Focus on Retention

"The biggest challenge coming out of COVID is the retention piece."

"[Our state is] also number one in the country for employees who quit because the market is so good....And so the employees—probably more so at the plant and the manual hourly employees than professional [employees], but we've seen both—we've had a higher turnover rate during the pandemic. We've had to really think about what we can do to retain those employees, to get them excited about wanting to work in a plant environment."

Embracing remote talent to level the geographic playing field

Employers are extending their recruitment geography in response to hiring competition. The shift toward remote work has resulted in levelling the geographic barriers for talent acquisition in certain roles, e.g., for business support functions such as IT, financial analysis, regulatory affairs, and more.

Life Sciences Industry Executives on Embracing Remote Talent to Level the Geographic Playing Field

"One thing that has changed when we conduct a search, we are deliberate about whether that role can be filled remotely. There are more roles we are now deciding to look at filling nationally, a couple years ago, we would have only looked at the local talent pool."

"The other thing that [coming out of COVID] has done is that it has dramatically opened up our hiring window."

"We've been able to add people by recruiting for remote work. ... [W]e've also had people whose spouses have had job relocations. Before we had this flexible remote work environment, those people would simply have had to resign. And now [they] can continue to work for us."

"The greatest recognition is that competition for talent is not local, but [rather] domestic and global."

Reconsidering baseline education requirements

As demand continues to rapidly outpace the supply of skilled talent, employers are revisiting educational requirements in their hiring criteria, particularly for a range of production, biomanufacturing, lab, and other technician-level positions. Having re-examined needed competencies and skills, recruitment dynamics, and challenges with employee tenure, several companies – including many of the executives interviewed for this report – are finding that many bachelor-level employees whose career aspirations are not well-aligned with these positions, are often a poor fit for these roles. Increasingly, companies indicate that they are, or are considering, targeting individuals with two-year associate degrees, certificates, and/or corresponding experience, and many are turning to strategic educational partnerships to rapidly secure this needed talent.

Life Sciences Industry Executives on Reconsidering Baseline Education Requirements

“To close the gap of talent availability, we have implemented ... revision of the minimum job requirements for technical roles [among other things].”

“Our company has adapted to the new reality, and for certain technician level roles, a bachelor’s degree is no longer required.”

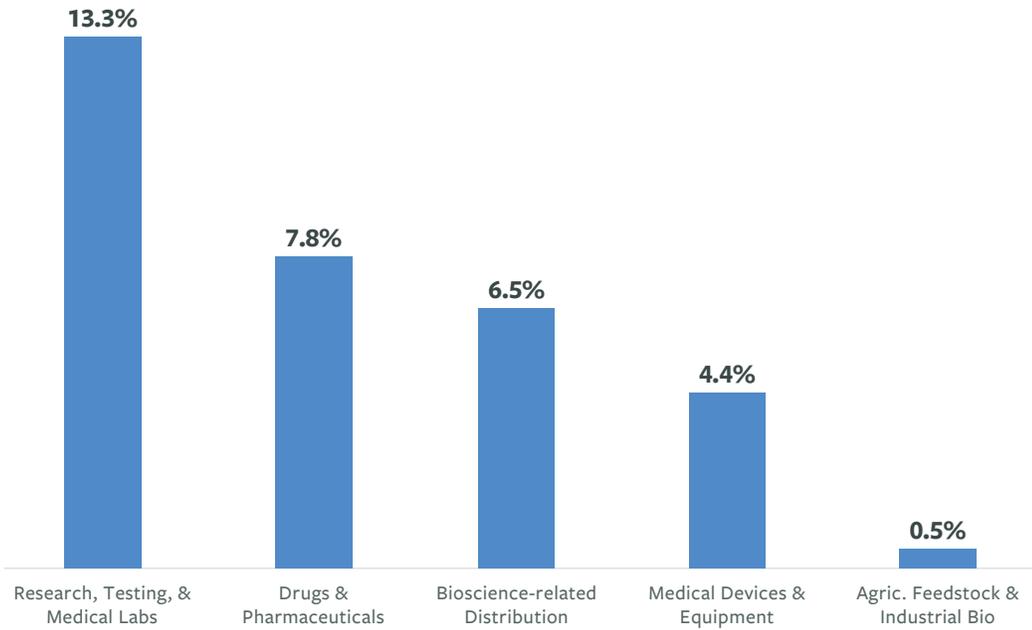
“The company has relaxed its policy and now emphasizes experience and skills for some positions over degree programs. We work with the local community college on skill areas and hire students from those programs.”

The strong demand for life sciences talent spans the breadth of the industry’s major subsectors, with each of the five subsectors growing its employment base since 2019, as shown in Figure 5. The composition of life sciences job postings (Figure 6) is reflective of this recent employment growth, where three of the five subsectors stand out in having a greater share of the industry’s recent job postings relative to their share of life sciences employment totals. These include:

- Pharmaceuticals
- Medical Devices & Equipment
- Research, Testing, & Medical Labs

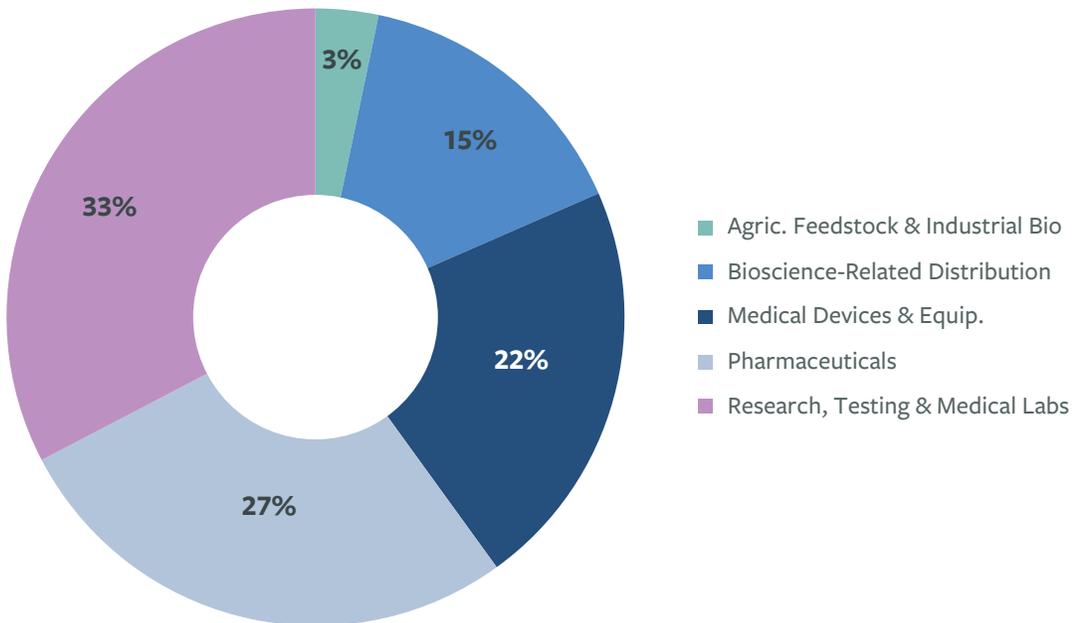
The Appendix includes a “Talent Demand Snapshot” for each of the five life sciences subsectors including trends in overall job posting activity, leading hiring employers, and leading job titles.

Figure 5: Industry Employment Change by Subsector, 2019-22



Source: TEconomy Partners' analysis of Lightcast 2023.1 data set.

Figure 6: Share of Industry Job Postings by Major Life Sciences Subsector, 2019-22



Source: TEconomy Partners' analysis of Lightcast JPA Database, 2023.1 data set.

Theme: High-demand skills and subject-matter expertise continue to evolve across the life sciences, with strong growth in manufacturing and production-related roles, indicating major operational and talent investments by companies, as well as continued strong demand for scientist, engineering, IT, technician, and other roles. Looking ahead, much of this evolution will be driven by the rapid expansion of industrial automation, AI, data sciences, and other disruptive technology investments and implementation.

The U.S. life sciences industry has an outsized concentration and demand for skilled STEM talent with postsecondary education and training credentials. As a highly innovative, science- and discovery-driven sector, the life sciences have a more-than-five-times greater concentration of individuals employed in STEM occupations compared with the overall private sector economy (Figure 7)—fully one-third (34%) of all life science industry jobs fall within a STEM role. At the same time, 82% of all life science industry roles have minimum typical entry-level requirements that can be classified as either middle- or high-skilled occupations. High-skilled jobs most often 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.⁴

In 2022, nearly half (48%) of life science industry employees were in high-skilled occupations, compared with 28% of employees in 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-degree education programs, including those at graduate levels, to meet the industry's top talent needs.

A typical misconception about the life sciences is that it is an industry only for those with advanced science and engineering degrees—while in reality, one in three life sciences occupations is in a middle-skills role (34%). At its core, the life sciences industry is an advanced manufacturing sector that employs thousands across production, technician, transportation, material moving and handling, logistics, healthcare, and other occupations that often require postsecondary certificates or associate's degrees and are highly accessible and in-demand. When taken together, positions that typically require either lower- or middle-skills credentials for entry account for just over half of all occupations in the life sciences industry—meaning just over half of industry occupational roles can be filled by individuals with less than a 4-year-degree.

⁴ 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.

Figure 7: Share of Employment in STEM Occupations, Life Sciences vs. All Other Industries, 2022

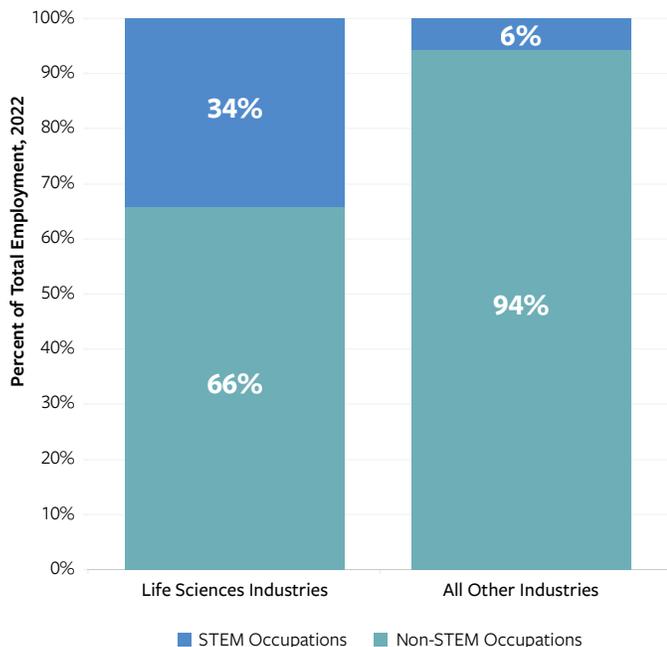
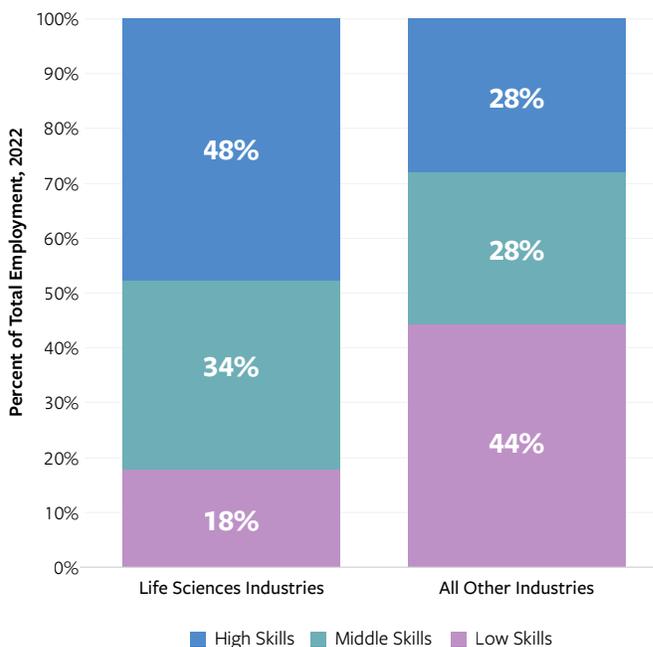


Figure 8: Skills Composition of Typical Minimum Entry-Level Occupational Requirements, Life Sciences vs. All Other Industries, 2022



Source: TEconomy Partners' analysis of Lightcast 2023.1 data set.

Source: TEconomy Partners' analysis of Lightcast 2023.1 data set.

Several quantitative and qualitative inputs provide insights on both recent as well as expected future occupational areas of high demand:

- **Industry “staffing patterns”**—the occupational makeup of the industry and how that is evolving, including examining high-demand growth occupations across the industry’s major subsectors.
- **Industry job posting activity**—shedding light on recent demand for key roles and occupations based on the job postings of life sciences companies.
- **The industry hiring survey**—which provides forward-looking insights on future demand over the next year, as well as occupations for which companies have particular challenges and difficulty hiring; and
- **Executive interviews**—insights on key technologies and associated expertise and skills needed both today and into the near future.

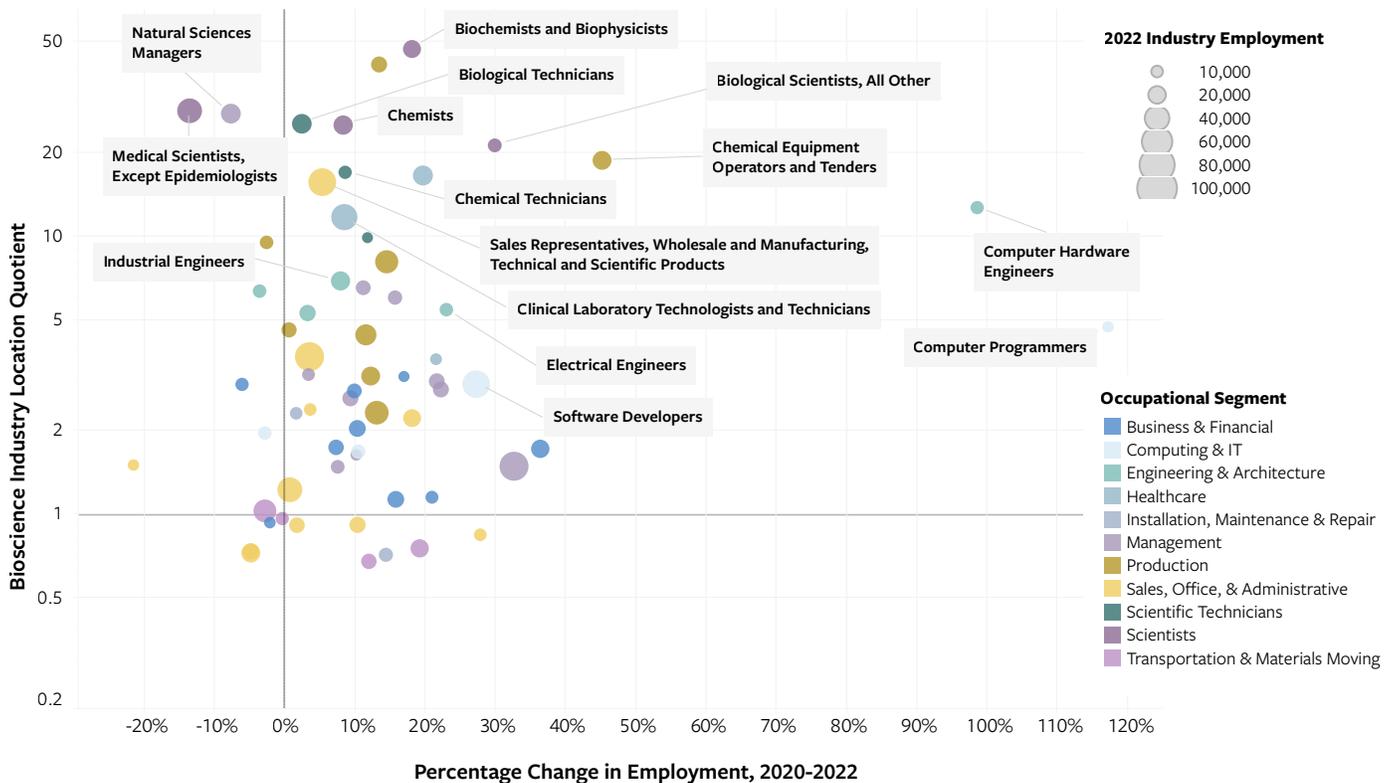
Industry staffing patterns

The graphic in Figure 9 brings together three key occupational employment metrics around the detailed dynamics within the nation's life sciences industry overall—the current employment level within the industry (size of each bubble), the concentration in life sciences relative to all other industries (location quotient on the vertical axis—where a value greater than 1.0 indicates a greater concentration relative to the national average/all industries), and the recent employment trend for each occupation within the life sciences industry (horizontal axis). This is limited to those larger occupational groups that comprise at least 0.5% of total employees in the U.S. industry.

In the last two years, the industry has seen strong, significant hiring activity and high levels of industry concentration among:

- Life Scientists, specifically including biochemists, biological scientists, and chemists.
- IT/Tech, including software developers and computer programmers, illustrating the shifting talent demands within the industry for tech development and applied data sciences and AI capabilities, as well as computer hardware engineers.
- Engineering, including electrical and industrial engineers.
- Technicians, including clinical lab techs, chemical and biological technicians working in both industrial production and lab support roles.
- Production, including chemical equipment operators; packaging and filling machine operators and tenders, inspectors, and testers (quality roles), electronic and electromechanical assemblers; supervisors; and assemblers and fabricators.

Figure 9: Employment Position and Performance of Detailed Occupations within the U.S. Life Sciences Industry—Employment Levels (Size of Bubble), Concentration (Location Quotient), and Recent Growth

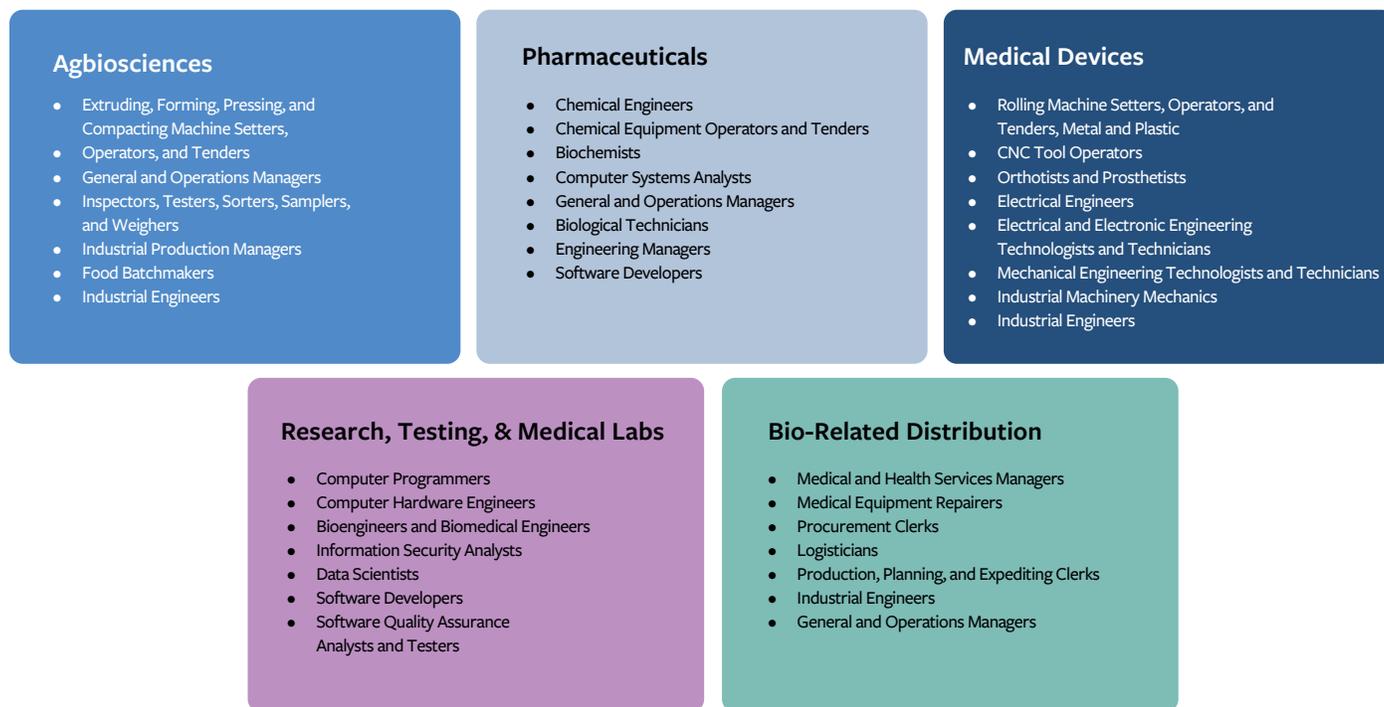


Source: TEconomy Partners' analysis of Lightcast 2023.1 data set.

The industry’s major subsectors have unique as well as cross-cutting talent dynamics, illustrated by the high-demand roles highlighted in Figure 10. These are occupations that have a significant employment base today, comprising at least 0.5% of total subsector employment, and have demonstrated the strongest growth within the industry since 2020. Some themes emerge across the subsectors:

- Cross-cutting functions such as industrial engineers, operations managers, and key production roles such as machine setters and operators, and industrial machinery mechanics and maintenance technicians, all point to the growing manufacturing and production emphasis in the industry—reflective of broad industry growth, but also to an extent, the national emphasis on rooting more production and supply chain activities domestically, i.e., strategic reshoring activities.
- The strong emphasis on IT and Tech roles in the research, testing, and medical labs sector, which is inclusive of biotech and other life sciences R&D and testing operations. This is illustrative of the industry’s evolving use of and investments in tech capabilities for data sciences, drug development, and other advanced analytics and AI applications.
- Unique context of other subsectors, including:
 - The deployment of biochemists, chemical engineers and operators and the biological technician roles within the pharmaceutical manufacturing subsector.
 - The use and deployment of specialized engineering talent in medical device production including electrical, mechanical, and industrial engineers, as well as complementary technicians in supporting roles.
 - Distribution expertise in the form of logisticians and clerks.
 - Key inspection and quality roles in agbiosciences, as well as manufacturing leadership and food processing expertise.

Figure 10: High-Demand Occupations by Life Sciences Industry Subsector—Based on Job Growth, 2020-22



Source: TEconomy Partners’ analysis of Lightcast 2023:1 data set.

Industry job posting activity

Industry job postings provide further insights and 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,⁵ Figure 11 utilizes groupings of leading job titles for summary purposes.

The leading technical and production-related job titles across the life sciences industry’s nearly 2.8 million unique job postings over the last 4 years are presented in Figure 11. The job postings illuminate the very strong demand for some key industry-specific support functions that are not as easily seen in the staffing patterns data using SOC classifications, including: quality assurance and control (QA/QC); data scientists; and regulatory affairs.

Among these leading areas of demand for employers illustrated via job postings, many, in fact more than half, are showing outsized (rising) demand in the latest year of the 4-year analysis (2022). While one might expect an even, roughly 25% distribution of job postings across all 4 years, these occupational groups have a greater than 35% share in 2022 alone. These include:

- Medical Technicians
- Quality Assurance & Control
- Scientists, General Research
- Data Scientists (inclusive of Bioinformaticians, Computational Biologists, and related)
- Lab Technicians
- Production, General
- Regulatory Affairs
- Production Supervisors
- Medical Directors
- Industrial Engineers
- Engineers, General
- Production Technicians

These functions experienced significant demand in the latest year and align with most of the themes from the staffing patterns analyses, including the emphasis on manufacturing/production occupations and skill sets; technician roles—both medical and lab; scientists; engineers; and specialized areas of data sciences, QC, and regulatory affairs.

Who’s Hiring in the Life Sciences Industry?

Leading companies by unique number of job posting totals during 2019-22 in descending order:

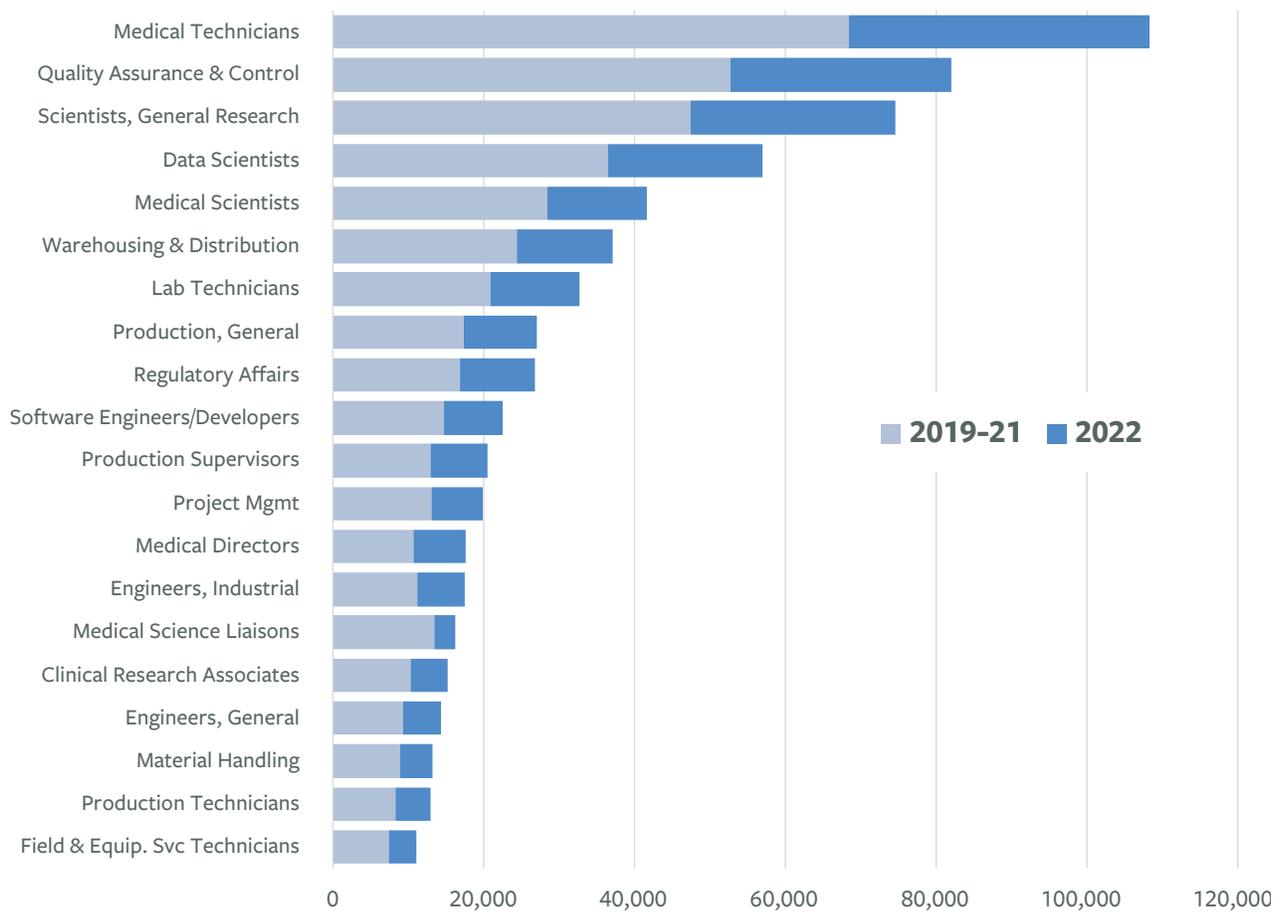
- Quest Diagnostics
- Johnson & Johnson
- Labcorp Drug Development
- Thermo Fisher Scientific
- IQVIA
- Abbott Laboratories
- Bayer
- Pfizer
- Medtronic
- Grifols
- Takeda Pharmaceutical Company
- Stryker
- Merck
- AbbVie
- Eurofins
- Bristol-Myers Squibb
- McKesson
- BD
- Cardinal Health
- AstraZeneca

Source: TEconomy Partners’ analysis of Lightcast, JPA Database, 2023.1.

⁵ For example, a general research “Scientist” might be referred to among different companies as Scientists, Principal Scientists, Associate Scientists, Research Scientists, Applications Scientists, etc. For summary analytical purposes, these examples have been grouped into a “Scientists, General Research” classification.



Figure 11: Leading Technical and Production-Related Job Titles in Life Science Industry Job Postings*, 2019-22



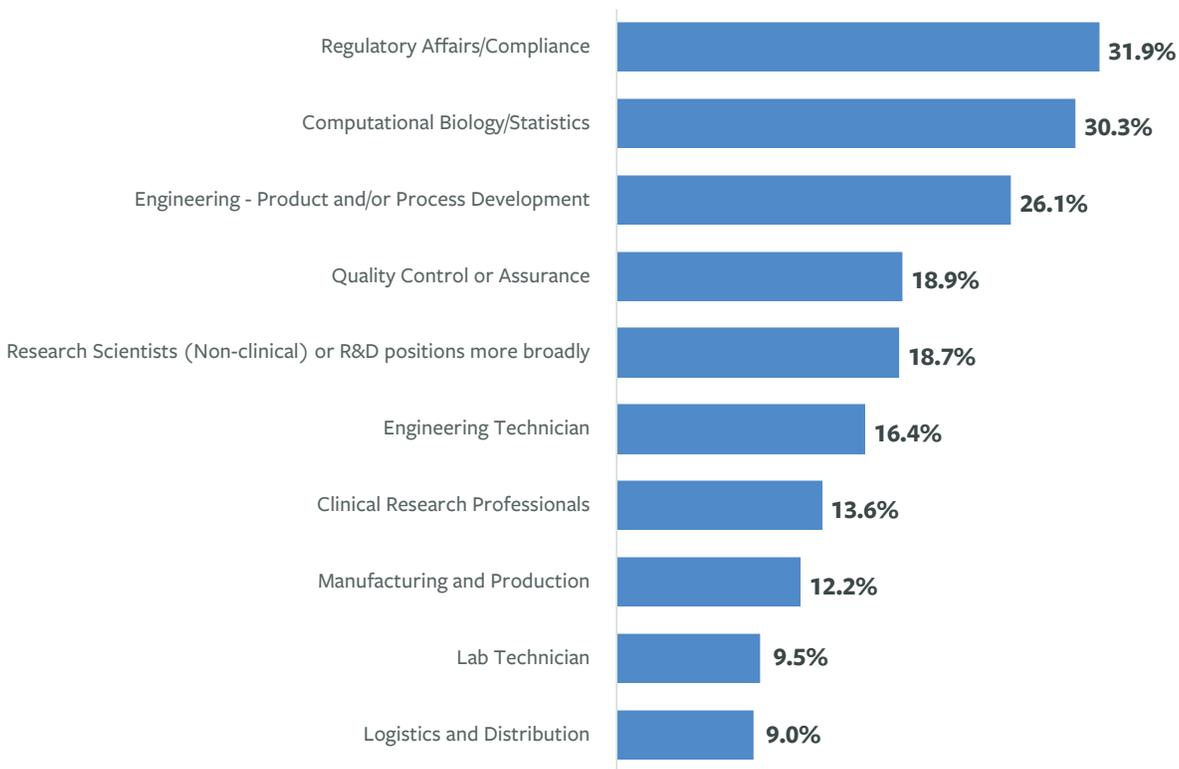
Note: Lightcast limits information on job titles and corresponding numbers of postings to the top 1,000, limiting the ability to provide comprehensive totals by categories.

***Note:** This figure 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.

Source: TEconomy Partners' analysis of Lightcast JPA Database, 2023.1 data set.

Life sciences companies report significant challenges in hiring across several of these high-demand occupational areas. Figure 12 shows the share of companies rating occupational areas as “very difficult” to hire, with the leading areas/challenges seen in regulatory affairs and compliance, computational biology/statistics, and product and/or process development engineers.

Figure 12: Share of Life Sciences Companies Rating “Very Difficult” to Hire in Selected Occupations



Source: CSBI and TEconomy Partners Life Sciences Industry Hiring Survey 2023.

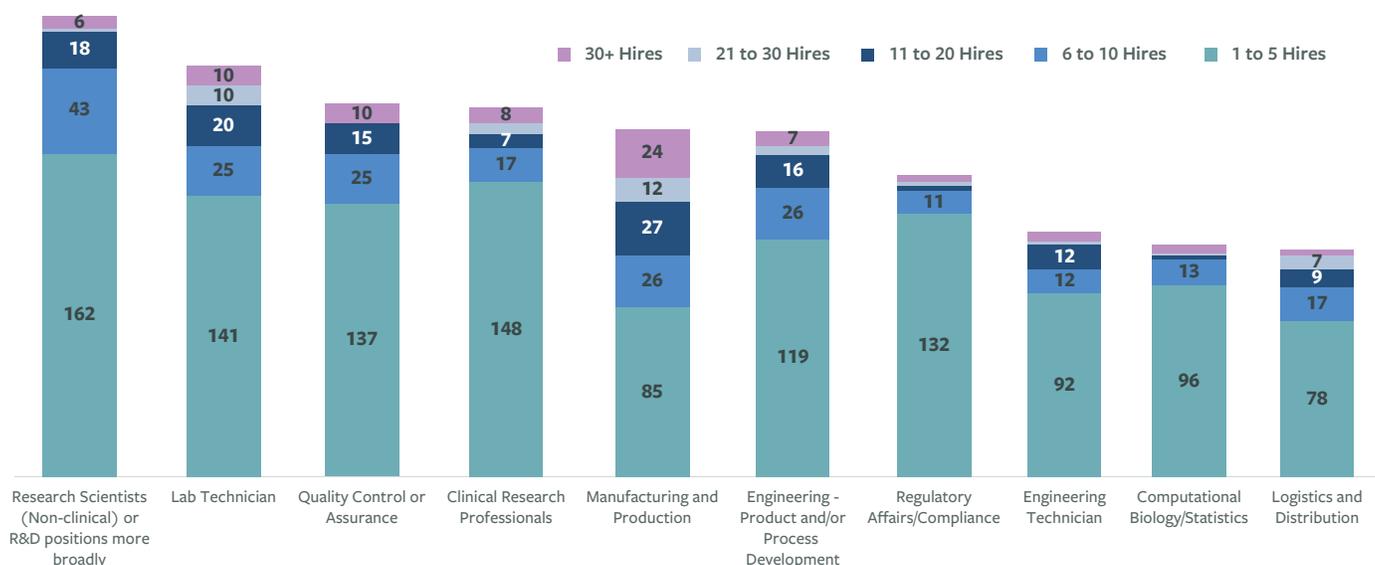
Looking to the future, the hiring survey shows several areas where companies report strong expected hiring in the near-term (over the next year). Figure 13 presents this by the number of companies reporting hiring plans within a set of “banded” hiring levels or counts. The survey was designed in this manner so as not to overburden responding Human Resource executives with tracking down highly specific expected hiring levels.

Looking ahead, in the next 12 months life sciences companies are expecting to significantly ramp up their hiring of manufacturing and production workers with 24 companies indicating plans to hire 30 or more workers in these roles and 39 companies with plans to hire between 11 and 30 in production occupations.

The following roles also have a strong hiring outlook according to industry HR executives:

- Quality Control or Assurance personnel
- Lab Technicians
- Research Scientists

Figure 13: Anticipated Hires Over Next 12 Months by Number of Hires (Range) and Number of Life Sciences Companies



Source: CSBI and TEconomy Partners Life Sciences Industry Hiring Survey 2023.

Companies are clearly investing in manufacturing and production operations and expertise. When asked about technologies impacting hiring demands, executives consistently refer to investments in industrial and laboratory automation in line with the broader shift globally toward Industry 4.0, which translates into needs for industrial automation engineers, technicians, and maintenance functions, as well as software development and associated tech functions to adapt to this highly digital transformation.

In addition to industrial automation, the following themes have been emphasized by executives regarding technology investments and areas of associated workforce and talent needs:

- Artificial Intelligence (AI) and Machine Learning (ML), with applications spanning drug development and related early validation of therapeutic treatments and targets, clinical trials execution, and continued basic research applying AI and ML tools to biology and genomic data sets.
- Wide agreement that all workers, no matter the role, have broad-based need for enhanced and upskilled digital/IT skills.
- R&D, manufacturing, and associated QC/QA expertise, including both top scientific talent and biomanufacturing technicians in gene and cell therapies and related production.
- Combined mechanical and electrical/electronic engineering expertise related to increasingly smart, connected care, and remote monitoring associated with modern, increasingly digital medical devices.
- Investments in data sciences and advanced analytics capabilities, for example, to design clinical trials, applied to genomic data, predictive analytic capacities, and associated AI/ML applications.
- Hybrid skill sets are critical, spanning many/most of these areas, including the need for strong Tech + Science skill sets and knowledge, for example AI + Biotech.

Life Science Executives on key, forward-looking technology areas and investments, and associated talent needs:

“Another [factor] that is very important for our company is artificial intelligence. AI is more and more having a major impact on all industries, and the life science industry is definitely one of those. We feel that we are a leader in AI as it applies to cancer focus, and I think that is going to become more and more important in the future.”

“The most disruptive horizon that that we’re navigating through as an organization is embracing machine learning and artificial intelligence.”

“...we have to look into automation and productivity improvements to keep up with the world of medical devices.”

“The pharmaceutical industry is highly regulated, so we have used a lot of paper in the past. We are switching to all-electronic processes. Now our workers at all levels need some type of computer and IT system competencies. The people on the shop floor need some, but not as much as other individuals. We need people who can develop programs and run automation systems. We have looked for [individuals with] 4-year degrees in the past for these positions, but because of competition for them, we are looking for people with associate degrees or certifications.”

“If you listen to our CEO speak, he’ll talk about these three kinds of mega trends that we are very actively leaning into as part of [COMPANY]. One is this whole idea around smart connected care. We’re part of a broader ecosystem and we need to think about products that we bring to market that can communicate with the ERP systems within the hospital themselves. Smart connected care and the digitalization of our solutions is really important, so we are looking [for related skills] in terms of talent.”

“Cell and gene therapy is a new modality and a new platform to treat diseases. There are all sorts of new expertise required to build the capabilities from a talent perspective.”

“...one of the technology pressures is towards smaller devices, and smaller deployment of these devices... through catheters or other methods. Also putting more functionality in, such as wireless communication, cybersecurity, interconnectivity between devices—those would be the drivers.”

“The majority of our success and growth has been related to hardware-related products, implants, rods, fixation systems, traditional hardware development. The next great set of innovations in our space fundamentally will be software- and/or data-related. We are materially investing exponentially more in software than we are in hardware.”

Many of the forward-looking talent themes and evolving skills and expertise needs raised by executives, and reflected in the high-demand industry roles, are further reinforced through a deeper analysis of job postings. Leading skills and expertise areas shown in Figure 14 highlight the increasing importance of digital skills and specialized expertise that are on the rise throughout the industry. The skills shown are ranked by the increase in their use and reference in industry job postings since 2019.

Figure 14: Leading Specialized Skills in Life Sciences Industry Job Postings Ranked by Increase in Use/Reference from 2019 to 2022



Source: TEconomy Partners’ analysis of Lightcast JPA Database, 2023.1 data set.

At the same time, employers often stress the importance of a wide range of “foundational” skills in job postings. As shown in Figure 15, despite already being emphasized in postings several years ago, many key foundational skills or characteristics have increased significantly in their emphasis by employers.

Figure 15: Leading Foundational Skills in Life Sciences Industry Job Postings Ranked [Top to Bottom] by Increase in Use/Reference from 2019 to 2022



Source: TEconomy Partners’ analysis of Lightcast JPA Database, 2023.1 data set.

Beyond Technical & Production-Related Roles, A Strong Demand for Sales and Other Business Functions in the Life Sciences

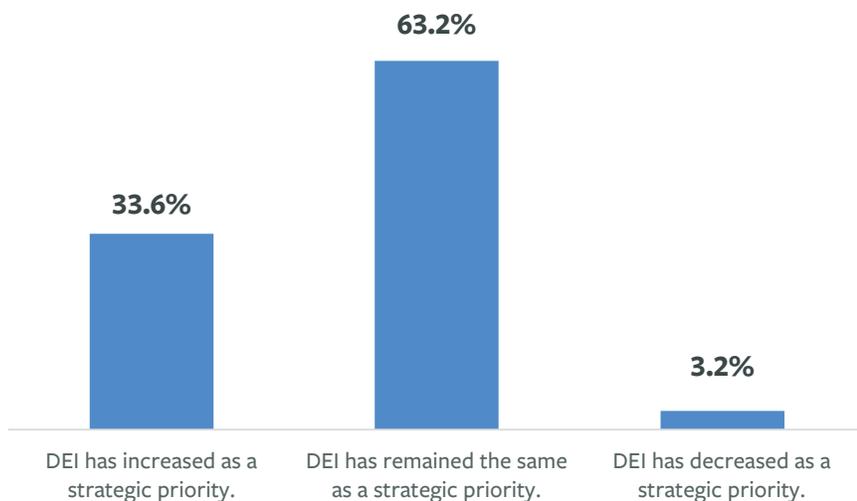
In addition to the demand for technical STEM-related and production-related positions, the industry has significant demands for financial, sales, customer service, and other business functions—areas in which the CSBI and its partner organizations are less directly focused, but which often require a STEM 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 4 years, with nearly 167,000 unique postings.
- **Business and Financial Operations** also make up a large segment of the workforce, reflected in job postings that totaled more than 50,000 from 2019 through 2022.

Theme: A strong commitment by life sciences employers to advancing Diversity, Equity, and Inclusion (“DEI”) remains and is maturing, though there continues to be a divide between mid- and larger-sized employers with formal initiatives versus smaller companies for which formal programs and initiatives are less prevalent.

Industry initiatives that support and emphasize more diverse, equitable, and inclusive corporate cultures have not waned, and in many companies continued to expand in 2022. For nearly all life sciences companies surveyed (97%), supporting and advancing DEI as a strategic priority has either “remained the same” or “increased” over the last year (Figure 16). Nearly two-thirds of these firms are maintaining their existing commitments to advancing DEI, with the remaining third reporting an increase in their commitment over the last year.

Figure 16: The Status of Diversity, Equity, and Inclusion as a Strategic Priority—How it has Changed, Evolved During the Past Year



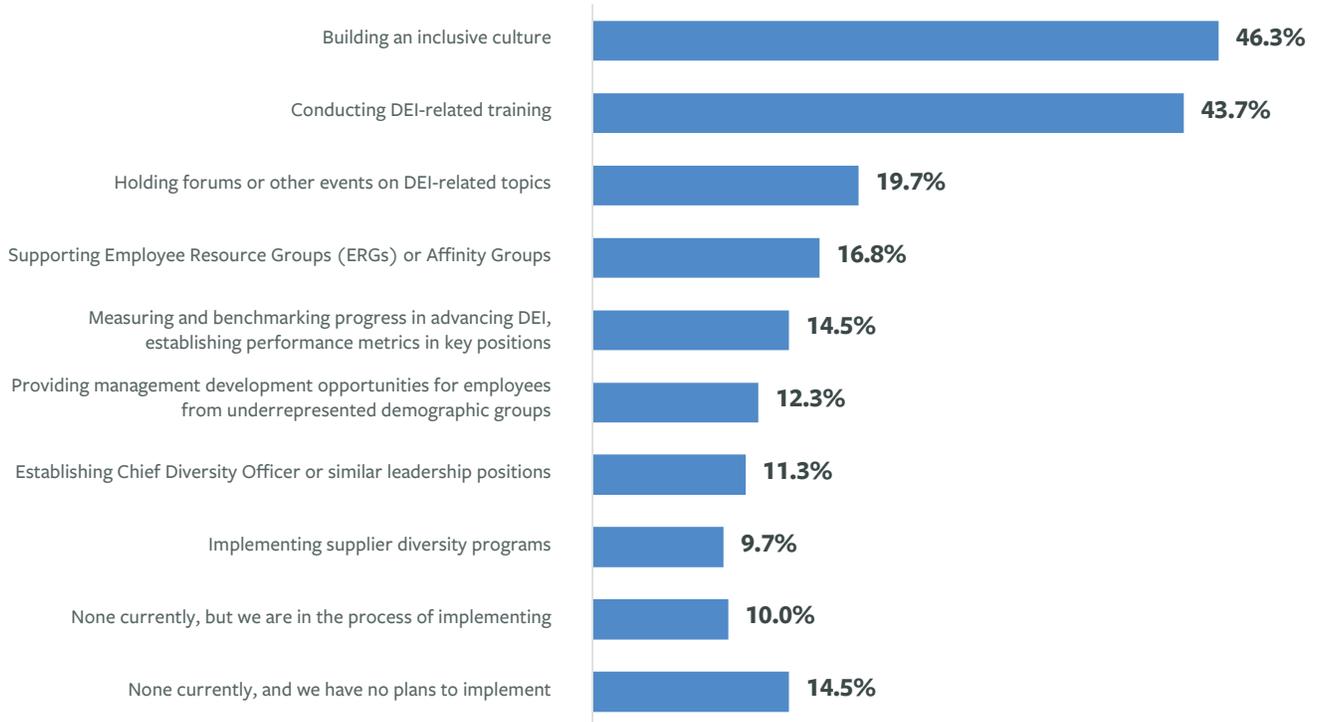
Source: CSBI and TEconomy Partners Life Sciences Industry Hiring Survey 2023.

As figure 17 shows, companies are implementing a wide array of approaches to advance DEI within and across their organization with some of the leading areas reported including: building an inclusive culture (46%); conducting DEI-related training (44%); and holding forums or other events on DEI-related topics (20%).

Executive interviews and the hiring survey indicate corporate commitments to advancing DEI are evolving and maturing. In recent years, many companies have created and hired Chief Diversity Officers or similar leadership positions (11% of surveyed

companies), and have established both formal (supporting Employee Resource Groups, conducting training, supplier diversity programs) and informal (holding forums and events) approaches to enhancing DEI. In addition, life sciences firms are measuring and benchmarking their progress in these efforts, and, in many cases, are reporting publicly on their progress.

Figure 17: Approaches Implemented by Companies to Advance DEI During the Past Year—Share of Companies Responding



Source: CSBI and TEconomy Partners Life Sciences Industry Hiring Survey 2023.

These investments and commitments implemented by both employers and dedicated employees are taking hold as priorities, with life sciences executives citing:

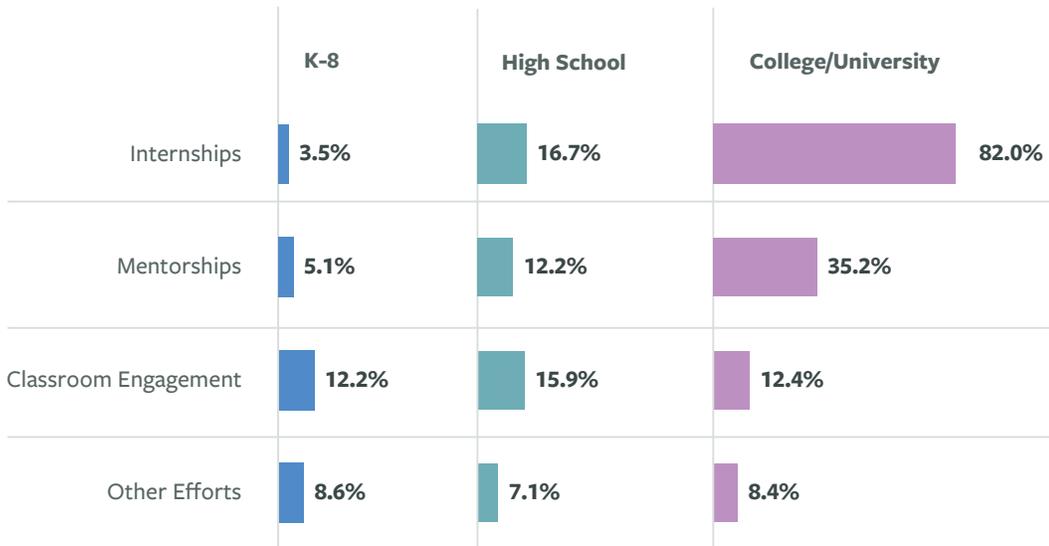
“DEI has been a changing landscape for probably the last two decades, and what I’m finding now for the first time, is that in the last two years, it influenced the decisions that people were making when they decided to come to my company, saying, ‘I had two job offers, and you obviously have a very proactive advanced DEI culture, and so I couldn’t imagine not working at a place like that. So here I am, I chose you.’”

“... our organization has focused a lot more on DEI in 2022 and 2023 than it ever has before. And it’s not just from the need that the market brings, but our employees have really asked that we focus on it, which is wonderful.”

“The sense of belonging is the number one thing that we hear in terms of why people stay and why people go, if they don’t feel like they belong...people need to be able to show up as their whole selves.”

The life science industry’s strong and rising demand for STEM workforce and talent has elevated the importance of engaging with U.S. students, early and often. Life sciences companies across the country are interacting with school districts, individual schools, and postsecondary institutions to advance a more diverse STEM talent pipeline at all schooling levels (Figure 18). Activities and initiatives take on several forms, largely dependent upon the age and education level of students—from visiting classrooms and establishing mentoring relationships for K-12 students, to more in-depth engagement of college and university students in internships and apprenticeships.

Figure 18: Share of Life Sciences Companies Surveyed 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 2023.

One life science company’s varied approaches and positive outcomes related to DEI initiatives:

“For DEI, our company has really championed this. ... for us that’s an advantage, [the] people working here comment on the accepting environment. ... if you have a good DEI program, people respect that [because] they want to feel accepted in the workplace.

We have a lot of internal programs [and have] created a diversity council to oversee diversity initiatives. We have employee engagement groups for various groups, like LGBTQ, Asian Pacific Islander, women at work, etc. We also have multiple leadership trainings around diversity and inclusion, and those are very well attended, [and] we’ve brought in some fantastic speakers. We also have an internal webpage that focuses on diversity and inclusion, so everyone knows what events are going on. We have multiple DEI events that people are encouraged to attend. We’re listening to leaders in other fields about what we can do to improve diversity, equity, and inclusion.

This absolutely impacts recruitment as well. We have people who have said in particular, ‘I’m gay and I feel accepted at [COMPANY]. And I’m telling my friends to come work here.’ We have whole families that all work at [COMPANY] because they’ve been very happy with the environment here. That’s been great. People feel accepted, and I think that’s very important. They feel valued.”

Bringing “A” and “B” into DEI Strategies

The last few years have witnessed a proliferation of initiatives by life science companies designed to build more diverse teams and equitable workplaces. This is occurring across the country, even in states where diversity, equity, and inclusion (DEI) discussions and efforts are highly politicized. Such practices and partnerships have ranged from company efforts to inspire and develop underrepresented students, to an array of recruitment, advancement, retention, and management strategies to augment the contributions of diverse talent. Over time, these efforts have been growing both broader and deeper as many life science companies work to elevate DEI as an integrated practice at all levels of the business, from internal performance metrics, board and executive management, and advocacy, to clinical trials, supply chains and more.

As inclusion awareness has grown in practice, so is a desire to expand and design learning and workspaces that are accessible to all employees, including employees with disabilities both apparent and non-apparent (i.e., neurodivergent persons, people who have experienced trauma and/or social anxiety, and more). This has gained greater momentum with the awareness that many underrepresented individuals are also people with disabilities who face social and environmental barriers that inhibit their ability to access successful careers.

Universal Design for Learning (UDL)

Developed in the mid-1980s with the goal of removing systemic barriers to learning, the Universal Design for Learning (UDL) framework and accompanying Guidelines offer concrete tools and practices relevant for multiple learning and working environments. UDL emphasizes individual variability rather than disability and posits that the barriers to learning are in the design of the learning environment and not in the individual. Importantly, UDL demonstrates that all learners benefit when environments are designed to be accessible to a variety of learning styles and individuals.

One need only substitute the word “employee” for “learner” to see the broad implications of a UDL approach to the workplace. Arguably, some of the best places to work (which also boast some of the highest rates of retention) are places where employees are able to continue to learn, grow and contribute. For employers seeking to develop inclusive and equitable workplaces that retain diverse talent, UDL offers tools that can help inform the types of goals, assessments and training methods that take into account individual variabilities and allow for the widest range of employees to achieve and contribute.

“Access” and “Belonging”

Like Diversity, Equity, and Inclusion advocates, UDL practitioners are quick to point out that while “access” is important for building equitable environments, companies are clear beneficiaries of the contributions of a diverse and varied group of individuals and experiences. “For a long time, the “access” discussion has focused only on accommodating the needs of disabled learners and employees so that they can access the same opportunities as others, and there are so many tools available to educators and employers to assist with this” states Luis Pérez, Disability & Digital Inclusion Lead at CAST. “While this is critically important, what this emphasis misses is the valuable contributions that such individuals can bring to their learning and working environments when barriers in the environment are removed by design.” CAST’s Chief Postsecondary & Workforce Development Officer, Sam Johnston adds, “Diversity in the industry impacts the ways companies make decisions and thus how they innovate. We need to reframe the discourse and practice to not just focus on curing and fixing persons with disabilities, but to consider what such individuals can offer to research, clinical trials, executive decisions, and more.”

Below are just a few examples of where life science companies and researchers are increasingly beginning to address “access” for persons with disabilities:

- The **Down Syndrome Clinical Trials Network** is accelerating research into the unmet medical needs of people with Down Syndrome by including them in clinical trials.
- North Carolina-based **Johnston Community College (JCC)** partners with **TEACCH Autism Program** to provide Autism-specific training for local biopharmaceutical manufacturing partners (including Novo Nordisk and Grifols) with support from the NSF (#2201663)
- **Disability In** corporate members, including many life science companies, are working to achieve disability inclusion and equality through the sharing of best-in-class programming.
- **Disability Solutions** is a leading non-profit consulting and services group focused on bringing real-world, proven solutions to help forward thinking employers create world class hiring and retention programs for people with disabilities.

“Doing the job, even lab-based work, is not the hurdle for people with autism. It’s getting them through the interview with employers that is the barrier. People with autism are one of the most under-employed of all individuals with disabilities.”

JCC Biotechnology Department Chair.

Some DEI practitioners have been or are evolving their strategies towards an increased focus on “Belonging” aimed at building and retaining teams where all employees feel like they are a part of the organization because they are able to contribute, to work with, lead, and/or be led by all employees including others like them. Moving from intention and discourse into measured practice is something that we will continue to discuss with life science executives and explore in the next iteration of this report.

UDL Resources

- **Universal Design for Learner (UDL) Guidelines**
- **How to turn on closed captions in a meeting or webinar**
- Adding **Alt Text in Word** to describe pictures, charts, graphs, and more
- Adding **Alt Text in Google Docs** to make documents/presentations more accessible
- Using in **Styles in Word** to create documents that are easy to navigate
- Using **Styles in Google Docs to create documents that are easy to navigate**
- **Creating descriptive links**
- **Corgi: Digital Graphic Organizers to Help Co-Organize Learning**
- **Create personalized learning environments using Clusive**

About CAST

Since its founding in 1984 as a nonprofit education research and development organization - with a mission of transforming education design and practice “until learning has no limits” - CAST has seeded and grown the field of Universal Design for Learning through creative research and development, strategic partnerships, teacher preparation and support, and international outreach.



Theme: Industry-academic partnerships remain a cornerstone to targeted talent solutions but must continue to evolve and deepen to tackle outsized demand.

The life sciences industry's outsized demand for STEM and skilled talent places a tremendous importance on the pipeline of students graduating from U.S. colleges and universities as well as intentional industry-academic connectivity around a growing workforce development and partnering agenda. In TEconomy's varied life sciences workforce engagements, our team has seen growing emphasis on the need for industry experience for early-career employment opportunities, such as laboratory and biomanufacturing technicians and quality control, as well as the need for deeper relationships with community colleges to develop and expand the industry's production and technician workforce.

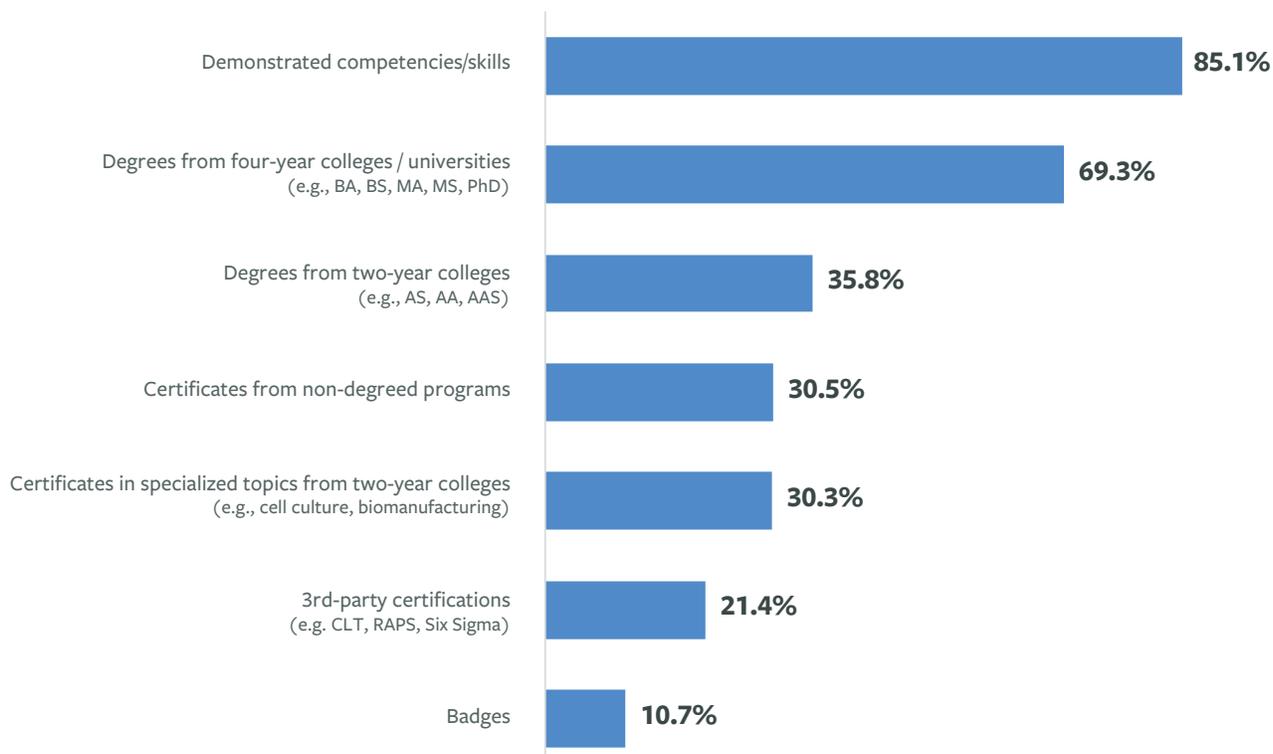
While COVID has limited or required companies to pull back on partnering in recent years, executive interviews and the hiring survey for this national effort reinforce the importance of industry-academic partnerships and strategic collaborations. Companies are emphasizing the following themes or engagements with schools:

- A growing interest and willingness to embrace alternative, often flexible, “stackable” credentials such as certificates, 3rd-party certifications, badges, and others, often in partnership with community colleges and universities (see Figure 19), and often with a manufacturing and increasing biomanufacturing emphasis.
 - While demonstrated competencies (85%) and 4-year and higher degrees (69%) are still seen as “very important” to employers for entry-level technical positions, the survey depicts growing support for a wide array of associate's degrees and alternative, non-degreed credentials, for these hires. This acceptance has grown since the survey from two years ago, most importantly for:
 - Degrees from two-year colleges (36%)
 - Certificates (30%)
 - 3rd-party certifications (21%)
 - Badges (11%)
- To meet early-career experience expectations and requirements, companies are heavily engaged in offering student internships and there is a growing emphasis on apprenticeship programs. As cited in the DEI section, the hiring survey found that an impressive 82% of companies are offering internships to college and university students to advance a more diverse STEM talent pipeline and to provide career connections. At the same time, several companies are participating in apprenticeship programs to achieve similar aims (see callout box below).



- Local and regional talent pipelines only thrive when students are aware of the careers in the life sciences sector. Companies are actively interacting with K-12 students to provide career and industry awareness. The hiring survey found that, even at the high school level, nearly 17% of companies reported offering internship opportunities, 16% of companies are participating in classroom visits, and 12% are providing mentoring relationships. Other activities cited in executive interviews include company tours and visits, equipment donations to high school laboratories, guidance on industry-relevant curriculum, and more.

Figure 19: Share of Companies Surveyed Ranking Various Credentials as “Very Important” when it comes to hiring entry-level technical positions (e.g., lab or engineering technicians, skilled production workers)



Source: CSBI and TEconomy Partners Life Sciences Industry Hiring Survey 2023.

BACE: Moving Toward a Nationally-Recognized Industry Credential

In an effort to address the nation's substantial demand for highly skilled biotechnicians, an industry-recognized credential is gaining traction with increasing numbers of life sciences companies across the country.

The **Biotechnician Assistant Credentialing Exam (BACE)** was launched in 2012 as an industry-recognized assessment delivered through the University of Florida's **Biotility** program. It is designed to evaluate core skills and knowledge that are defined by the bioscience industry for technician level-positions. The BACE credential was developed through engagement with industry representatives and is reviewed and updated annually with oversight from a national advisory board.

BACE is already on the approved lists of industry-recognized credentials of twelve states and the District of Columbia that recognize the value of applicants who have demonstrated mastery of industry-defined competencies and skills and can quickly be trained on company-specific protocols.

In June 2021, The Center for Global Health Innovation (CGHI) in Georgia was awarded a \$1.2M grant from the National Science Foundation (NSF) to expand BACE to an additional five states to accelerate the development of the bioscience workforce, with the potential to establish the BACE credential as the national industry-recognized system for entry-level biotechnicians.

Some milestones to date:

- BACE is currently offered at 158 exam sites in 29 states.
- Over 5,500 individuals have earned the BACE credential.
- Credential earners are employed by diverse industry sectors, including biopharma, pharma, agriculture, dietary supplements, medical devices, and food science.



Life science industry executives on these industry-academic themes:

“We’ve had to rely heavily on bringing in people who are coming out of the four-year university programs. What we’re finding is a lot of these people want to work in industry, but their long-term ambition isn’t just to be in manufacturing. They want to go into more scientific roles that may be in R&D or process development or other functional areas. So, we are trying to also build more of a connection with local community colleges to develop other pathways of individuals who aren’t coming out with a four-year degree or a master’s degree, because we want to extend the life of someone in manufacturing. We’d like them to spend their expertise growing into manufacturing operations.”

“We had 22 interns last summer. We work with local universities, community colleges, HBCUs, [LOCAL ARMY BASE] to increase our talent outreach and [it] has been very successful. We have started apprenticeship programs including [programs] for veterans.”

“On the frontline employee side, we have partnerships with most of the local school districts from [LOCAL DISTRICTS], that focus on STEM. Typically in the spring, they’ll bring through a lot of juniors and seniors and we’ll do educational tours around STEM. We also go to the schools and have our engineers do demonstrations around the products that we make. And then typically during spring break, we’ll have job shadowing, we’ll have, maybe 50 of them come in on different spring break rotations for two to three weeks. We also have partnerships with the local school districts around special education students that are looking for work through their transitions program.... And then we also have partnerships with the [LOCAL COMMUNITY COLLEGE], there’s a specific manufacturing program there.”

“We have investments in early STEM programs in a few high schools. We have a focused objective of increasing entry-level, black and Latinx talent. We’re making some inroads there, but we believe that investing in middle schools and high schools in different underrepresented communities is going to help build that pipeline and overall make it easier for inroads to biotech careers for black and Latinx talent.”

“For our [entry-level] biomanufacturing technicians, GMP experience is vital and we’re partnering with [LOCAL COMMUNITY COLLEGE] Certificate Program ... it’s in the early stages but so far working well.”

Meeting Industry’s Critical Talent Demand through Apprenticeship Partnerships

As key segments of the life science industry continue to experience outsized demand for qualified talent, a number of innovative apprenticeship programs are taking root across the country to meet this growing charge.

Apprenticeship programs to bolster the industry’s talent pipeline

Relatively new in the bioscience sector, apprenticeships offer opportunities for new entrants in the field - many of whom do not have a 4-year degree - to embark on an accelerated pathway to meaningful careers with sustainable wages. With employers determining the skills needed to do the job, apprenticeships focus on competencies rather than degrees. Participating companies gain access to work-ready talent with skills that have been tailored to meet their difficult-to-fill positions – an opportunity, essentially, to “grow their own.” They also gain a leg-up on efforts to diversify their teams beyond traditional and limited recruitment efforts by offering a substantive on-the-job experience for underrepresented talent supported by industry and academic partners.

The urgent need for such training models has been validated by a growing focus in state and federal grants and corporate sponsorships earmarked to meet this growing industry demand. We highlight a few breakthrough life science apprenticeship programs below:

MassBioEd Life Science Apprenticeship Programs

Since 2021, in response to pronounced demand by the Massachusetts life science sector, MassBioEd - the nonprofit offspring of the state life sciences industry association - has created three successful registered apprenticeship programs:

- **Biomanufacturing Technicians (BMTs)**
- **Clinical Trial Associates (CTAs)**
- **Laboratory Support Specialists (LSSs)**

Designed with life science employer partners, universities and professional associations, these programs offer one year of paid work experience and an accelerated pathway for work-ready talent to transition into meaningful employment through combined technical and soft skills training, on-the-job experience, and income support.

Over 20 life science companies (and over 50% of them, for subsequent cycles and/or programs) have stepped forward to serve more than 100 apprentices in one or more of the programs, which boast the following success metrics:

- 95% of Apprentices completed classes.
- 46% of Apprentices were unemployed prior to enrollment.
- For those employed, the average wage increased 33% in the first month of on-the-job training.
- 64% of the Apprentices are People of Color.
- The average age of Apprentices is 32.
- 90% of Apprentices who completed the program were offered permanent positions.

Pre-apprenticeship programs to attract young talent to the industry

A new program model seeks to address the often-cited concern of life science executives and academics alike, who lament the limited exposure among younger students to the vast and rewarding career opportunities in the life sciences, leading to a weakened pipeline of domestic and diverse talent for the industry. Pre-apprenticeship programs seek to attract new talent to the industry through early exposure to industry-relevant training for high school students.

Some programs of mention:

Bio-Flex

A new and innovative project in Los Angeles County promises to deliver an effective and proven employer-directed career development Pre-Apprenticeship program that, along with its Registered Apprenticeship Programs, aim to attract new talent to the bioscience industry. Formed with a consortium of employers, educators, professional and community-based organizations, the Bio-Flex Pre-Apprenticeship programs seek to provide an important resource to employers while increasing job seekers' access to well-paid careers in an effort to create a flexible yet structured career pathway for high school students who might otherwise have challenges accessing this industry.

Commandeered by the LA County South Bay Workforce Investment Board (SBWIB), the Bio-Flex programs target high school students, college students, veterans, underserved populations, new hires, and incumbent workers to connect them to a rewarding career pathway in the life sciences.

Among the apprenticeships registered by the SBWIB with the federal Department of Labor and CA Department of Apprenticeship Standards (DAS) are: **Bio-Production Technician; BioMedical Maintenance Technician; and BioMedical Quality Assurance Specialist**. In addition, a Clinical Laboratory Scientist has been registered by the Department of Labor and will soon be registered by the CA DAS.

FOOD SAFETY Pre-Apprenticeship/Apprenticeship Career Pathway

An innovative pre-/apprenticeship pathway addresses the critical need for compliance with new safety requirements under the Food Safety Modernization Act (FSMA). Funded by a combination of federal, community college and private sector sources, this pathway provides training in the life science industry's high-demand areas of Quality & Regulatory compliance, Good Manufacturing Practices (GMP) and more, and also holds promise for the industry's burgeoning "cultured meat" segment.

Over 50% of food workers are younger, bilingual women who are often burdened with compliance responsibilities, but possess no corresponding authority or training. This pathway provides the food industry with employees who are adept with food safety and compliance skills and knowledge. Administered by **Food Smart Strategies International**, the following programs are offered nationally:

- **The DAS-Registered Pre-Apprenticeship program** in Food Safety provides training in Quality & Regulatory Compliance and Food Safety. Pre-apprentices earn community college credits in Food Safety, and Quality & Regulatory compliance, and badges in Good Manufacturing Practices (GMP) and Sanitation Standard Operating Procedures (SSOPs). Successful graduates of the Food Safety Pre-Apprenticeship program may advance to:
 - **The DAS-Registered full Apprenticeship program in Food Safety**, which provides apprentices with up to 3 years of paid 'on the job training' (OJT) while earning food industry certifications and the **ASQ Certified Quality Improvement Associate (CQIA) certificate**, the foundational Quality certification. Upon completion, apprentices can understand, implement, and maintain safety standards at food facilities, including writing and implementing actual FSMA plans and receive the **FDA Preventive Controls Qualified Individual (PCQI)** certification, making them true Food Safety & Compliance Officers.

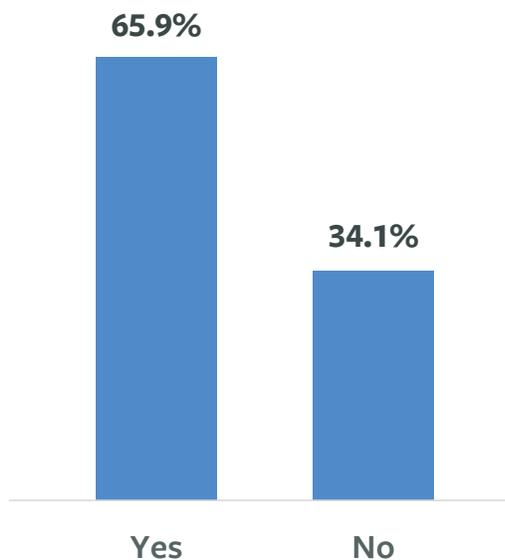
Theme: Remote and hybrid work arrangements appear to be here to stay; however, there is an underlying “push-pull” dynamic between employers who are often reluctant to fully embrace remote or hybrid arrangements, versus employees who resoundingly prefer these alternative arrangements.

In the hiring survey, two-out-of-three (66%) life sciences companies report that they are implementing, expanding, or considering implementing remote work options for at least some employees (Figure 20).

“With COVID, how we worked did change.”
-Life Sciences industry executive

Interviews with company executives, however, indicate these arrangements continue to differ for the manufacturing and lab-based workforce segment, whose roles require them to be on-site, versus those in supporting roles and business functions where hybrid arrangements are much more prevalent. Both segments represent a large portion of the industry’s workforce, resulting in a continued mixed implementation of remote and hybrid arrangements, even within a single company’s operations.

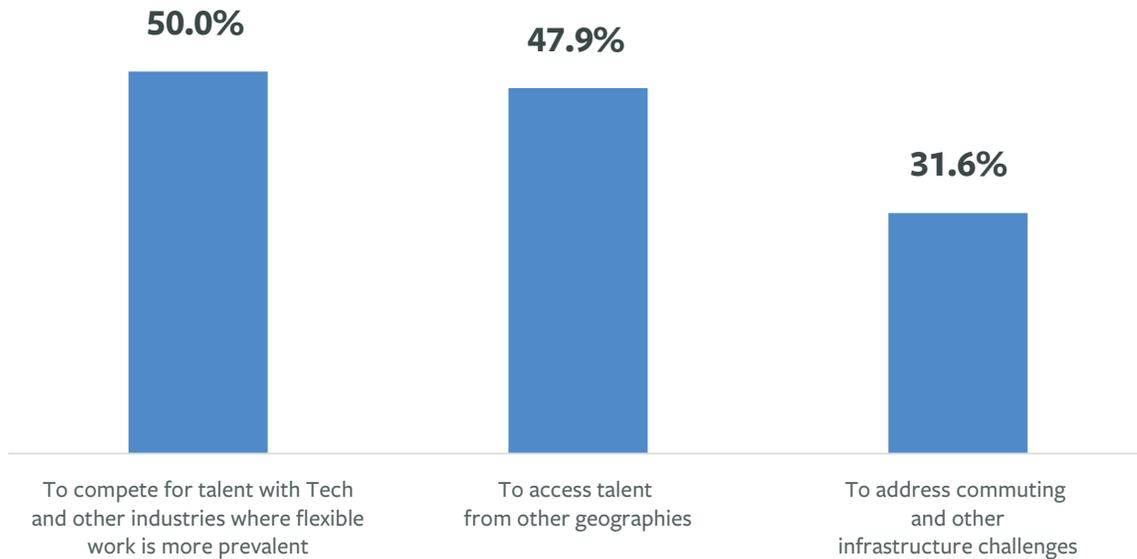
Figure 20: Share of Companies Surveyed Reporting Remote Work Options—*Is the organization implementing, expanding, or considering implementing, remote work options for some employees?*



Source: CSBI and TEconomy Partners Life Sciences Industry Hiring Survey 2023.

Companies are advancing remote work models for varied and sometimes overlapping reasons: competition for talent with other industries; accessing talent from other geographies; addressing commuting and other infrastructure challenges; as well as the continued realities of the COVID-19 pandemic—cited as the primary “other” option in the survey (Figure 21).

Figure 21: Reasons Cited for Remote Work Policies (Share of Companies with Remote Work)



Source: CSBI and TEconomy Partners Life Sciences Industry Hiring Survey 2023.

Insights from executive interviews indicate there is an underlying “push-pull” dynamic between employers who are often reluctant to fully embrace remote or hybrid arrangements, versus employees who resoundingly prefer these alternative arrangements. At the extreme ends, some employers are pushing for more on-site or “return to office” policies, while new hires and job candidates are requesting fully remote arrangements.

From the interviews, examples of employer-cited benefits of remote work:

- As discussed earlier in the report, companies are benefiting from levelling the geographical playing field for talent recruitment for certain positions.
- Many companies cite no loss in productivity among remote or hybrid workforce.
- Employees clearly like and continue to want/prefer the flexibility of remote/hybrid arrangements, helping employers attract and retain talent.

Executives citing benefits of remote and hybrid work arrangements:

“In many ways, I think we were, I’ll say, pleasantly surprised during the years that the teams were remote, how the organization was able to maintain pretty high levels of productivity. As teams transition back, one of the questions that’s top-of-mind is how do we both maintain that productivity, but leverage the in-person venues to drive culture and drive associate engagement? Despite what was a high level of productivity during COVID, that piece around culture was more of a challenge.”

“Learning to live with COVID meant the ability to work remotely and have more flexibility in our workday as a result.”

“One of the things that’s been really challenging for us is regulatory affairs roles, some quality roles. Not all, but those types of roles, can be done a hundred percent at home and really in any location. [To address those challenges] we have really flexed in certain areas like that.”

From the interviews, examples of employer-cited challenges of remote work:

- How to optimize the limited time spent in office under hybrid arrangements to maximize personal interactions and to be, as one employer put it, “in person with purpose.”
- Connecting employees who in the past would know each other personally, professionally, but now do not under remote arrangements.
- The relatively new challenges of managing teams in a remote environment requires, as one executive put it, “deft management”.
- Advancing innovation is challenging under these new arrangements, according to some employers, and thus requires new approaches and learning to innovate remotely.
- In some instances, companies are finding that employees have moved out of region or out of state since working remotely, creating transition challenges.
- The flip side to a more geographically level playing field is that employers sometimes lose local life sciences talent to more distant locales.

Executives citing challenges of and adapting to remote and hybrid work arrangements:

“[Remote employees] don’t always know one another. Others are going to be on site. They want to make the most of their time on site, so we’re trying to provide resources. We’ve recently designated anchor days at different sites, so that if you come in on those days you can meet other people and maximize that in-person interaction.”

“When you design medical devices, you do that together, it’s very hard to do it in a remote fashion. So, we have to ‘learn how to innovate’, if that makes sense. And we figured out new ways of doing that [but] It’s still not as good as when you’re all together.”

“Now, where [remote work] got difficult is when employees started to move themselves to different places away from those centers of operation. It was all fine while the pandemic was going on, but then when things started to come back, [and] we’re trying to get people to come back to the offices, they’re like, ‘well, I moved to Colorado. I don’t want to come back to California.’ So, we created policies that have remote employee designations.”

“For those that worked for us for many years and then we let them go remote, we’ve seen no change in activity and quality of work. But if you’re a new hire into a remote environment, it’s very, very hard.”

“We lost some top talent because they were recruited away by companies that were not necessarily based in [OUR STATE] but [who allowed them to work] remotely. The competition is coming from local start-ups and other large companies that are not necessarily located in [OUR STATE].”

A National Summit on Envisioning the Next Bioscience Workforce

In June of 2023, InnovATEBIO convened thought leaders from industry, academia, and government with an aim to develop a workforce that will maintain U.S. leadership in all phases of the life sciences endeavor. Held at the National Academies of Science and funded by the National Science Foundation and industry sponsors, the *Envisioning the Next Bioscience Workforce Summit* consisted of visionary speakers who forecasted the new wave of discoveries from the industry’s biopharmaceutical, biomedical device, bioprocessing, bioengineering, synthetic biology, and food production subsectors, and their subsequent implications for workforce education and training. Over 200 persons attended the two-day summit, the first-of-its-kind multi-stakeholder assembly convened by InnovATEBIO and the Coalition of State Bioscience Institutes, to address this important issue.

Recognizing that the industry’s workforce challenges are too urgent for individual stakeholders to address alone, a key aim of the summit was to advance the development of ecosystem partnerships within individual states to address their region’s specific talent needs. After hearing about best practices and helpful resources on such topics such as ecosystem collaboration, industry-academic partnerships (including apprenticeships), career pathway development, industry credentials and DEIA, **nineteen state task forces** – comprised of industry, industry association, academic and governmental representatives – were tasked to work together to develop action plans to address the human resources needed over the next five years to capitalize on emerging life science technologies in their states.

InnovATEBIO and its partners will continue to support the work of the state ecosystem task forces in the aftermath of the summit to both broaden and deepen this important work.

Conclusion

The life sciences workforce trends and themes identified in this sixth national report might best be summarized as “evolving”. While this innovative industry is consistently and dramatically changing due to breakthrough discoveries, disruptive technologies, and leading-edge scientific advancement, so too are its companies, workplaces, and employees, who, with their associated expertise and high-demand skills, report to work each day at U.S. life sciences companies, whether in person and/or remotely.

- The life sciences industry is evolving to increasingly leverage digital technologies and applications and associated know-how, both with respect to R&D and discovery, as well as product design and development and new modes of production.
- The workplace is also evolving with respect to still-new hybrid work arrangements and the challenges and opportunities of both sourcing and managing talent remotely.
- Corporate culture is evolving as the growing prioritization and emphasis on diversity, equity, inclusion (access and belonging) solidifies and matures.
- Industry-academic partnerships are evolving in recognition of the shifting need for flexible and competency-driven approaches, with increasing numbers of companies embracing two-year degree and other credentialing programs, while still seeking highly skilled talent from STEM bachelor’s and graduate programs.

All aspects of this evolution have direct implications for workforce and talent development, sourcing, retention, and necessary and effective corporate and workforce alignment.

Evolution requires adaptation, and life science companies continue to adjust to the aftermath and upheaval of the pandemic, continued rapid growth, ground-breaking discoveries, new regulations and more. Transitional dynamics, however, are not without challenges. This report seeks, in part, to shed light on this evolution and its implications for talent dynamics going forward—not only for life science companies, but also for students, academic, government and other stakeholders, as well as for the incumbent life science employees who are experiencing this dynamism first-hand—as all respond to a booming industry’s demand for talent.

Appendix

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
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.

Subsector Talent Demand Snapshot: Agricultural Feedstock & Industrial Biosciences

Figure A-1: Trend in Industry Job Postings, 2019-22

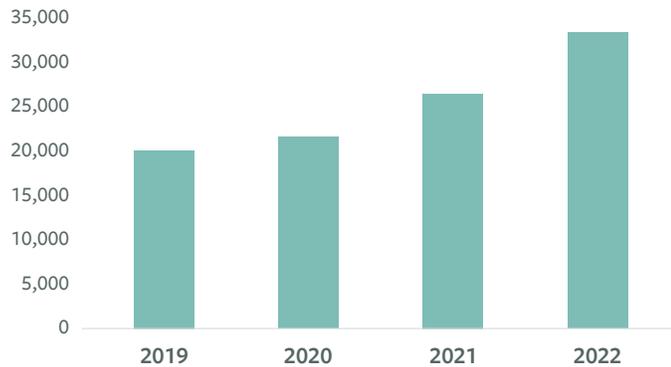


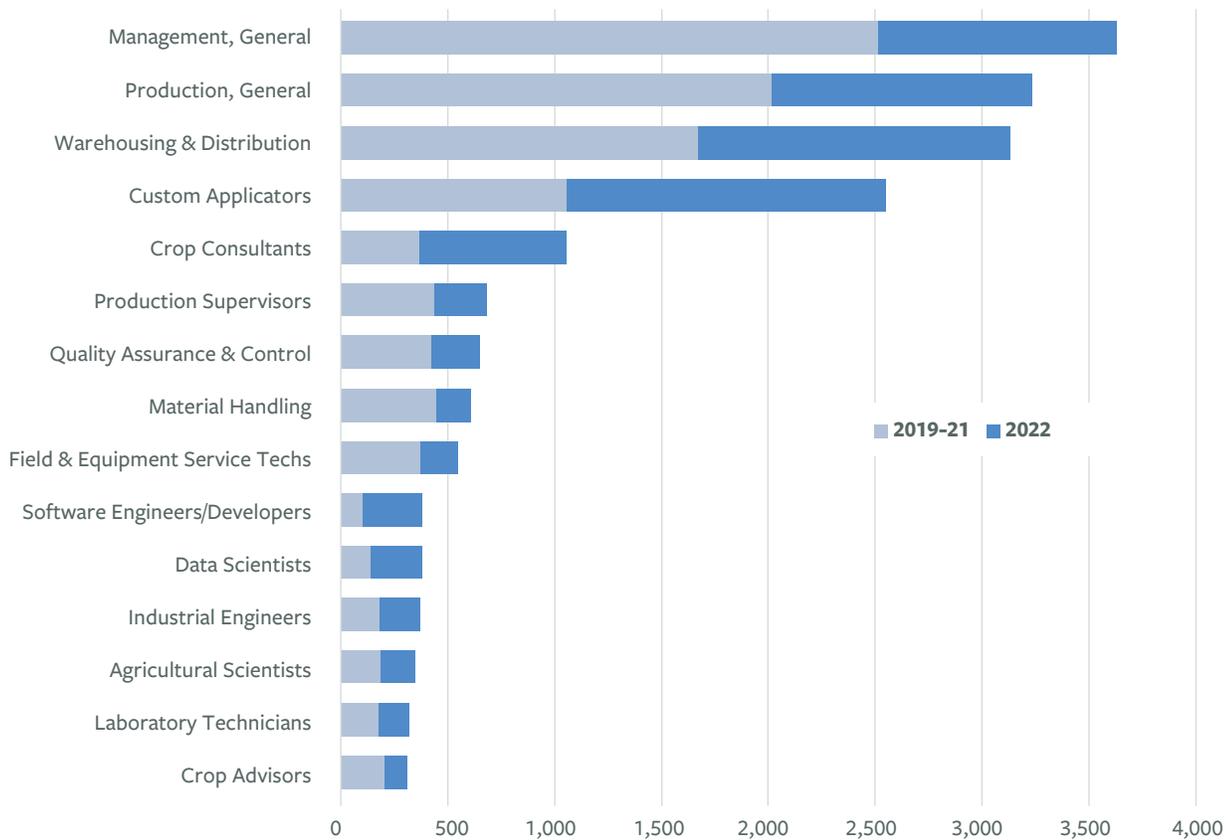
Figure A-2: Leading Hiring Companies, 2019-22



Source: TEconomy Partners' analysis of Lightcast JPA Database, 2023.1 data set.

Source: TEconomy Partners' analysis of Lightcast JPA Database, 2023.1 data set.

Figure A-3: Leading Technical and Production-Related Job Titles in Agbiosciences Industry Job Postings*, 2019-22



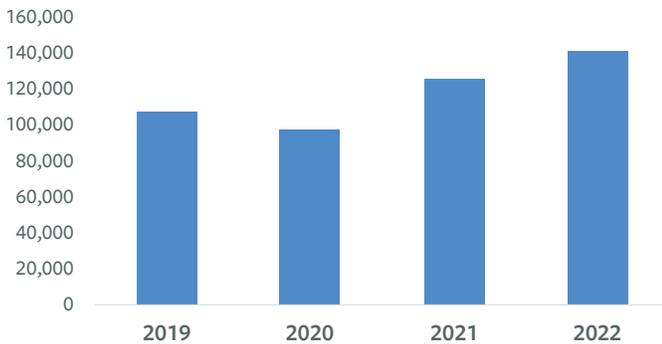
Note: Lightcast limits information on job titles and corresponding numbers of postings to the top 1,000, limiting the ability to provide comprehensive totals by categories.

***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 sales and other business functions to focus on more actionable intelligence for life sciences-specific education and workforce development.

Source: TEconomy Partners' analysis of Lightcast JPA Database, 2023.1 data set.

Subsector Talent Demand Snapshot: Bioscience-Related Distribution

Figure A-4: Trend in Industry Job Postings, 2019-22



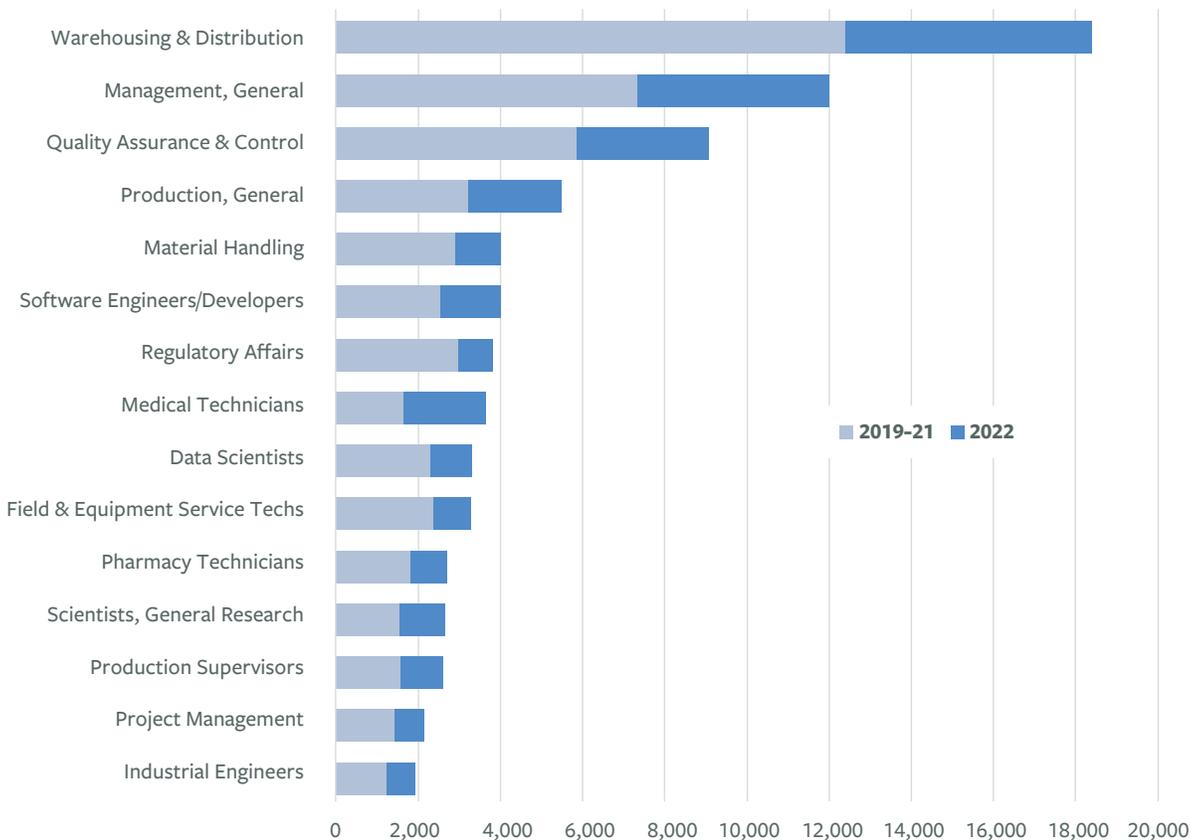
Source: TEconomy Partners' analysis of Lightcast JPA Database, 2023.1 data set.

Figure A-5: Leading Hiring Companies, 2019-22



Source: TEconomy Partners' analysis of Lightcast JPA Database, 2023.1 data set.

Figure A-6: Leading Technical and Production-Related Job Titles in Bioscience Distribution Industry Job Postings*, 2019-22



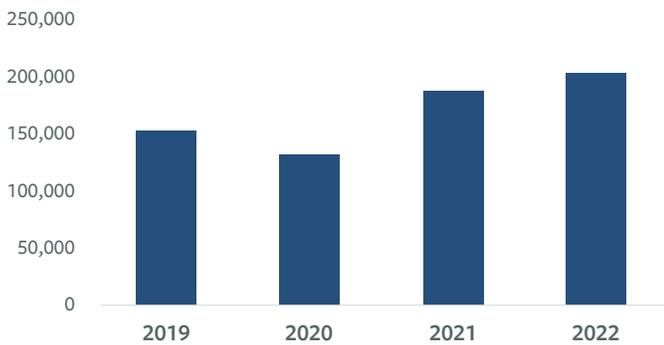
Note: Lightcast limits information on job titles and corresponding numbers of postings to the top 1,000, limiting the ability to provide comprehensive totals by categories.

***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 sales and other business functions to focus on more actionable intelligence for life sciences-specific education and workforce development.

Source: TEconomy Partners' analysis of Lightcast JPA Database, 2023.1 data set.

Subsector Talent Demand Snapshot: Medical Devices & Equipment

Figure A-7: Trend in Industry Job Postings, 2019-22



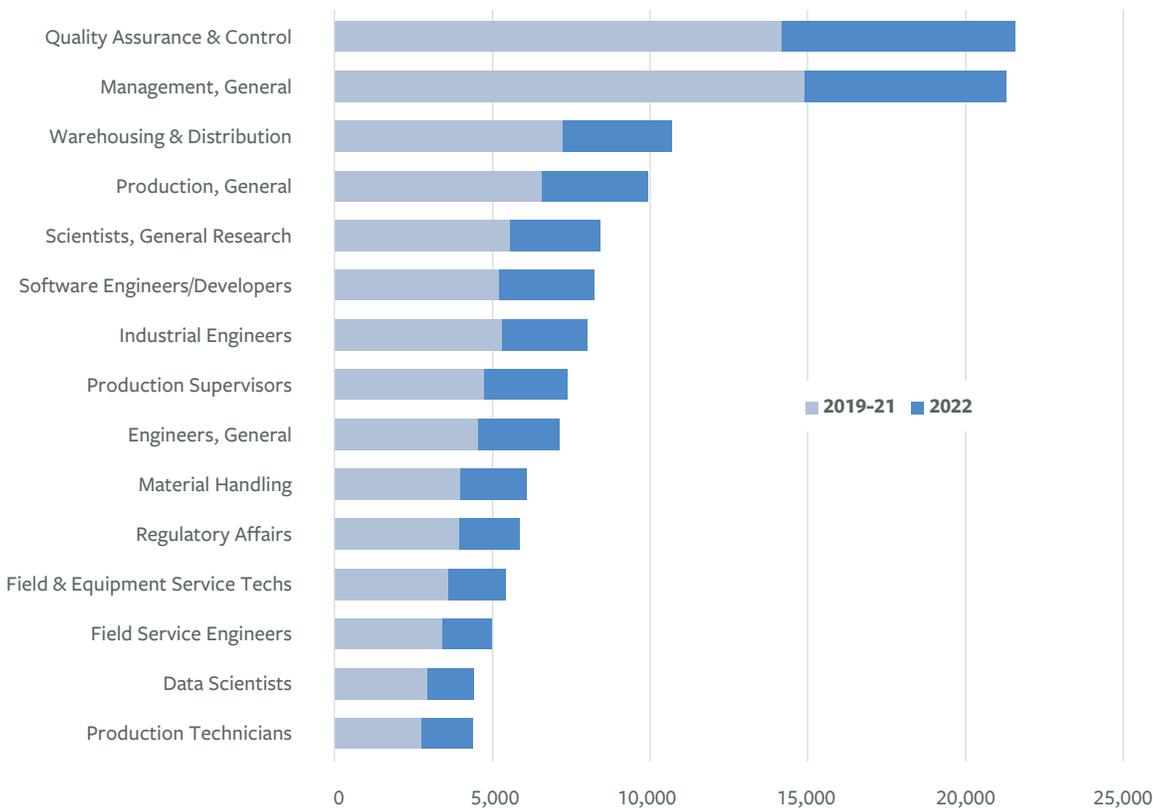
Source: TEconomy Partners' analysis of Lightcast JPA Database, 2023.1 data set.

Figure A-8: Leading Hiring Companies, 2019-22



Source: TEconomy Partners' analysis of Lightcast JPA Database, 2023.1 data set.

Figure A-9: Leading Technical and Production-Related Job Titles in Medical Devices & Equipment Job Postings*, 2019-22



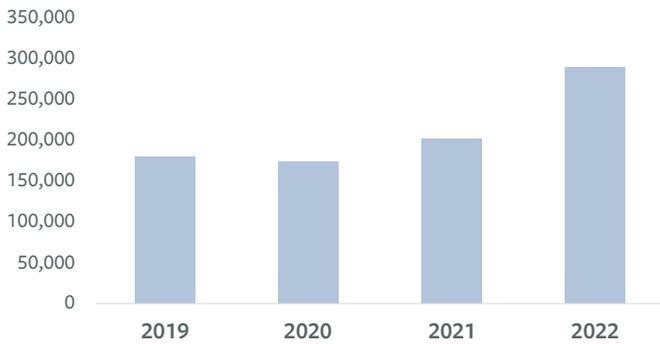
Note: Lightcast limits information on job titles and corresponding numbers of postings to the top 1,000, limiting the ability to provide comprehensive totals by categories.

***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 sales and other business functions to focus on more actionable intelligence for life sciences-specific education and workforce development.

Source: TEconomy Partners' analysis of Lightcast JPA Database, 2023.1 data set.

Subsector Talent Demand Snapshot: Pharmaceuticals

Figure A-10: Trend in Industry Job Postings, 2019-22



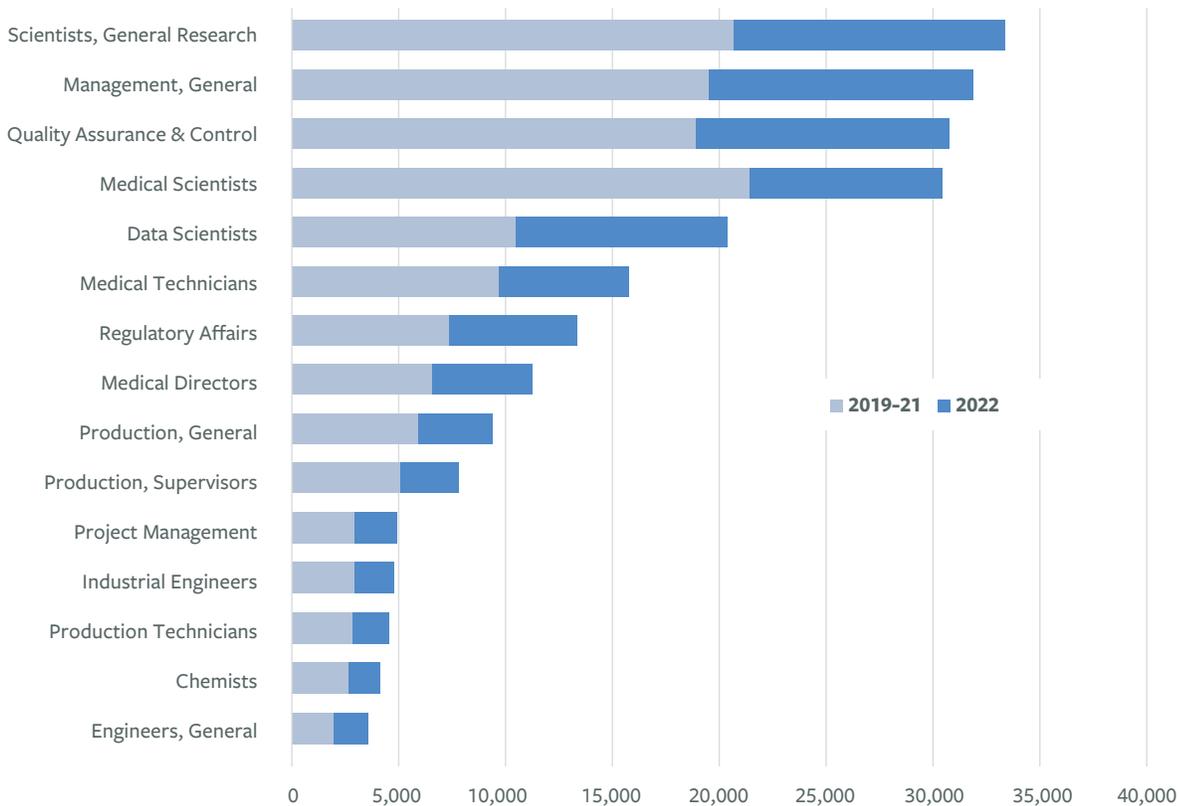
Source: TEconomy Partners' analysis of Lightcast JPA Database, 2023.1 data set.

Figure A-11: Leading Hiring Companies, 2019-22



Source: TEconomy Partners' analysis of Lightcast JPA Database, 2023.1 data set.

Figure A-12: Leading Technical and Production-Related Job Titles in Pharmaceutical Manufacturing Job Postings*, 2019-22



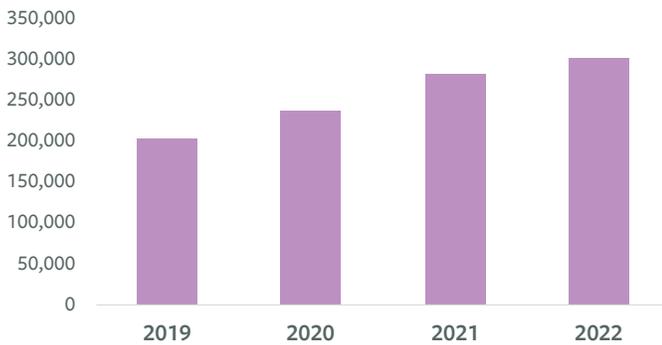
Note: Lightcast limits information on job titles and corresponding numbers of postings to the top 1,000, limiting the ability to provide comprehensive totals by categories.

***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 sales and other business functions to focus on more actionable intelligence for life sciences-specific education and workforce development.

Source: TEconomy Partners' analysis of Lightcast JPA Database, 2023.1 data set.

Subsector Talent Demand Snapshot: Research, Testing, & Medical Labs

Figure A-13: Trend in Industry Job Postings, 2019-22



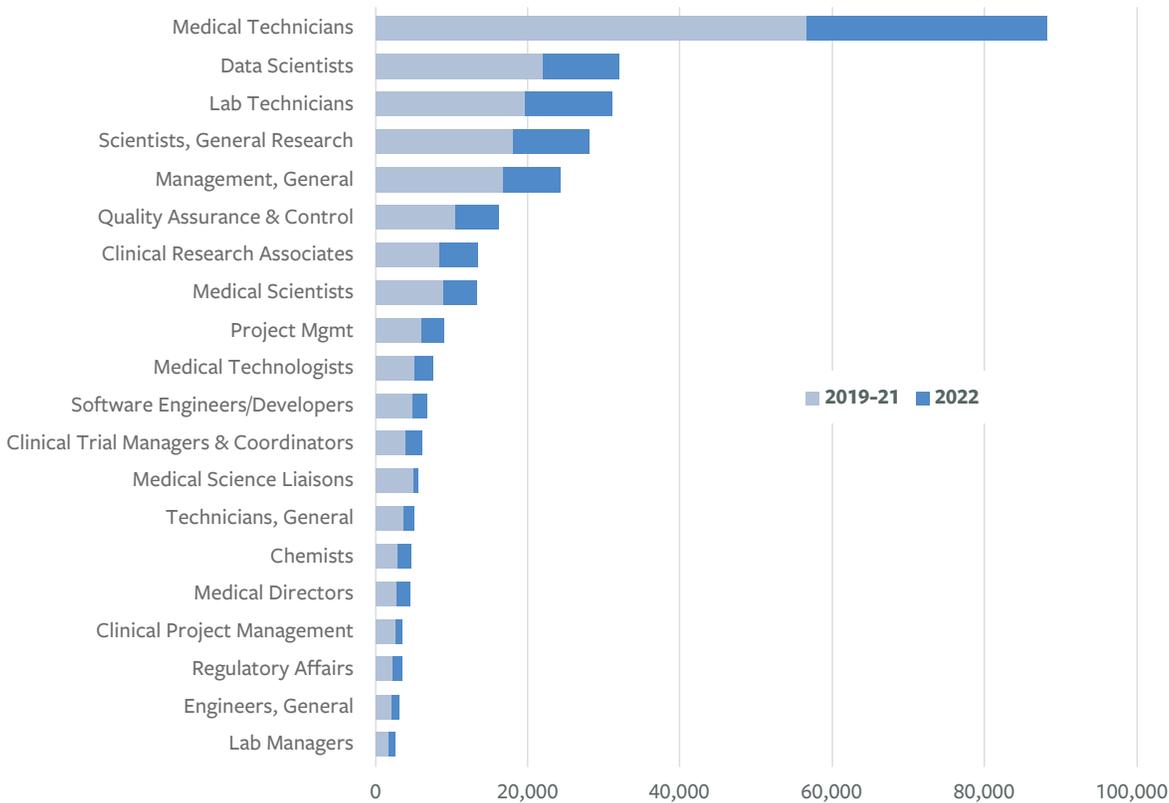
Source: TEconomy Partners' analysis of Lightcast JPA Database, 2023.1 data set.

Figure A-14: Leading Hiring Companies, 2019-22



Source: TEconomy Partners' analysis of Lightcast JPA Database, 2023.1 data set.

Figure A-15: Leading Technical and Production-Related Job Titles in Research, Testing, & Medical Labs Job Postings*, 2019-22



Note: Lightcast 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 sales and other business functions to focus on more actionable intelligence for life sciences-specific education and workforce development.

Source: TEconomy Partners' analysis of Lightcast JPA Database, 2023.1 data set.

Industry Hiring Survey

A national life sciences industry hiring survey was conducted across 18 states and Puerto Rico in early 2023 and completed by nearly 700 companies. The survey was designed to capture data and information on recent and anticipated hiring and related workforce dynamics; wage and salary increases; remote work policies; difficult-to-fill positions; future hiring plans; workforce diversity initiatives, and more. 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. Responses were received 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	# of Companies	% of Companies
Research, Testing, and Medical Laboratories	239	35.6%
Drugs and Pharmaceuticals	211	31.4%
Medical Devices and Equipment	116	17.3%
Industrial Biotech	64	9.5%
Agricultural Feedstock and Chemicals	8	1.2%
Bioscience-Related Distribution	3	0.4%
Other Biosciences	30	4.5%
Total	671	100.0%

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

Employment Size	# of Companies	% of Companies
1 to 25	173	25.8%
26 to 50	44	6.6%
51 to 150	66	9.8%
151 to 500	49	7.3%
501 to 1,000	19	2.8%
1,001 or more	82	12.2%
Don't Know/No Response	238	35.5%
Total	671	100.0%

Life Sciences 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 in early 2023. Executives from life science companies were interviewed by representatives from the partner 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: Industry Hiring Survey – Count of Respondents by Major Life Sciences Industry Subsector

Industry Subsector	# of Companies	% of Companies
Drugs & Pharmaceuticals	75	41%
Research, Testing, & Medical Labs	54	29%
Medical Devices & Equipment	38	21%
Other Biosciences	12	6%
Agricultural & Industrial Biosciences	4	2%
Bioscience-related Distribution	2	1%
Total	185	100%

Table A-5: Industry Hiring Survey – Count of Respondents by Employment Size

Employment Size	# of Companies	% of Companies
1 to 25	49	26%
26 to 50	17	9%
51 to 150	26	14%
151 to 500	33	18%
501 to 1,000	15	8%
1,001 or more	45	24%
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.

CSBI State and Regional Partner Organizations Participating in this Effort

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

State/Territory	Partner Organization
Arizona	Arizona BioIndustry Association (AZBio)
California	Biocom California Institute
California	California Life Sciences (CLS)
Georgia	Center for Global Health Innovation / Georgia Bio
Illinois	Illinois Biotechnology Innovation Organization (iBIO)
Maine	Bioscience Association of Maine (BIOME)
Maryland	Maryland Tech Council
Massachusetts	Massachusetts Biotechnology Education Foundation (MassBioEd)
Michigan	MichBio
Montana	Montana BioScience Alliance
New Jersey	BioNJ
New York	NewYorkBIO
North Carolina	North Carolina Biosciences Organization (NCBIO)
Ohio	Ohio Life Sciences
Oregon	Oregon Bioscience Association
Puerto Rico	Industry University Research Center, Inc. (INDUNIV)
Tennessee	Life Science Tennessee
Texas	Texas Healthcare and Bioscience Institute (THBI)
Utah	BioUtah
Washington	Life Science Washington

