

2018 LIFE SCIENCE WORKFORCE TRENDS REPORT



The life science industry continues to fuel breakthrough discoveries that are having profound impacts around the globe. In addition to improving health, securing a more sustainable food supply and promoting cleaner energy, the life science sector is an economic driver, accounting for



up from 1.66 million jobs in 77,000 companies in 2014².

Behind this innovation and growth is a dynamic industry shaped by disruptive technologies, a growing global marketplace for healthcare, and a complex regulatory environment. To ensure their companies' success, life science employers must navigate these forces, and identify, secure, develop and retain necessary talent.

Building on the success of its three prior workforce trends reports³, the Coalition of State Bioscience Institutes' (CSBI's) 2018 Workforce Trends Report provides insights into some of the most pressing talent needs of the life science industry, as well as a few key trends that are driving talent acquisition. The report cites actions that industry and academic partners can take to help ensure that employers are recruiting the best employees, sustaining growth and maintaining the nation's competitive advantage in the life sciences.

¹TEconomy/BIO State Bioscience Industry Report 2018

²TEconomy/BIO State Bioscience Industry Report 2016 / CSBI Life Sciences Workforce Trends Report 2016

³CSBI Life Sciences Workforce Trends Report 2016, 2014, and CSBI and Booz & Company, Demand for Talent: Current & Projected Workforce Trends in the Life Science Industry 2013



METHODOLOGY⁴

This biennial snapshot presents insights and data from across the United States including Puerto Rico:



INTERVIEWS

with over 135 life science executives, who address current and future business priorities/capabilities and their implications for workforce and training, conducted between January and April 2018.



SURVEY

responses from 354 life science industry hiring managers and HR professionals on workforce composition and hiring challenges conducted between January and April 2018.



JOB POSTINGS

Quantitative analysis of over 53,400 job postings for life science technical jobs nationwide, drawn from representative industry NAICS codes, using Burning Glass Technologies from January to December 2017. Non-technical positions in the industry, such as sales, accounting, purchasing, etc., are not included in this sample.

The companies interviewed and surveyed span the **five major subsectors** as defined by the Biotechnology Innovation Organization (BIO)⁵:

1 Agriculture, Feedstock and Chemicals

2 Drugs and Pharmaceuticals

3 Medical Devices and Equipment

4 Research Testing and Medical Laboratories

5 Bioscience-related Distribution

⁴ Interviews and job postings data from Coalition of State Bioscience Institutes (CSBI) member states included in this report may also have been combined with additional states' data to produce individual state reports. As appropriate, some of the analyses, recommendations and quotes can be found in both this national and individual state reports. For more details on methodology, see www.csbioinstitutes.org.

⁵ TEconomy/BIO

*5 major
subsectors*



1



2



3



4



5

JOB POSTINGS STRONG AFTER SLIGHT DECLINE

The total number of national life science job postings from 2010 to 2017 (Figure 1) indicate steady total job growth from 2010 to 2013, with a spike in job postings in 2015 before declining in 2016 and 2017. Despite the recent decline, the 2017 postings remain higher than any year between 2010 and 2014. Technical life science postings depict a similar trend, with a spike in 2016 before falling slightly in 2017 (Figure 2). Life science jobs still represent an impressive percentage of total job postings across all US industries (1.12%) (data not shown).

Number of Life Science Industry - Total Job Postings, 2010-2017

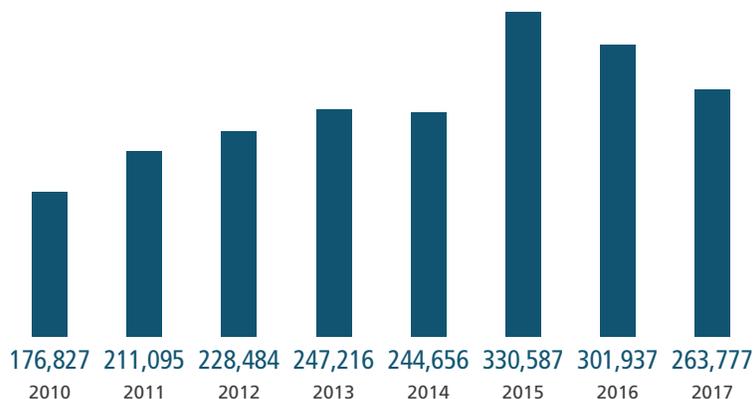


Figure 1 – Source: Burning Glass Technologies

Number Life Science Industry - Total Technical Job Postings, 2010-2017

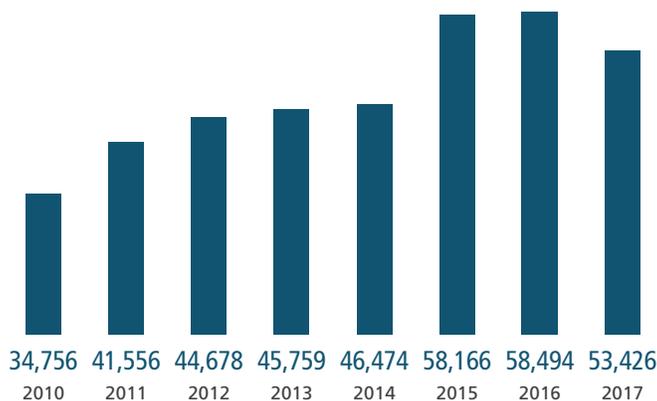


Figure 2 – Source: Burning Glass Technologies

For the technical job postings noted in Figure 2, during the two-year period between January 2016 and December 2017, the majority of the job postings (62%) required a Bachelor's degree. Almost one-quarter of the technical jobs posted during that time were available to individuals with less than a Bachelor's degree (Figure 3).

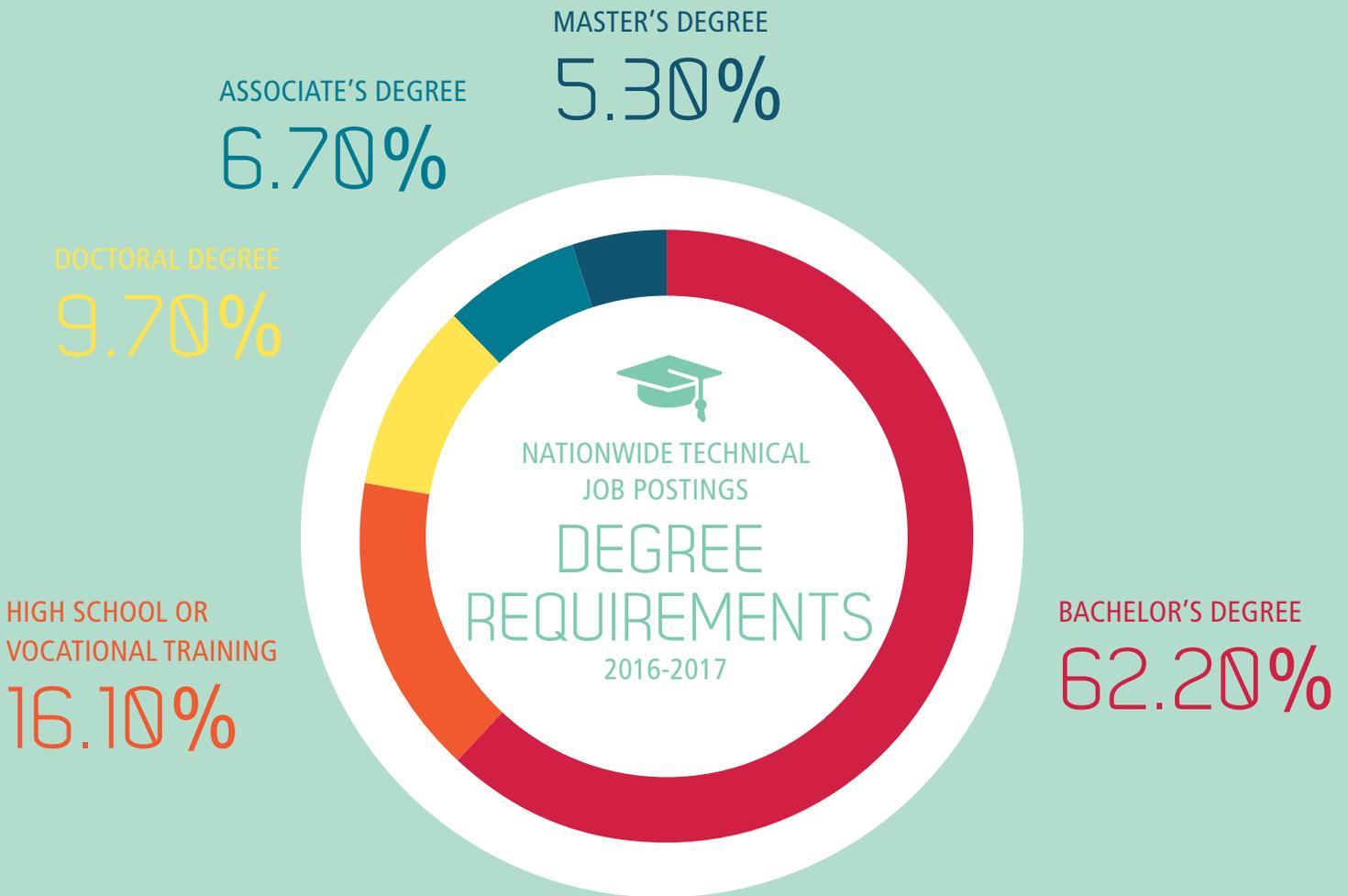


Figure 3 – Source: Burning Glass Technologies

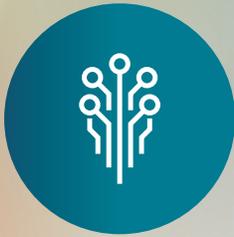
AN INDUSTRY IN FLUX

Throughout its existence, the life science industry has been characterized by continual flux as a result of the fluid global and regulatory environments in which it operates, the breakneck speed of new discoveries, evolving business models, and process innovations aimed at reducing the long development timelines from discovery to commercialization. While technical expertise remains important, employers also seek people who can navigate these complex external and internal changes while driving innovative product development and commercialization. New and varied regional challenges have also emerged as companies search for talent. Some companies are addressing their workforce challenges through innovative and targeted partnerships and creative business models.

"In all phases of our business we see rapidly evolving practices and skill needs."

"Companies don't exactly hire for one set position anymore, because positions and tasks associated with a position will change. So what we are really looking for in a candidate is someone we surmise will be able to learn and grow skills as the nature of his or her work changes."

When asked about key developments that are impacting their current and pipeline talent needs, **five key trends** dominated the discussions with life science executives across the country:



1 RAPID TECHNOLOGY & BUSINESS INNOVATION
Driving talent needs

2 SOFT SKILLS
Demand for soft skills rises to the top

3 REGIONAL, CLUSTER-SPECIFIC WORKFORCE
Challenges emerge

4 DIVERSITY
Diverse approaches taken by companies

5 ACADEMIC PARTNERSHIPS
Industry reaps the rewards

TREND 1

Rapid technology and business innovation drives talent needs

Across the nation, life science companies continue to operate in a dynamic and often unpredictable environment. Technological innovations, rapidly shifting business needs and evolving regulatory requirements require companies to remain vigilant and adaptable to the changing landscape, while continuing to innovate.

New technologies are emerging and shifting the ways we think about products, product development and markets. New drug modalities (e.g., mRNA, RNAi and CRISPR) and scientific breakthroughs in fields such as computational biology, molecular genetics, gene editing, immunotherapeutics, emerging diseases, oncology, auto-immunity and inflammation create strong, ongoing demand for experts in a broad range of cutting-edge technologies. Interviewees identified growing needs for technical expertise in:

IT FUNCTIONAL AREAS

including data analytics, bioinformatics, 3D printing, IT security, data quality/integrity, artificial intelligence.

LIFE SCIENCE TECHNOLOGIES

such as next generation sequencing, stem cells technology, analytical chemistry, clinical development, drug delivery, aseptic processing, downstream processing, and pharmacogenomics.

SPECIALIZED ENGINEERING FIELDS

that include automation, miniaturization of medical devices, process integration, downstream processing, CAD design.

"We see the arrival of new technologies that profoundly impact our industry, including CRISPR/gene editing technology, greater access to human cells, including pluripotent stem cells and novel ways of combining these technologies.... We need people who can think outside their core or historic area of expertise to take advantage of the newly available technologies."

"Changes will require dramatically different skill sets over time... In 10-15 years we will see a lot less wet lab research and see it replaced by much more computer modeling and in silico chemical design for drug research."

"Product mix is becoming more of a commodity, so affordability and cost competitiveness is as important as technological evolution – both requiring greater innovation."

TREND 1: Rapid technology and business innovation drives talent needs



Companies seek employees who are experts in the latest technologies, comfortable working with computers and other electronic technology, and who can work in functional areas across the industry where large amounts of data, artificial intelligence, massive computing power and processing speeds are now key in decision-making and business operations.

While much of the specialized expertise with the latest tools and technologies comes from academic labs, companies realize that today's hot technology will be superseded by the next wave of innovation and thus seek employees who have curiosity, a passion for life-long learning, and aptitude for troubleshooting and combining technologies to solve new problems.

Overlaying these technological innovations, and informing company decisions on technology applications are:

EVOLVING BUSINESS MODELS

requiring talent in business planning and operational functions, project management, business development, cost analysis, outcomes research and strategic planning, to help organizations navigate these complex and fluid landscapes.

NEW REGULATORY GUIDELINES

requiring global regulatory expertise, GMP experience and quality management, global health economics, drug pricing and reimbursement, health care provider and patient training/education, digital health, telemedicine, and health care data management.

Combined, these forces impact the ways companies recruit and think about their workforce. Because ongoing change is certain, companies value employees who are flexible and adaptive to future needs and a changing landscape.

"Job responsibilities are shifting throughout the organization. Even lab jobs are requiring new skills... jobs in the past that were predominantly hands-on now require more and more planning, processing and analysis. "

"As our product/service offerings become more complex and incorporate more technology hardware, software and connectivity capabilities, we need to bring in more people who understand how product development works and who understand these kinds of integrated offerings. This creates demand for more expertise in project management, connectivity, systems integration, analytics, Agile and Lean processes."

Values Based Healthcare Continues to Impact Talent

As in 2016, a number of executives pointed to the impacts of the rapid changes in the US healthcare industry. The US spends an unsustainably large amount of its GDP on healthcare, and while patients, hospitals and doctors still need innovative products, payers are less willing to pay for them. Payers are looking to commoditize solutions and pay the lowest cost for a set minimum standard of care. Many companies are responding by shifting from a fee-for-service model to a model more based on value and risk sharing.

Employers still look for individuals who can navigate the complex health care system, have regulatory expertise and understand reimbursement, and who are adept at managing relationships and business partnerships. They also continue to express concern that the national discourse on drug pricing adds to their recruitment challenges.



“...we see a growing need for regulatory support to help adapt our business to meet the changing FDA requirements, economic analysis to address the pricing pressures resulting from healthcare reform and project management skills to ensure success of many of the key initiatives taking place at any given time. In addition, healthcare reform has required us to become better at reimbursement strategies.”

“The whole industry is suffering from reimbursement and high health care cost issues. Consolidation of the pharmacy benefit management and reimbursement sectors is putting more pressure on controlling healthcare costs at large and on drug prices in particular.”

Who's Hiring

94% of responding companies report having hired employees within the past 12 months (data not shown). This recent hiring spans the industry with respect to industry sectors (Figure 4).

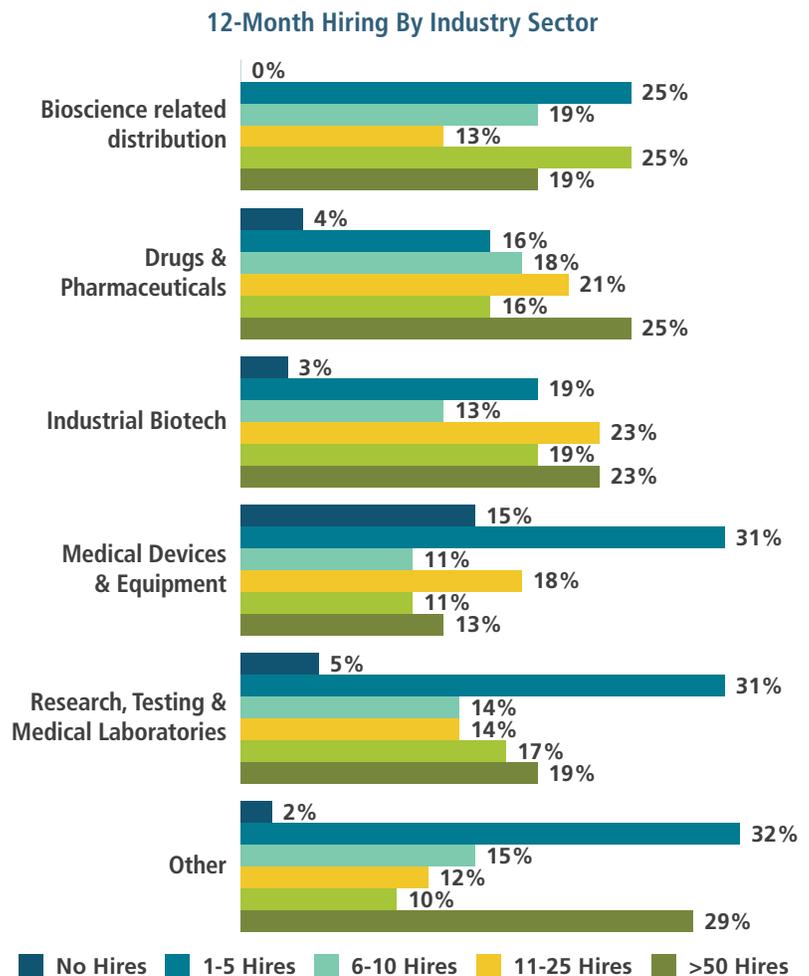


Figure 4 – Companies self-reported their industry sector. Note the “Other” category includes 15 organizations in integrated manufacturing and research, consulting, staffing, manufacturing, environmental clean-up and services, healthcare technology, hospital and research. (CSBI Hiring Manager Survey, n=354)

TREND 2

Demand for soft skills rises to the top

While new discoveries and the rapidly changing life science environment create demand for new technical skills, executives continue to point to the overarching need for strong soft skills as critical for career success. As companies' needs evolve and change, so does the desire for nimble, adaptive employees who are willing to continue to learn and grow. Flexibility, creativity, strong communication skills, the ability to work well with others, comfort working with ambiguity, and the ability to work in matrix or virtual work environments are frequently cited as necessary and valued skill sets. To thrive in this dynamic and competitive environment, executives seek employees who have "fire in their bellies," energy, passion, integrity, resilience, interest in taking on more responsibility, and commitment to the company's success.

"What is more challenging is not the 'what' of technical training but the 'how' of working in industry. It's the 'how', or soft skills, that are so important. The market for people with strong soft skills and for people who can manage scientists is very competitive. There is lots of high IQ talent but most of it is high IQ-low EQ."

"While hard skills are important, we are finding that the soft skills are the ones that help our employees reach their full potential, and ultimately support our business success. This includes people who can manage change, think innovatively, be resourceful and approach problems with a process improvement mindset."

"Focus on soft skills in technical fields. Reinforce the importance of inter/intra discipline communication."

"There is so much discussion of soft skills but many facets of soft skills are critical in enabling workers to succeed in such a setting - critical thinking, collaboration, communications, writing, teamwork - the list goes on. Include this in the educational space and we are creating a nation of lifelong learners that can handle anything as the world changes."

As multiple internal and external groups and organizations collaborate for successful product development, companies value employees who appreciate the "big picture". Such employees take initiative to drive alignment across functional and organizational boundaries to anticipate and solve problems, and proactively identify new opportunities aligned with company goals. They are excellent verbal and written communicators and possess the ability to think creatively, and to develop and implement thoughtful, team-driven solutions. Individuals who understand how to lead, persuade and make decisions, and how to energize teams are highly valued. They may need to synthesize solutions with incomplete information, and - in matrix organizations - to influence rather than manage a team of disparate stakeholders. In this environment, collaborators and team players are valued over individual contributors.

People with hybrid backgrounds and strong soft skills can be highly effective, but not easy to find. The hybrid scientist-business professional, for example, may be uniquely qualified to negotiate and sell technical products and services. An engineer with IT expertise might be ideally suited for the medical device team that is building new automation and robotics capabilities into its product line. Technology experts with holistic views of problems or systems who effectively engage with people in other functional areas to solve complex problems are increasingly valued by employers.

TREND 2: Demand for soft skills rises to the top

Across all recent technical position job postings, communication skills were the most commonly cited soft skill, followed by the ability to research and write. Quality assurance and control were also seen as important for positions requiring an associate degree or bachelor's degree. Teamwork/collaboration was the next most cited skill for positions requiring graduate degrees (Figure 5a).

When compared to the data from 2010/2011 (Figure 5b), one can see a growing mention of soft skills in job postings for all educational levels. Teamwork/collaboration showed the most dramatic increase, appearing 5.9% more frequently for positions requiring a bachelor's degree and 10.8% more frequently for positions requiring graduate degrees. Troubleshooting and problem solving are two additional soft skills that made large jumps over the prior period.

Top Ten Soft Skills by Degree Level, by Pct of Total Job Postings, 2016/17

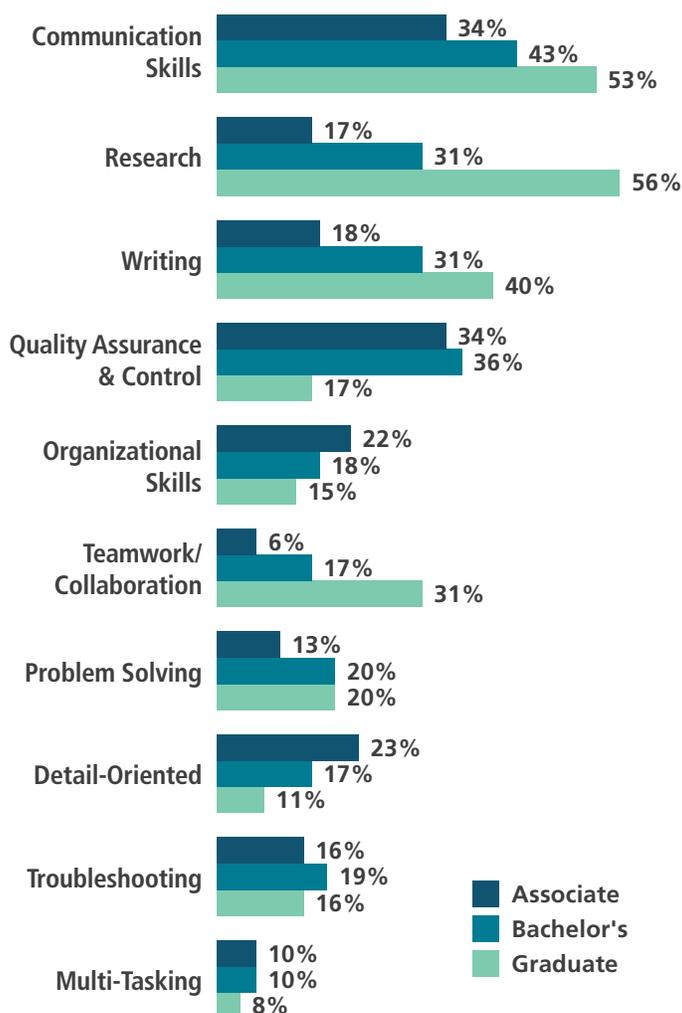


Figure 5a – Frequency of mention of the top 10 soft skills across job postings for technical positions in the life science industry, assessed by degree requirement for job postings.

Source: *Burning Glass Technologies*

TREND 2: Demand for soft skills rises to the top



Soft Skill Demand Growth by Degree Level, 2010/11 to 2016/17, by Percentage-Point

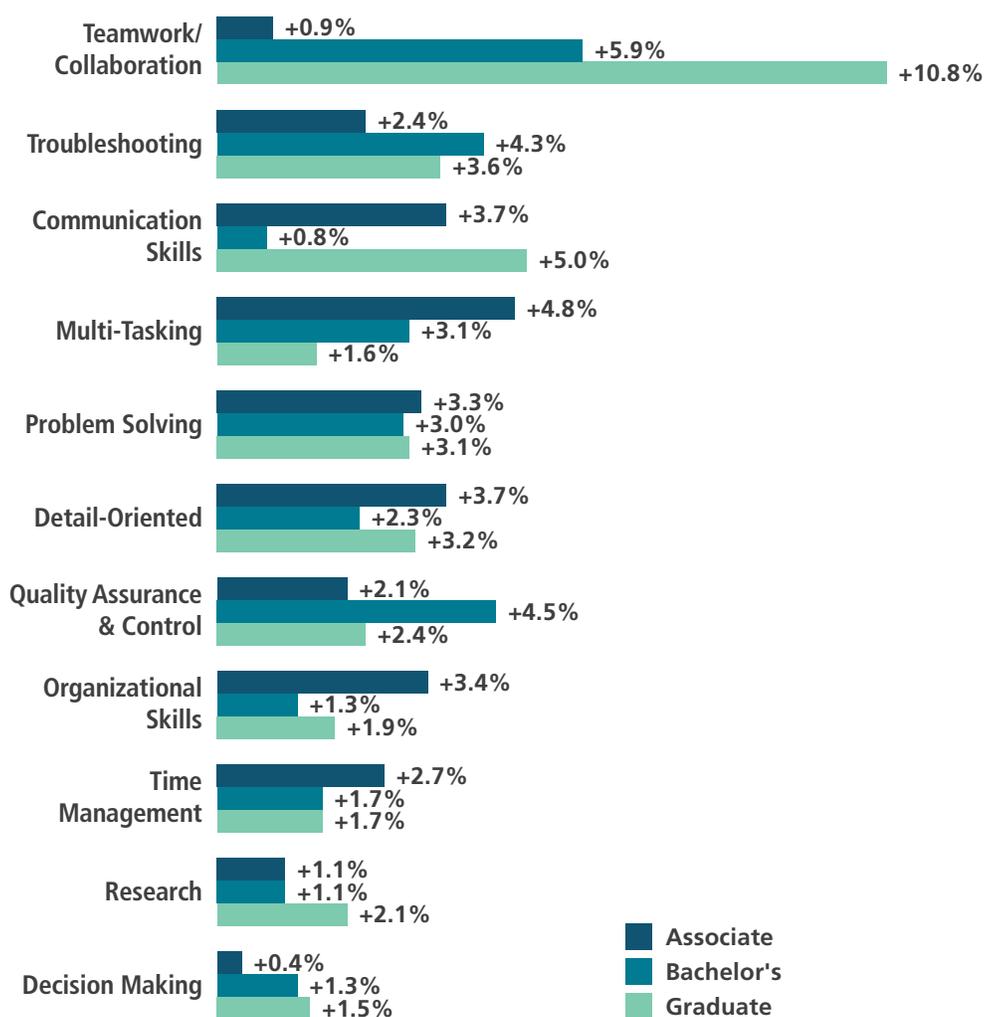


Figure 5b – Changes in the frequency of soft skill mentions in life science industry technical job postings comparing the 2-year period January 2010 to December 2011 and January 2016 to December 2017.

Source: *Burning Glass Technologies*

Top Jobs

Laboratory Technicians and Medical Scientists top the list of technical job postings during 2017 (Figure 6).

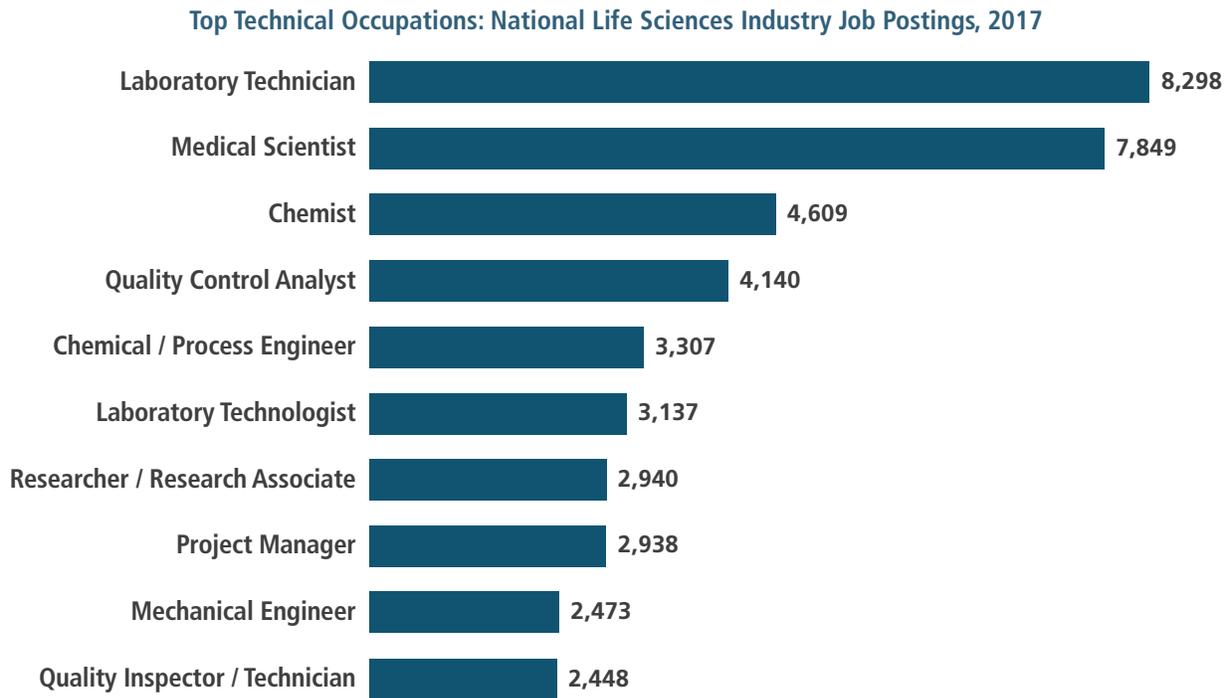


Figure 6 – Source: Burning Glass Technologies

The Bureau of Labor Statistics (BLS) defines life science industry “medical scientist” as an individual with a PhD, usually in biology or a related life science, or an MD degree and conducting research aimed at understanding human diseases and improving overall human health. Burning Glass Technologies (Burning Glass) employs an expanded definition of medical scientist that includes individuals with bachelor’s degrees and a variety of additional job titles such as Clinical Research Associates and Clinical Laboratory Scientists. It is this expanded definition of “medical scientist” presented in Figure 6.



TREND 3

Regional, cluster-specific workforce challenges emerge

Emerging life science industry clusters

Companies in emerging industry clusters consistently bemoan the scarcity of local talent to enable them to build or expand their companies. Recruiting local, entry-level talent is a challenge because the candidate pools lack fundamental skills (e.g., reading, writing and math skills), the ability to follow instructions, attention to detail and soft skills (e.g., communication, critical thinking, and team work). One organization reported a very low, 1 out of 9 retention rate for local, entry-level hires.

Additionally, companies struggle with a dearth of experienced local talent. Most report seeking qualified, experienced job candidates from other states or from abroad. This problem is more severe in recruiting mid-level management or executive talent.

Over time, companies envision large, anchor companies more deeply rooting life science industry clusters in their regions and allowing more robust talent marketplaces to flourish. In the interim, they find industry associations have been essential in supporting their emergent clusters by providing training and advocacy, building local awareness, facilitating industry-academic discussions and helping advertise industry job opportunities.

"We plan to hire a recruiting firm in Silicon Valley to have the firm pitch our state's lower cost of living, better lifestyle, etc. This has worked well for another company [in our state]."

"Programs focused on attracting and retaining [talent are] important. Keeping talent is the bigger challenge, especially middle/upper level management."

"We have many people [here]... adept at startups and an early exit strategy... building an [organization] from the ground up requires a different set of skills and thinking, particularly around longer horizons."

"[We] need to attract talent with experience in successful larger organizations (example: building company from \$10M to \$100M)."

TREND 3: Regional, cluster-specific workforce challenges emerge



Unique Challenges in Northern California

In contrast, the mature industry cluster of the San Francisco Bay Area benefits from a rich local pool of talent. The region however is struggling with infrastructure and affordability challenges, making it difficult for young people to remain in the area. This makes it challenging to recruit and retain talent, and difficult for young talent and recent graduates from the region's excellent universities to remain in the area.

While unlikely to lose its position as one of the global leaders in life sciences innovation, many business, patient, community and industry groups are working closely with local, state and national policymakers to address this issue head on.

The proliferation of tech companies and increasing overlap and convergence between the tech and life science industries creates additional and unique regional opportunities and challenges. Innovations in computing and technology and their increasingly frequent applications in the life sciences create abundant new opportunities for value creation, change the customer

experience, and create new career pathways. They open new vertical markets and opportunities for life science companies to develop connected devices, systems and networking solution to improve clinical outcomes. Increased adoption of technology into life science products, services and operations also creates new cyber security and hacking risks where the impact of a data breach can mean life or death.

This convergence of industries creates demand for people who can work at the interface of previously non-overlapping industries, think in new ways about global markets, sectors and customer experiences. Life science companies often find that much tech talent is not comfortable working in the regulated sectors of the life science industry, where product development cycles are long and the tolerance for error and risk is very different than for tech companies. This limits the mobility of talent from tech to life sciences.

At the same time life science companies increasingly are competing with tech companies who offer rich benefit packages and rapid product development cycles with attractive resume-building opportunities. This can make it difficult for life science companies to recruit talent in some of these new roles.

"This convergence of technologies creates great opportunities for nimble, creative people to make a big impact. It also means industries are competing...for talent in new ways."

"As the regulated life science industry collides with tech, finding the right talent can be a challenge.... When I talk with young people about their careers they are more excited about Google, Facebook and other tech companies and attracted to the 'cool factor' of technology and the rapid development cycle of tech."

"Medical devices are more integrated with smart phones and there is increasing pressure to make [them] more like consumer electronics – things people wouldn't be ashamed to pull out and use in public."

What Jobs are Hardest to Fill? How are Companies Sourcing Talent?

When surveyed about how difficult it has been to hire certain positions, 78% of respondents reported they were able to fill positions within 4 months; 42% of them within 9 weeks or less (data not shown). Regulatory Affairs/Compliance positions continue to stand out as the most challenging to fill. 35% of respondents described those positions as “more difficult” or “much more difficult” than average to fill (Figure 7).

Multiple companies cited significant individual challenges in finding the right candidates for C-suite positions or for positions in Analytical R&D, Bioinformatics, Clinical Development, Clinical Operations, IT & Data Analytics, Project/Program Management, Quality, Regulatory, Research, Sales, Software Engineering (data not shown).

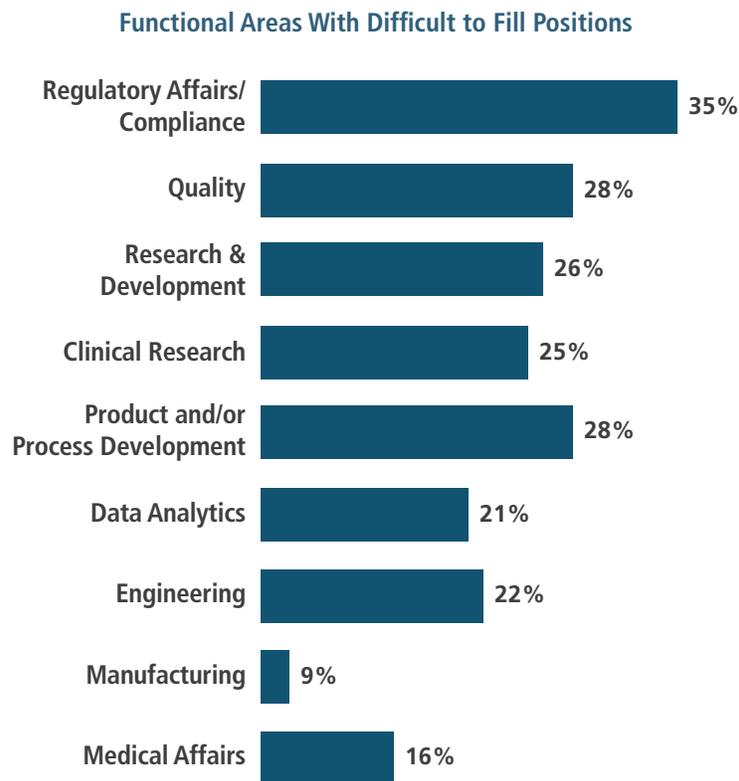


Figure 7 – Source: CSBI Hiring Manager Survey (n=354)

Companies rely on a variety of sources to identify and recruit talent (Figure 8). In recruiting experienced talent, most companies use recruiters or staffing companies, frequently in combination with on-line job boards and/or internal sources.

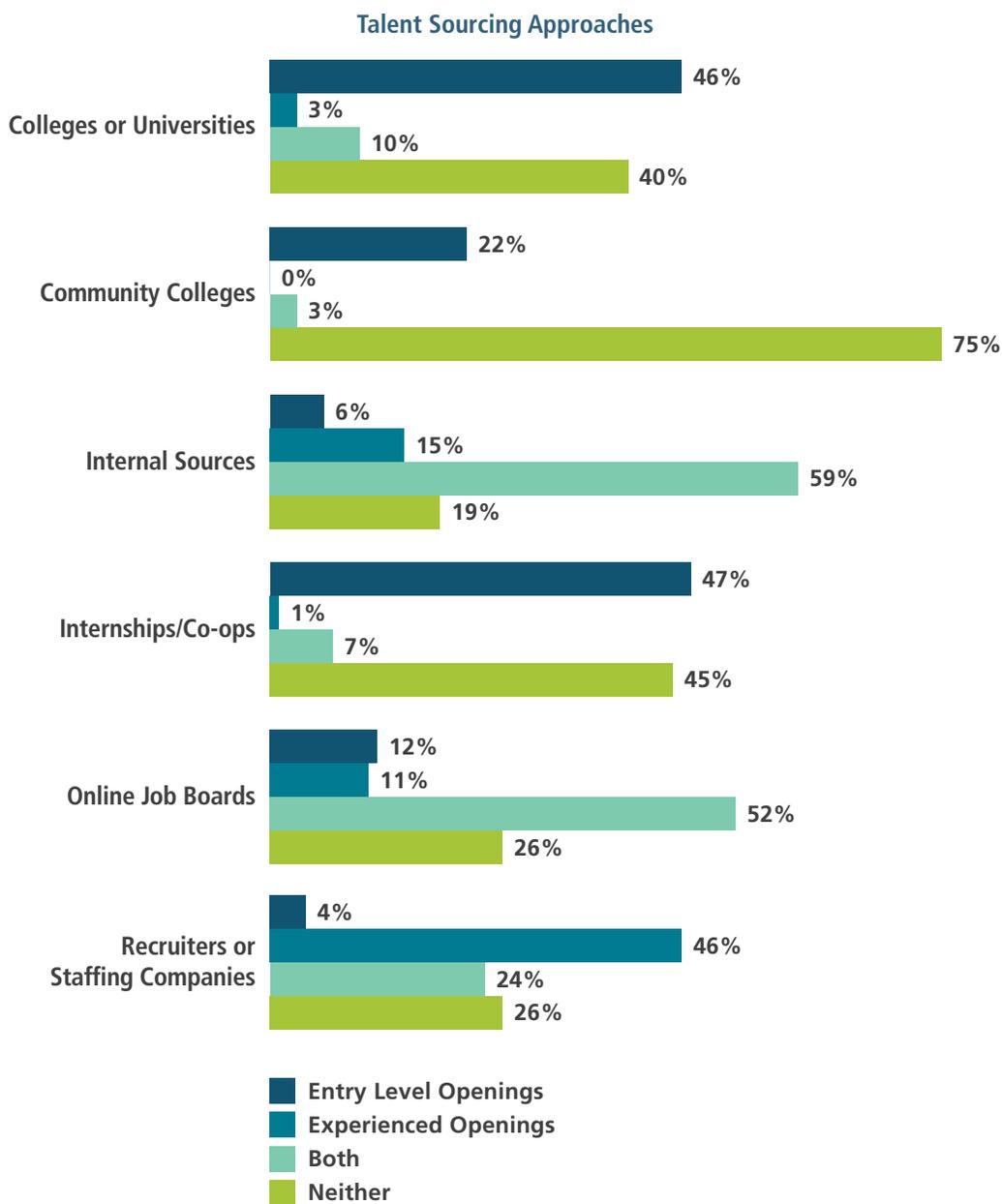


Figure 8 – Source: CSBI Hiring Manager Survey (n=354)

Talent demands are frequently met with contract workers employed across the industry. Very small companies followed by large companies report the greatest use of contract workers (Figure 9).

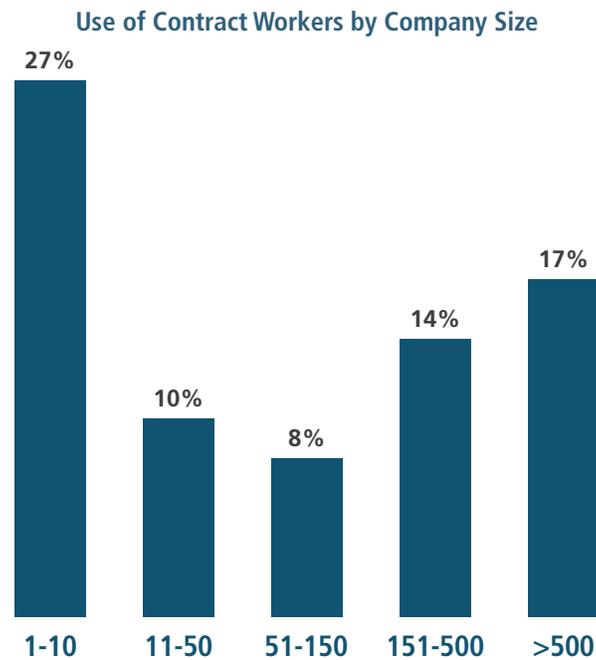


Figure 9 – Source: CSBI Hiring Manager Survey (n=354)

Hiring of H1B visa holders is common across the industry, with greater participation increasing with company size. While only 29% of the very small companies (1-10 employees) report having H1B visa holder employees, 85% of the very large (>500 employees) have H1B visa holder employees (Figure 11). Across company sizes and industry sectors, among companies employing H1B visa holders, they represent 5%-12% of the companies' total workforce (data not shown).

Percentage of Companies by Size Class with H1B Visa Holder Employees

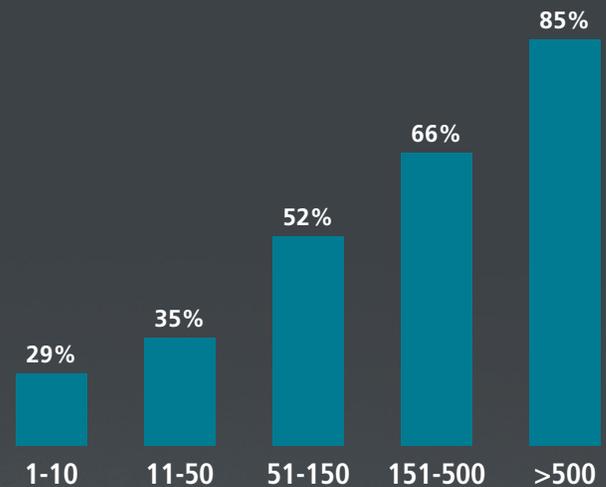


Figure 10 – Source: CSBI Hiring Manager Survey (n=354)



TREND 4

Companies take diverse approaches to diversity

Many companies in the life sciences benefit from diversity in their workforce and find that diversity helps them reach better decisions, facilitate relationships with disparate stakeholders and better prepare them to understand and compete in global markets and in discrete market niches. These life science industry leaders are committed to diversity and see its importance in driving innovation. They define diversity to include diversity in gender, age, race, culture, country of origin, military background, sexual orientation, and educational background or life experiences. Many talk of "diversity of thinking" or "diversity of experience" as an important element of all their work: from entry-level employees to the board of directors; from advisory boards, and patient advocacy groups to the experiences of customers, partners, and clinical trial subjects.

Some have formal diversity and inclusion initiatives to help recruit and retain diverse teams and even staff dedicated to diversity initiatives. They have initiatives focused on closing the gender diversity gap on their leadership teams or boards, increasing their numbers of military veteran employees, or shaping the diversity of their workforce to mimic the local population's diversity, for instance. One executive has a world map in his office with a pin marking the birth location for each company employee to help him monitor diversity. Other companies hold hiring decisions until their candidate pools meets pre-defined candidate diversity targets. Others have taskforces that monitor internal hiring and promotion decisions to flag potential biases.

Gender diversity was also frequently cited by interviewees. One company described grooming women for advancement by giving them stretch assignments earlier than they would otherwise. Another set up a training program to groom women leaders to be future industry board members. Because so many organizations are seeking to do the same thing, they are finding it very competitive to find senior women board candidates. None of these companies reported being fully satisfied with its current level of diversity.

Some companies explained that diversity is a luxury they cannot afford within their limited local labor pools. Others in these emerging sectors described their workforce as diverse by necessity: since they have been unable to find qualified talent locally, they have been forced to hire international staff to fill key roles. A much smaller subset of companies argued that diversity not the responsibility of the private sector. While there is no consensus on the value of diversity or how to define it, diversity is a rich topic of discussion, introspection and learning across the life science industry.

Per the Hiring Manager Survey: 25% - 26% of respondents have "formal" diversity initiatives for gender or race. Most of those companies have initiatives that cover both gender and race and that target both management and non-management rolls. Board diversity initiatives are much less common (data not shown).

"The business benefits of workforce diversity should not still have to be debated (although they still are)."



"The benefits we bring to patients and society as a whole stem directly from the diverse experiences, ideas and perspectives of our workforce. For that reason we strive to foster an inclusive working culture that values and respects differences"

"Diversity in education backgrounds, diversity of geographical and cultural aspects [are important]. In general diversity generates innovation and help us to see business progress from different standpoints and views."

"Although we don't have any formal diversity initiatives, we are a very diverse organization. It's not by design but results from our mission of hiring the best people we can."

"Good ideas become great ones when we can discuss them around the table and include a diverse set of voices."

"It's not enough to assemble a team of people who look different. This historic view of diversity is not sufficient. Instead we look intentionally at the diversity of experiences people have had. Tapping the minds of people who have had different experiences and diverse thoughts is powerful and leads to better ideas and better problem solving."

"We have a lot of diversity at the VP level and the next level down, but it's really tough to get the kind of diversity that people are expecting at the C level and the next level down because those individuals are in such demand now. The encouraging thing is there is a really good crop of individuals out there that are moving up the ladder. So, I'm hoping it's not going to be as difficult in the next 3-4 years as it is right now."

Projected Growth

86% of respondents anticipate expanding their employee headcount across major functional areas during the next 12 months. R&D and Quality were most frequently mentioned as functional areas targeted for increased head count (Figure 11).

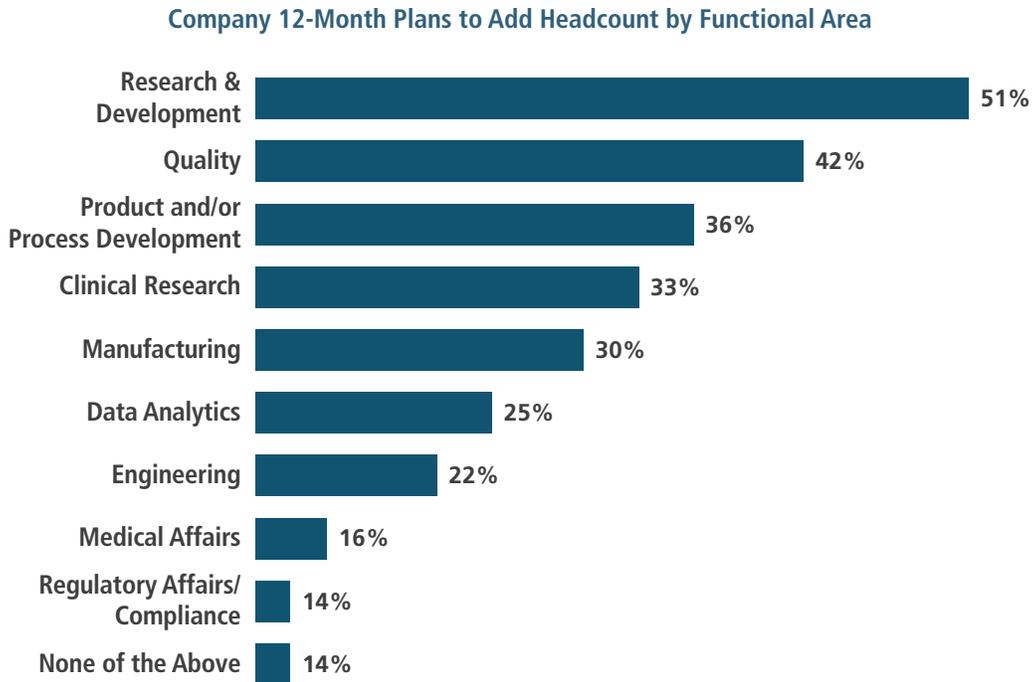


Figure 11 – Source: CSBI Hiring Manager Survey (n=354)

Skills Needed for Technical Positions

Skill clusters can be defined as a combination of skills needed in a particular area. Such clusters can inform job seekers and educators of the broader skill needs for in-demand jobs.

For the two-year period from January 2016 to December 2017, the top skill clusters for the life science technical positions requiring an Associate or Bachelor's degree were Laboratory Research, Quality Assurance and Control,

and Manufacturing Processes (Figure 12a). As compared to the two-year period from January 2010 to December 2011, the demand increased the most for the Laboratory Research Skills cluster for positions requiring an Associate or Bachelor's degree (Figure 12b). For those positions requiring a PhD degree, the Drug Development skill cluster was most frequently in demand (Figure 12a).

Top Ten Skill Clusters by Degree Level, by Pct of Total Job Postings, 2016-17

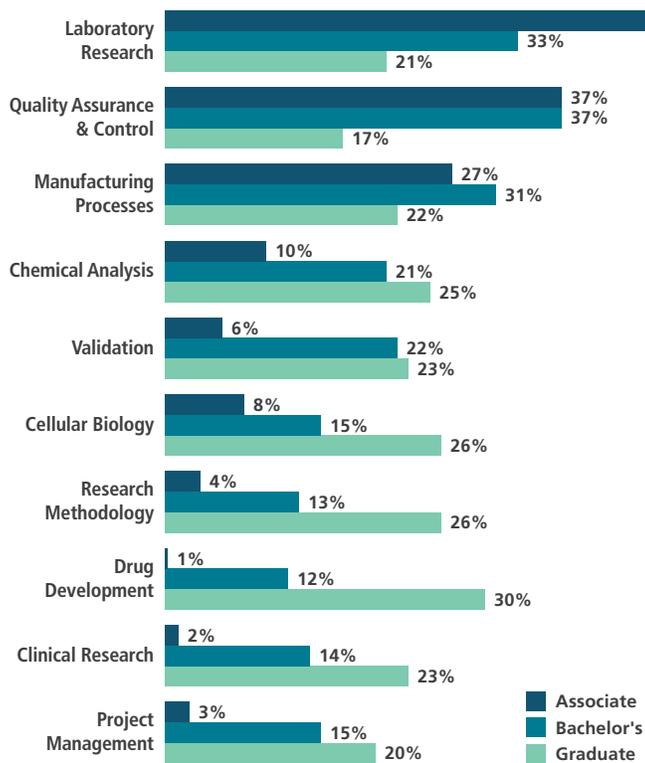


Figure 12a – Source: Burning Glass Technologies

Skill Cluster Demand Growth by Degree Level, 2010-11 to Present, by Percentage-Point

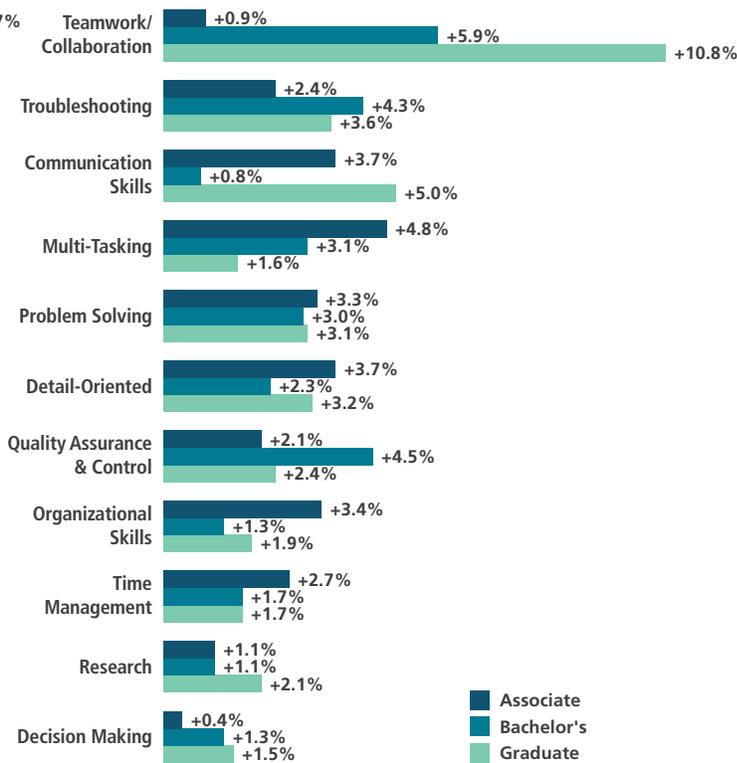


Figure 12b – Source: Burning Glass Technologies

TREND 5

Industry reaps the rewards of academic partnerships

Life science companies have a rich history of partnering with academic institutions for discovery research, technology licensing, drug candidate evaluation in disease models, clinical development and advisory board service.

Many life science companies are exploring new approaches to partnering with academic institutions, several noting the misalignment of industry and academic incentives that have traditionally limited partnerships.

Companies continue to deliberately locate R&D operations near academic partners. They invest significant time in building deeper relationships with academic departments more so than with professors or key opinion leaders at educational institutions. And they are sending their employees to partner campuses to participate in training, workshops or other events to learn side-by-side with their academic colleagues to establish stronger relationships and build trust.

Companies and educational institutions have also developed a number of innovative programs with academic partners at all levels to provide young people with industry exposure and experience. In one example, industry and academic partners collaborate in a co-op program in which graduate students spend six months in an academic lab followed by six months in an industry

lab. Another company is investing in a large university lab and co-manages the hybrid academic-industry lab with its academic partner, providing multiple benefits for both organizations and unique learning opportunities for the lab's students and post-doctoral fellows.

Recognizing the importance of reaching students early, several companies are working with local schools to develop or customize curriculum that educates students on how the industry works and the skills it needs. They offer company tours and job shadows, give informational interviews and career talks, serve as mentors on research projects, and help teachers to develop and deliver hands-on science modules with applications for day-to-day life. These companies and individuals recognize the need to inspire and develop an affinity for science early in order to attract more students – particularly underrepresented students - into STEM careers.

Of the companies responding, 82% report regularly offering internships. College student internships were the most common (regularly offered by 73% of responding companies). Much less common are internships for graduate students (39%), community college students (21%) and high school students (17%) (Figure 13).

"We need more scientists and researchers with one foot in the academic side and one foot in the industry side."

"Being near these universities allows us to more easily have open discussions in pre-competitive spaces."

"In collaborative projects between industry and universities, the onus is on industry to make sure they are engaging with more than just the PI, but also with the students, to influence their understanding of drug development and our business model."

"Definitely industry-academic partnerships are extremely beneficial."

Company Internship Programs by Intern Type

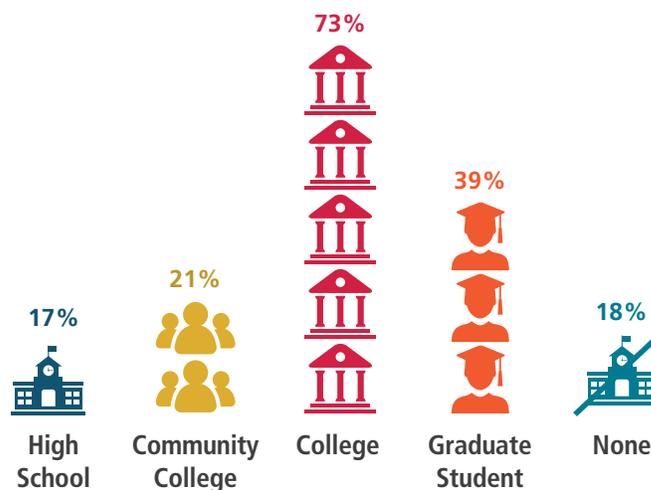
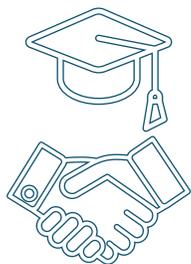


Figure 13 – Source: CSBI Hiring Manager Survey (n=173)

The Power of Internships

Internship programs with local educational institutions continue to be a coveted way for students to gain the industry experience and hands-on learning that companies commonly point to as important qualifications for entry-level hires. They can also serve as a means of inspiring an early appreciation of the life sciences in young people. Internships provide invaluable industry experience for (community) college and graduate students in technical fields, and increasingly for students in business and non-technical fields as well. High school internships are less common. Companies describe internships as “test drives”, giving both students and companies the chance to evaluate fit, and frequently pave the way for students to join their sponsoring companies as regular employees following graduation.

Life science startups are often a great source of internships for (community) college and graduate students. Staff-starved startups have figured out a way to augment their own capacity, while providing students with valuable exposure to life science techniques and startup culture. In best case scenarios, these young companies “grow their own” and bring on students as employees as their companies grow.



While there is no question that internships can play an important role in new talent development, many companies are reluctant to hire interns out of concerns for time investment, capacity, liability issues, and more. This is particularly true of smaller companies. Many have said they would consider interns if internship programs were easier to implement and manage. Numerous companies describe failed attempts to engage local colleges or universities in discussions about creating internship programs. Additionally, an unsuccessful internship experience can cause reluctance on the part of employers to try again without first putting more formal structures in place to ensure successful management of the program.



Several school programs that seek to provide industry-relevant experience for their students lament the lack of internship opportunities available in life science companies and organizations. Some suggestions for expanding internship programs include:

SHARE

internship program best practices to help peer companies understand how to develop successful, rewarding, and cost-effective programs. For an emerging life science industry cluster, this might include creating a single, regional internship program in which a major educational institution partners with a whole group of local companies.

CREATE

win-wins for startups and students by making lab space available to entrepreneurs who take on interns.

CREATE

incremental internship programs where students may work with a sponsor company over the course of several years, gaining incremental experience and exposure to the company and industry.

DEVELOP

“reverse internship” programs where industry professionals supervise student research at their schools/colleges, with regular company site visits to present their findings.

BUILD

more deliberate training into internships, allowing students to explore career options, functions and skills beyond their assigned internship project scope.

The Value of Certification Programs

Companies in emerging life science clusters, in particular, seek more affordable, local, short-term certification programs that provide ongoing learning for their incumbent workforce. Such programs also better prepare the future workforce for industry positions. Among the general and functional area specific topics for certification programs cited are:

GENERAL

Communication

Computer Skills (basic skills)

Critical Thinking

Following Directions

Leadership

Record Keeping

Science (fundamentals)

Six Sigma

Statistics

Technical Writing

FUNCTIONAL AREA SPECIFIC

Clean Room Techniques

Compliance

Customer Service

Manufacturing/Lean Manufacturing

Quality Assurance

Regulatory Affairs

Safety

Discussions on the topic of credentialing are not new and are quite common in other industries. Credentials have different forms and meanings depending on who is talking about them. This report does not recommend a particular path towards industry-vetted credentials, but the responses from industry indicate that continued dialog is important. It's clear that industry believes it has a role to play in informing curriculum.

"Allow industry to help design the requirements for industry-vetted certifications so that the curriculum produces talent to support industry."

"Shorter-term certification opportunities for practical areas of growth that can be achieved while working full time; online classes in quality assurance, critical thinking skills, statistics, technical writing, leadership, business [would be helpful]"

"Provide internships and co-ops that are intentional, including training and reviews. Industry-vetted certifications are a GREAT idea!"

"Industry organizations should ensure that the skills/ training required to support the industry positions are well understood by academia. This may translate into 2-year or 4-year degree programs as well as certification programs."

"Industry academic partnerships are critical and industry participation in decisions made regarding degree programs and certifications are very critical."

RECOMMENDATION

Grooming the Next Generation of Talent: More Work Needed

As in prior years of this report, executives continue to lament the lack of preparedness of students coming out of university programs. Some criticize institutions for focusing on developing talent for an increasingly small number of academic positions rather than for high-demand careers in the industry. This leaves several graduate and post-doc job seekers ill-prepared for jobs in the corporate sector. It can also lead to mistrust and challenges in industry-academic collaborations.

The charge is similar for recent 4-year graduates who many executives feel are not well-prepared for entry-level positions. These new hires typically don't understand how industry works, its culture, the importance of soft skills and teamwork over individual contributions, the basics of product development or the fundamentals of business. As a consequence, some companies exclusively or predominantly hire people with prior industry experience.

"Our education system is broken. We need to stop teaching to the test and focus on coaching students and future employees to solve real world problems."

"High school graduates ... are not meeting the grade in terms of fundamental reading/writing skills."

"Universities seem to encourage young PhDs into academic pursuits vs. exposing them to the possible benefits of industry efforts. We would like to see more balance from universities."

"Graduates are not coming out prepared to work. They need improvement in career development... [understanding] how to dress, how to mesh into the workplace."

Early Career Exposure Needed

Executives note that too many young people are still unaware of the vast and exciting careers available in the life science industry, and the opportunities to move into well-paying, interesting, mission-driven jobs that provide lifelong learning opportunities. Many students don't understand the importance of early STEM education in providing access to these career pathways.

This lack of awareness is especially acute among populations most underrepresented in STEM careers (i.e., women, people of color, economically disadvantaged) who often do not have industry role models and who thus opt out of STEM pathways altogether. This lack of pipeline diversity makes it more difficult for industry leaders to build the diverse teams that many of them believe drives innovation. Most executives agree that we cannot wait until students reach college or graduate school to get students excited about careers in the life sciences.

"If we don't get them early, we've lost them by the time they've reached their teens."

"Many college students we have engaged have virtually no idea that these types of industries exist."

Partnerships that expose young talent to the industry and help promote the culture and pace of life science innovation can better prepare students for success. Many of those interviewed agreed that more should be done to foster academic partnerships to help develop the next generation of talent. Some ideas to foster greater industry-academic partnerships include:

ADDRESS

the foundational factors that misalign incentives between companies and academic institutions.

COLLABORATE

more on designing curriculum in areas that are meaningful and drive innovation for industry.

CREATE

more opportunities for industry and academic professionals to collaborate on advisory boards and roundtables and engage in greater dialog about talent development, education and innovation.

INCREASE

focus of partnership programs on technical schools and community colleges.

Small companies often lack the resources to develop partnerships with academic institutions. Many of them expressed interest in doing more with academic partners – from participating more extensively in internship programs to establishing more R&D collaborations.

There are numerous pilot programs and initiatives underway to better prepare talent for future life science industry jobs. Companies are aware of some of these, but the means for sharing impact metrics and disseminating best practices are less clear. Ideas about programs and approaches that might be helpful in grooming the next generation of life science industry talent include:

CREATING

regional industry-academic advisory teams to develop strategic roadmaps that identify drivers of life science innovation and the skills and training needed to realize those roadmap destinations.

WORKING

with industry partners to design research projects that require critical thinking and the application of academic knowledge to real-world industry challenges for students in STEM academic programs.

DESIGNING

industry-academic partnerships in ways that allow graduate students and post-docs to participate and gain working exposure to industry partners and culture.

EXPANDING

mentoring programs, particularly for populations that are underrepresented in STEM fields.

ENCOURAGING

student participation in professional industry associations.

TRAINING

students in STEM education programs on soft skills (e.g., communication, working on teams, persuasion, leading by influencing, critical thinking, problem solving, getting along with others, dealing with ambiguity) and industry job readiness skills (e.g., understanding industry culture, decision-making, value drivers and economics).

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