Talent Pathways:

A Biosciences Workforce and Talent Strategy for GO Virginia Region 9 to Support Rapid Growth and Momentum of a Vibrant Industry

Performed For: CvilleBioHub
Performed By: TEConomy Partners, LLC
Funded by: GO Virginia

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TECONOMY PARTNERS LLC

CVILLE BIOHUB

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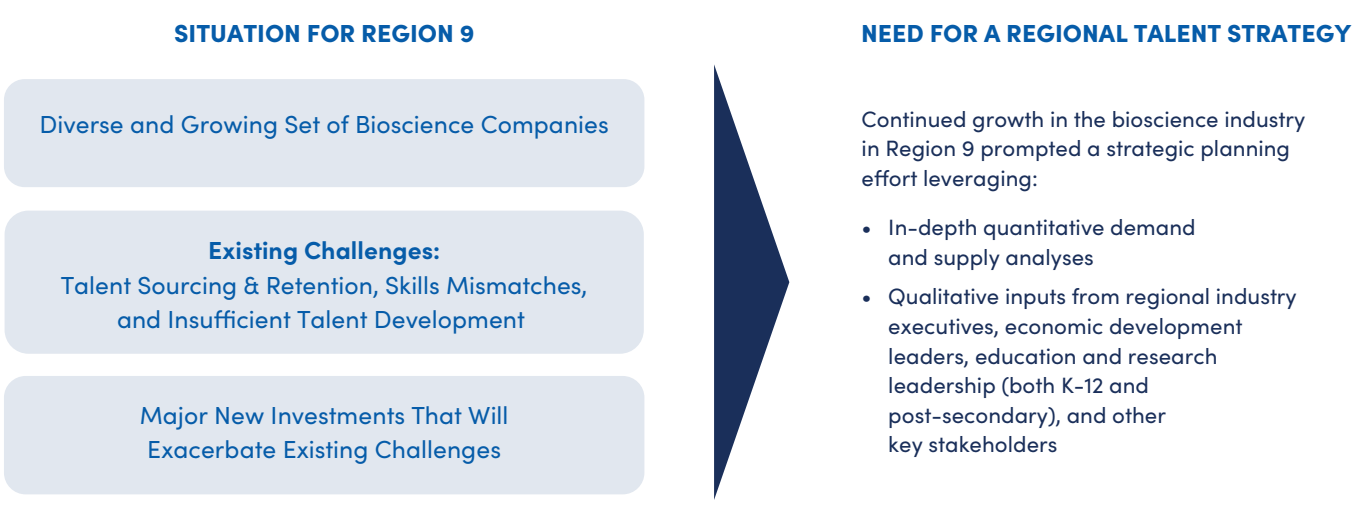
Executive Summary

Central Virginia is emerging as a dynamic biosciences hub, but long-term success hinges on preparing a skilled workforce ready to power and sustain growth across pharmaceutical manufacturing, MedTech, health IT, agricultural and industrial biosciences, and other industry subsectors.

In a geographic context aligned with GO Virginia Region 9, Central Virginia has experienced significant recent biosciences job and company growth, with company expansions underway, and exciting new investments expected to come online in the coming years both by the region's leading research institution—the University of Virginia (UVA) and its development of the new Manning Institute of Biotechnology—as well as major new manufacturing operations recently announced by AstraZeneca.

Amidst the backdrop of industry and ecosystem growth, CvilleBioHub—a non-profit organization working to advance, strengthen, and accelerate the growth of the biosciences industry cluster and supporting ecosystem in Greater Charlottesville and the surrounding Central Virginia region—has heard consistent themes from regional firms facing challenges with respect to workforce and talent sourcing and skills "mismatches", sufficient talent development at the local level, talent retention, and other issues, all while seeing growing demand for talent from its companies and from UVA. Fueled by both new investments and growth in the region's bioscience industry, it is a critical time and inflection point for the region to conduct a thorough biosciences cluster workforce assessment, strategy, and corresponding action plan to ensure this priority industry cluster is primed for current and future growth (Figure ES-1).

FIGURE ES-1. PROJECT PURPOSE AND APPROACH



Source: TEConomy Partners, LLC.

FIGURE ES-2. REGION NINE'S BIOSCIENCE INDUSTRY—SIZE AND SUMMARY METRICS, 2024

Region 9's Bioscience Industry represents:

2,100	254	1.37	23%	$121,000
Jobs	Establishments	Virginia "LQ"	Job Growth Since 2019	Avg. Annual Wages*

Growth and momentum are expected to continue based on recent investments by:

Afton SCIENTIFIC · AstraZeneca · BIO-CAT · AgroSpheres · bonumose · University of Virginia

*Average wage figure is for the Industrial Biosciences component of the overall industry.
Source: TEConomy analysis of Lightcast (2025.3) QCEW data.

CvilleBioHub has partnered with Albermarle County Economic Development, City of Charlottesville Economic Development, UVA, Piedmont Virginia Community College (PVCC), and other regional stakeholders to secure grant funding from GO Virginia to advance this strategic planning effort through its Talent Pathways Initiative (TPI).

GO Virginia Region Nine's industry and innovation ecosystem has significant, diverse, and growing bioscience-related workforce and talent demands, as represented by its industry's size, outsized concentration within Virginia,[1] its growth, and ability to generate high-quality jobs with family-sustaining wages (Figure ES-2).

The nearly year-long strategic planning effort has leveraged both quantitative and qualitative approaches to identifying "high-demand, high-priority" occupations and roles in the region's unique blend of bioscience industry subsectors.

These assessments and information gathering span and include:

QUANTITATIVE ASSESSMENTS:

> Industry "staffing patterns"—the deployment of specific occupations across the region's bioscience industry—both in terms of relative concentrations and growth over time; projected occupational growth within the industry; indications of workforce demand culled from recent regional industry job postings; and insights gleaned from job requisitions data provided by UVA.

QUALITATIVE ASSESSMENTS:

> Outreach to Region 9 bioscience employers, both via an online talent demand survey as well as through one-on-one interviews with regional executives.

1 Regional location quotients (LQs) measure the degree of job concentration within a given industry locally relative to the national average. States or regions with an LQ greater than 1.0 are said to have a concentration in the sector. When the LQ is significantly above average, 1.20 or greater, the region is said to have a "specialization" in the industry. LQs can also be measured and provide important insights for a region relative to statewide averages, in this case for the Commonwealth of Virginia.

Utilizing the varied quantitative and qualitative inputs and assessments, a set of high-demand and high-priority occupations are summarized in Figure ES-3. Importantly, they are segmented by those with higher-volume demand for talent versus those with lower-volume demand in specialized areas of expertise. In Figure ES-3, occupations are assigned two check marks for the highest level of significance in the associated data or qualitative input, where there is a clear differentiation of importance based on employment levels or growth, projected growth, or indications of strong demand from job postings and/or from industry input. One check mark signals importance but to a somewhat lesser degree.

FIGURE ES-3. IDENTIFIED HIGH-DEMAND, HIGH-PRIORITY OCCUPATIONS AND ROLES FOR CENTRAL VIRGINIA'S BIOSCIENCE INDUSTRY

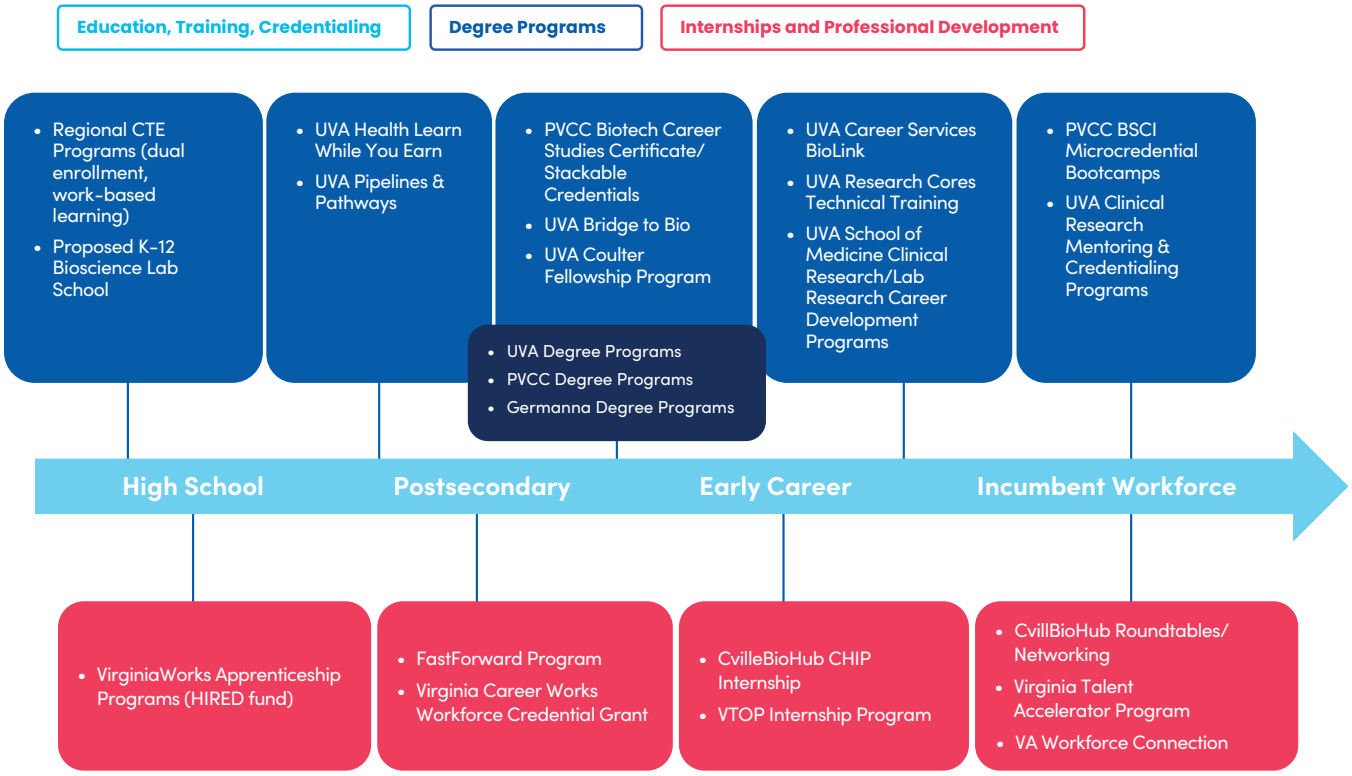
	Occupation/Group	Significant Deployment in Region's Bio Industry	Significant Recent Growth in Region	Significant Projected Growth in Bio Industry	Indication of Strong Demand from Regional Job Postings	Input from Co.'s via Survey, Interviews on Hiring Expectations	Notes
HIGHER-VOLUME DEMAND	Medical Scientists	✔✔	✔✔	✔✔	✔✔	✔	Includes significant demand from Univ, Hospitals Sectors
	Biological Technicians	✔✔	✔✔	✔✔	✔✔	✔	Includes significant demand from Univ, Hospitals Sectors
	Medical/Clinical Lab Technicians	✔✔		✔✔	✔✔	✔	Includes significant demand from Univ, Hospitals Sectors
	Other Scientists	✔✔	✔✔	✔✔	✔	✔✔	Includes Chemists, Materials Scientists, Epidemiologists, Microbiologists
	Skilled Production Roles	✔✔	✔✔	✔		✔✔	Includes Machinists, Assemblers, Inspectors, CNC Operators
SPECIALIZED, LOWER-VOLUME DEMAND	Biomedical Engineers	✔			✔✔	✔	Includes significant demand from Univ, Hospitals Sectors
	IT – Software Development	✔	✔✔	✔	✔✔		
	QA and QC Professionals	✔	✔✔		✔✔	✔✔	
	Other Engineers	✔		*	✔	✔✔	Includes Industrial, Mechanical, Field Svc Engs.
	Data Scientists & Bioinformatics			*	✔✔	✔	Limited but "Emerging" demand in region

*Note: indicates moderate levels of broad-based projected demand not isolated to biosciences industry.
Source: TEConomy's analysis of: Lightcast (2025.3) Staffing Patterns data; Central Virginia Bioscience Interviews; Industry Hiring/Workforce Demand Survey; and UVA Job Requisitions Data.

Turning to the supply side of the region's capacity for workforce education and skills training, an in-depth inventory of academic and workforce related programs and initiatives finds that Central Virginia has a robust foundation for a multi-stage bioscience talent pipeline (Figure ES-4). Complementing formal degree pathways are a constellation of specialized educational and experiential programs ranging from Career and Technical Education (CTE) and apprenticeship initiatives at the secondary level to bridge programs, internships, micro-credentials, and clinical research mentoring at the postsecondary and early-career stages, each operated by dedicated institutional "champions" and often supported by industry partners and nonprofit intermediaries such as CvilleBioHub.

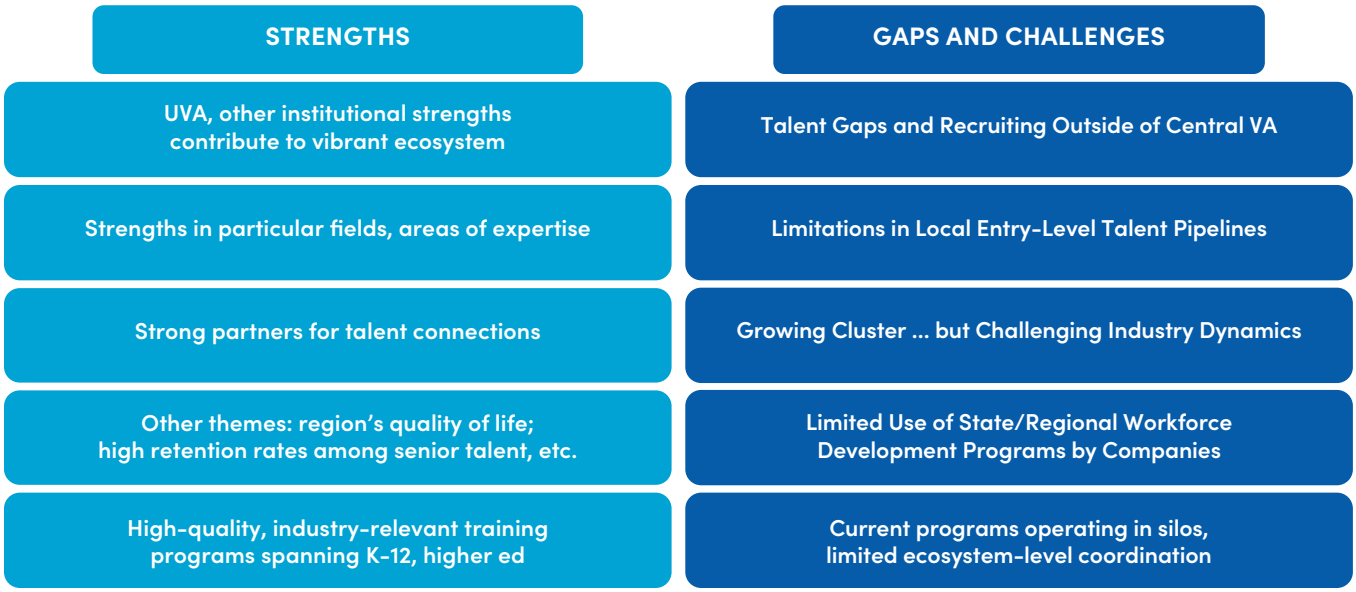
While this multilayered institutional ecosystem provides Central Virginia with a genuine competitive advantage in breadth and quality of talent development offerings, the region faces a critical operational challenge: these assets remain largely disconnected, with limited formal coordination and insufficient awareness of regional opportunities for life sciences graduates, a challenge now heightened by anticipated demand from major pharmaceutical manufacturing investments entering the region.

FIGURE ES-4. EXAMPLES OF REGIONAL PROGRAMS SUPPORTING WORKFORCE SUPPLY IN THE BIOSCIENCES



Source: TEConomy Partners' inventory of regional programs.

FIGURE ES-5. KEY THEMES RAISED BY REGIONAL LEADERS, STAKEHOLDERS INFORMING STRATEGIC PRIORITIES FOR CENTRAL VIRGINIA



Source: TEConomy Partners, LLC.

Among the most critical challenges with respect to biosciences talent supply dynamics for Central Virginia is retention. Data on long-term career outcomes support this conclusion, showing that a large share of the region's life sciences graduates leave the area (and often the state) as their careers progress. Addressing retention will require not only growing the number of local opportunities, but also improving awareness of those opportunities and strengthening the ties between students and regional employers earlier in their educational careers. Notably, many Central Virginia bioscience firms report very high retention for those employees who do join them, with several employers highlighting that their experienced staff tend to stay 10 to 20 or more years, drawn by the mission-driven work and quality of life in the region.

The current landscape for biosciences talent in Central Virginia reflects a clear duality, but opportunity for near-term transformation: a foundation of high-quality, anchor-led assets operating within an ecosystem that has yet to fully integrate its education and training programs with evolving industry demands. In light of recent momentum and anticipation of rapid expansion of the pharmaceutical manufacturing industry presence in the region, it is essential to clearly identify and articulate the strategic priorities necessary to position the region as a competitive hub for biosciences growth and innovation, a strategy fundamentally driven by ongoing talent strengths and workforce development.

The combined themes related to both regional ecosystem strengths as well as gaps and challenges elevated out of interviews with industry executives, hiring survey input, and feedback provided by the project Advisory Coalition are summarized in Figure ES-5.

Strategic Priorities to Enhance and Align the Regional Biosciences Workforce Ecosystem

The situational assessment reveals a region with substantial educational and institutional assets but critical gaps in coordination, alignment, and ecosystem integration. The presence of high-quality programs operating independently rather than as a unified system has created inefficiencies in talent flow, employer engagement, and career opportunity awareness. Compounding this challenge is the structural mismatch between the region's talent production and employer demand: while educational institutions generate many bachelor's and higher life science graduates annually, less than one-third of bachelor's-level life sciences graduates remain in the region a decade after graduation and entry-level technical talent pipelines are constrained. Simultaneously, unprecedented industry growth driven by signature public-private investments and anticipated facility construction and expansions by major pharmaceutical manufacturers is creating an urgent demand for scaled, coordinated talent development across all skill levels.

Given this landscape, and the findings from the demand analyses on high-priority occupations, three strategic priorities emerge directly from this assessment and form the basis for subsequent regional strategy to meet demand from industry and build out a lasting talent generation ecosystem:

> **Priority 1:** Develop and Strengthen Regional Talent Pipelines for Both Biosciences Technician and Laboratory Support Workforce and Specialized, High-Skilled Science and Engineering Roles.

> **Priority 2:** Address a Disconnected Ecosystem for Workforce and Talent Development and Enhance Both Career and Company Awareness by Formalizing a Regional Framework for Coordinating Life Sciences Workforce Development Pathways.

> **Priority 3:** Develop and Better Tell the Story of Central Virginia's Bioscience Industry and Innovation Strengths for Branding and Specialized Talent Recruitment.

These three priorities are mutually reinforcing. Strengthening talent pipelines requires ecosystem coordination, particularly amidst rapid expansion of employer-driven demand; ecosystem coordination enhances the visibility and credibility necessary for effective development of competitive identity; and effective branding and differentiation of regional competitive advantages accelerates the talent development imperative by making the region's opportunity more tangible and attractive to prospective recruits. Together, they constitute the basis for a comprehensive strategy for transforming Central Virginia's talent ecosystem from a collection of excellent individual programs into a high-performance, regionally coordinated ecosystem capable of meeting the workforce demands of an accelerating life sciences industry.

Four distinct strategies are elevated in the report and designed to address the three strategic priorities. Each strategy includes a set of detailed associated actions and recommendations for consideration (Figure ES-6).

FIGURE ES-6. STRATEGIC RECOMMENDATIONS TO ADDRESS CENTRAL VIRGINIA'S WORKFORCE AND TALENT NEEDS AND PRIORITIES TO ENSURE BIOSCIENCE INDUSTRY COMPETITIVENESS INTO THE FUTURE

Strategy #1: Grow the Pipeline for the Regional Biosciences Technician and Laboratory Support Workforce	*Action 1.1: Scale and Support Targeted Technical Training Programs in Partnership with Community Colleges and Regional Workforce Boards*
	Action 1.2: Expand Collaboration and Coordination with UVA Workforce and Training Programs to Complement Regional Training
	Action 1.3: Expand Experiential Learning and Lab Exposure Programs for Bachelor's Level Students to Better Position Entry-Level Graduates for Industry and Research Settings
	Action 1.4: Anchor Talent in the Region by Providing Ongoing Professional Development for Entry-Level and Early-Career Workers
Strategy #2: Address Specialized Talent and Skills Demand in High-Skilled Roles	*Action 2.1: Strengthen Structured Talent Pipelines by Expanding Experiential Learning and Skills-Based Development Programs for Science and Engineering Students*
	Action 2.2: Fully Reinstate and Fund the CvilleBioHub Internship Program (CHIP) at More Significant Scale and Connect to Other Regional Intern Programs
	Action 2.3: Leverage Proximity to UVA Health and Clinical Research Infrastructure to Create Translational Research Fellowships and Joint Industry-Clinician Training Programs
	Action 2.4: Build Programs for Interdisciplinary Skill Development that Bridge Research and Commercialization
	Action 2.5: Encourage Return Migration of Talent by Targeting Former UVA and Other Regional Graduates Now Working in Larger Biotech Hubs
Strategy #3: Better and More Seamlessly Connect the Workforce and Talent Ecosystem and Resources by Formalizing a Regional Framework for Coordinating Biosciences Workforce Development Pathways and Enhancing Career and Company Awareness	*Action 3.1: Establish and Fund a "Regional Biosciences Career Navigator" Function at CvilleBioHub*
	Action 3.2: Increase Cross-Company Awareness and Collaboration Through Signature Events and Industry-Wide Networking
	Action 3.3: Expand Networking Opportunities Like Those Offered by CvilleBioHub's CEO Roundtables to Enable Broader Participation and Access
	Action 3.4: Establish a Curated Venue for Emerging Leader Development and Advising to Seed Next Generation of Life Sciences Talent
	Action 3.5: Develop a Coordination Framework and Working Group Among Regional Workforce Development Stakeholders Which Can Seek to Better Integrate Programming, Avoid Duplicative Functions, and Improve Responsiveness
Strategy #4: Develop, Tell, and Promote Central Virginia's Bioscience Industry "Story" and Associated Brand Identity for Specialized Talent Recruitment	*Action 4.1: Leverage Ongoing Identification of Regional Strengths and Growth Opportunities in the Bioscience Industry and Innovation Thrusts Identified in Concurrent Work with CVPED and UVA for the "Innovation Corridor" Effort*
	Action 4.2: Coordinate with CvilleBioHub, CVPED, and UVA's New Manning Institute to Amplify the Regional Research Brand Around Focus on Early-Stage Biologics Development

Source: TEConomy Partners, LLC.

I. Introduction

Central Virginia, in a geographic concept aligned with GO Virginia Region 9, is home to a diverse and thriving bioscience industry cluster with a blend of companies that demonstrate the varied industrial activities and innovation focus of the life sciences spanning pharmaceutical manufacturing, medical devices and MedTech, health IT, agricultural and industrial biosciences, and other related sectors. This industry base is not only sizable and diverse but also growing at a rapid pace. GO Virginia Region 9 as well as individual regional counties such as Albermarle have identified the bioscience industry as a targeted cluster for economic development.[2]

At the same time, a leading top-tier research university, the University of Virginia (UVA), and its medical school and related health system anchor the region and are advancing major investments in biotech/biosciences innovation and commercialization. These are exciting times for the regional cluster, though strong growth and new industry and university investments, expansions, and new location announcements in the biosciences are placing a strain on the regional ecosystem, specifically on its ability to ensure a robust and appropriate workforce and talent pipeline and career connections.

CvilleBioHub—a non-profit organization working to advance, strengthen, and accelerate the growth of the biosciences industry cluster and supporting ecosystem in Greater Charlottesville, Virginia and the surrounding Central Virginia region—has developed and implemented a strategic plan focused on growing the cluster. Its efforts include community building, advancing entrepreneurship, and expanding its impact through strategic collaborations, ensuring sufficient risk capital, advancing R&D and clinical trials, and other appropriate regional strategies. Underpinning these strategic pillars and arguably the most critical element to advancing a thriving biosciences industry cluster is a strong and robust foundation of workforce and talent development that is well-connected to the industry and its unique regional education and skills needs.

Arguably the most critical element to advancing a thriving biosciences industry cluster is a strong and robust foundation of workforce and talent development that is well-connected to the industry and its unique regional education and skills needs.

2 See, for example: https://www.govirginia9.org/ and https://www.enablealbemarle.org/about-albemarle/strategic-plan.

Amidst the backdrop of industry and ecosystem growth, CvilleBioHub has heard consistent themes from regional firms facing challenges with respect to talent sourcing and skills "mismatches", sufficient talent development at the local level, talent retention, and other issues, all while seeing growing demand for talent from its companies and talent demand overlaps related to major initiatives at the University of Virginia.

Recognizing the region's industry growth, its challenging talent dynamics, and CvilleBioHub's strategic efforts to double the regional bioscience industry employment base by 2030, it is a critical time and inflection point for the region to conduct a thorough biosciences cluster workforce assessment, strategy, and corresponding action plan to ensure this priority industry cluster is primed for current and future growth. CvilleBioHub has partnered with Albermarle County Economic Development, City of Charlottesville Economic Development, UVA, Piedmont Virginia Community College (PVCC), and other regional stakeholders to secure grant funding from GO Virginia to advance this strategic planning effort through its Talent Pathways Initiative (TPI).

The regional organizations engaged TEConomy Partners, LLC, national experts in tech-based or innovation-led economic development, and with extensive experience in bioscience-related workforce and talent assessment and strategy across the nation, to support and help assess the situation and facilitate a strategic planning process to ensure development of a robust bioscience workforce and talent strategy for GO Virginia Region 9.

The regional geography representing the focus of this effort—a 10-County region plus the City of Charlottesville—is shown in Figure 1, and throughout this report the terms "Central Virginia" and "Region 9" will be used synonymously.

FIGURE 1. REGIONAL DEFINITION OF GO VIRGINIA REGION 9—CITY OF CHARLOTTESVILLE AND TEN CENTRAL VIRGINIA COUNTIES

Source: GO Virginia.

Project Approach

This study has been designed to meet the aforementioned objectives with an updated assessment of workforce and talent dynamics across Central Virginia's biosciences industry cluster and to elevate strategic priorities and recommended actions to ensure the region has the right workforce with the right skills for the biosciences industry to maintain and enhance its national and global competitiveness. The project approach and strategic planning effort combines both deep quantitative analyses as well as extensive qualitative input from regional industry executives, economic development leaders, education and research leadership (both K-12 and postsecondary), and other key stakeholders via one-on-one interviews and the deployment of an industry hiring survey.

The project has benefited from and been guided by a 38-member regional Advisory Coalition made up of an appropriate blend of the types of regional leaders and stakeholders noted above. The Coalition worked across a series of three in-person and virtual meetings at key inflection points during the project to ensure the work plan met the project goals and objectives, to assist in connecting the project team with key cluster leaders and stakeholders, to react to and provide feedback on interim and final project findings and recommendations, and to become key champions for the ultimate strategic plan and implementation.

The project has benefited from and been guided by a 38-member regional Advisory Coalition made up of regional industry executives, economic development leaders, education and research leadership (both K-12 and postsecondary), and other key stakeholders.

This *Talent Pathways* report is organized across the following major sections:

Rapidly Growing, Evolving Bioscience Industry Cluster and Workforce Dynamics: Profiling the Demand for Talent in Central Virginia

Regional Life Sciences Talent Supply Dynamics

Growing, Enhancing the Regional Biosciences Workforce Ecosystem: Key Themes Inform Strategic Priorities

Strategic Recommendations to Address Central Virginia's Workforce and Talent Needs and Priorities to Ensure Bioscience Industry Competitiveness Into the Future

II. Rapidly Growing, Evolving Bioscience Industry Cluster and Workforce Dynamics: Profiling the Demand for Talent in Central Virginia

Defining the Bioscience Industry for Central Virginia

A key characteristic of the bioscience industry, and a driver of the industry's wide-reaching innovation and societal impacts, is its varied makeup of companies delivering a wide range of market and product solutions. From seeds to alternative jet fuels and from wearable electronic medical devices to vaccines and innovative therapeutics, the biosciences are far from monolithic. Defining the biosciences is therefore challenging due to its diverse mix of technologies, products and markets, R&D focus, and companies themselves. The industry includes companies engaged in advanced manufacturing, research activities, and technology services but has a common thread in their application of knowledge in the life sciences and how living organisms function. At a practical level, federal industry classifications do not provide for one over-arching industry code that encompasses the biosciences.

TEConomy, in its biennial national reports with the Biotechnology Innovation Organization (BIO) has developed an evolving set of major aggregated subsectors that group the bioscience industry into five key components.[3] This national definition utilizes 25 detailed industries that must be combined and grouped to best organize and track the industry in its primary activities.[4]

The five national industry subsectors—best thought of as the private sector led "Industrial Biosciences," include:

AGRICULTURAL FEEDSTOCK AND INDUSTRIAL BIOSCIENCES

Firms engaged in agricultural research and development, processing, organic chemical manufacturing, and fertilizer manufacturing. The subsector includes industry activity in the production of ethanol and other biofuels.

- Examples of Region 9 companies: AgroSpheres; Bonumose; BIO-CAT.

BIOSCIENCE-RELATED DISTRIBUTION

Firms that coordinate the delivery of bioscience-related products spanning pharmaceuticals, medical devices, and ag biotech. Distribution in the biosciences is unique in its deployment of specialized technologies including cold storage, highly regulated monitoring and tracking, and automated drug distribution systems.

- Examples of Region 9 companies: Owens & Minor; Cardinal Health.

3 TEConomy Partners and BIO, *The U.S. Bioscience Economy: Driving Economic Growth and Opportunity in States and Regions*, 2024.
4 A list of detailed industry NAICS codes that define each of the major bioscience industry subsectors is included in the Appendix to this report.

MEDICAL DEVICES AND EQUIPMENT

Firms that develop and manufacture surgical and medical instruments and supplies, laboratory equipment, electromedical apparatus including MRI and ultrasound equipment, and dental equipment and supplies.

- Examples of Region 9 companies: MicroAire Surgical Instruments; RIVANNA Medical; Lighthouse Instruments.

PHARMACEUTICALS

Firms that develop and produce biological and medicinal products and manufacture pharmaceuticals and diagnostic substances.

- Examples of Region 9 companies: Afton Scientific; Rivus Pharmaceuticals.

RESEARCH, TESTING, AND MEDICAL LABORATORIES

Firms engaged in research and development in biotechnology and other life sciences, life science testing laboratories, and medical laboratories. The subsector includes contract and clinical R&D organizations.

- Examples of Region 9 companies: UVA Medical Laboratories; PRW Laboratories.

These five subsectors, however, do not fully encompass the region's full set of relevant biosciences activities and the demand for workforce and talent overlaps with others. TEConomy, in a facilitated discussion with the project Advisory Coalition, recommended including the following additional subsectors given their prominence and importance in the region and overlapping talent demands:

DIGITAL HEALTH

Firms that develop digital tools and platforms to support health and wellness, including mobile health apps, clinical and wellness software, information processing, and patient safety systems. Federal industry classifications do not isolate digital health employment from broader IT/tech sectors; therefore, a database of regional companies and their estimated current regional employment for the subsector was developed specifically for this project effort

- The region has a sizable base of companies leading innovations in areas such as patient monitoring, visualization, simulation, and predictive analytics.
- Examples of Region 9 companies: Springbok Analytics; ArcheMedX, Inc.

COLLEGES AND UNIVERSITIES

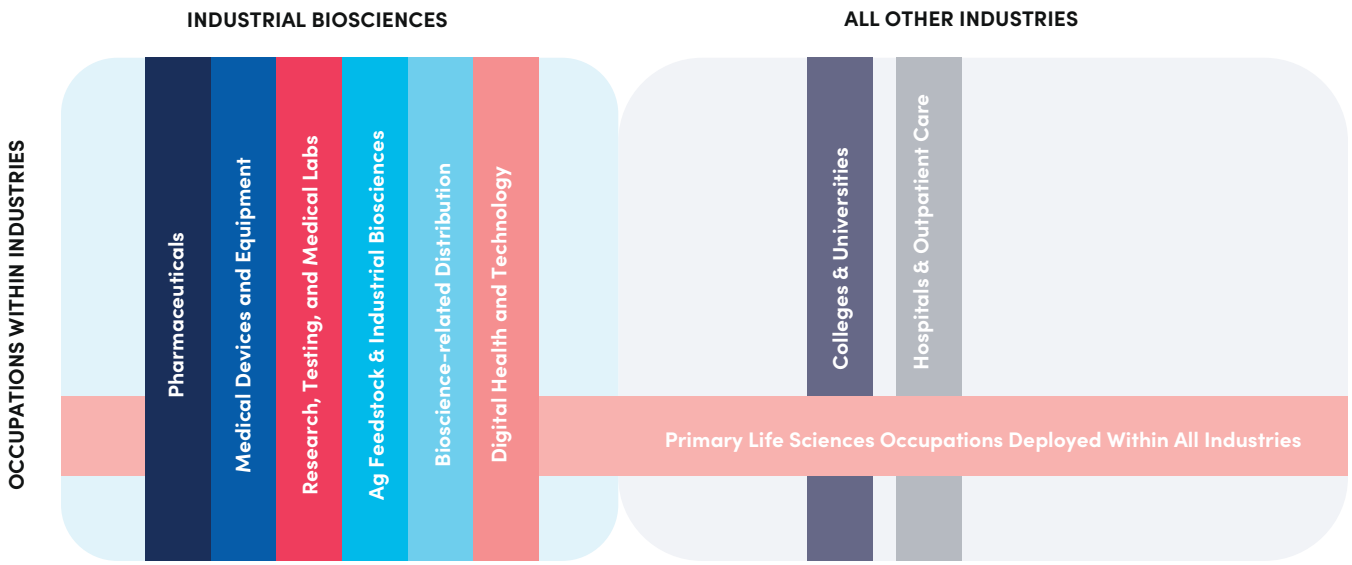
In Region Nine's context, this is the demand for bioscience-related research scientist, lab technician, engineering, and other related workforce at UVA that competes with the private sector industrial biosciences for overlapping talent needs. This relatively narrow slice of relevant employment has been estimated by TEConomy by applying the sector's share of "primary" life sciences occupational employment that do not include teaching faculty occupations but instead isolate the relevant occupational employment in research and related support staff.

HOSPITALS AND OUTPATIENT CARE

This includes the academic and other medical research and healthcare services complex in the region that recognizes its importance to Central Virginia's biomedical innovation and clinical research activities and strengths as well as its talent demands that overlap with private sector industrial biosciences workforce needs in areas such as medical scientists, lab technicians, medical technicians, data scientists, software development, etc. As with the universities segment, TEConomy has applied a sharing factor for primary life sciences occupations to isolate this relevant demand for regional talent that does not include physicians, nursing, allied health, and other primarily clinical or health services roles.

- Examples of Region 9 companies: UVA Health, Sentara Health

FIGURE 2. CENTRAL VIRGINIA BIOSCIENCE INDUSTRY AND ITS MAJOR SUBSECTORS



Source: TEConomy Partners, LLC.

A Growing and Dynamic Regional Industry Cluster: Setting the Context for Workforce & Talent Demand

The bioscience industry in Central Virginia is sizable and growing at a rapid rate. In 2024, the regional sector employed 2,100. Bioscience employment is distributed relatively evenly across several industry subsectors though is led by the "primary" bioscience-related employment in the region's colleges and universities as well as research, testing, and medical laboratories, each with approximately 500 regional jobs (Table 1). Medical device manufacturers employ more than 350 and regional bio-related distributors support payrolls totaling nearly 300.

Bioscience jobs have an outsized or "specialized" concentration in Region 9 relative to national averages in the colleges and universities and state and local hospitals subsectors, reflective of the large and highly concentrated employment of a leading research institution (UVA) and its academic medical center and hospital system (UVA Health) in a relatively modest-sized region. Central Virginia has a roughly five times greater concentration of jobs in these two subsectors relative to national averages. Employment concentration is a useful and valuable way in which to gauge the relative importance of an industry like the biosciences to a regional or state economy. Regional location quotients (LQs) measure the degree of job concentration locally relative to the national average. States or regions with an LQ greater than 1.0 are said to have a concentration in the sector. When the LQ is significantly above average, 1.20 or greater, the region is said to have a "specialization" in the industry.

Location quotients can also be measured and provide important insights for a region relative to statewide averages, in this case for the Commonwealth of Virginia. Under this concept, four Central Virginia subsectors have specialized concentrations relative to other regions—the universities and hospitals context mentioned

TABLE 1. CENTRAL VIRGINIA'S BIOSCIENCE INDUSTRY AND MAJOR SUBSECTORS—SUMMARY EMPLOYMENT, ESTABLISHMENT METRICS, 2024

Industry Subsectors	Establishments, 2024	Employment, 2024	VA LQ, 2024	U.S. LQ, 2024	Growth, 2019-24	VA Growth, 2019-24	U.S. Growth, 2019-24
Agricultural Feedstock & Industrial Biosciences	2	10	0.45	0.14	96.9%	52.8%	3.8%
Bioscience-related Distribution	29	291	0.73	0.45	33.2%	35.3%	14.3%
Medical Devices & Equipment	23	353	2.81	0.92	26.9%	12.4%	3.2%
Pharmaceuticals	16	161	1.48	0.47	110.5%	-7.5%	13.8%
Research, Testing, & Medical Laboratories	74	525	0.96	0.68	14.6%	20.5%	22.7%
Digital Health Technology*	24	168	n/a	n/a	n/a	n/a	n/a
Colleges and Universities**	31	483	4.53	4.71	41.4%	7.3%	-9.8%
Private Hospitals and Outpatient Care**	73	103	0.54	0.45	-2.7%	3.4%	4.7%
State and Local Hospitals**	6	174	12.12	5.43	-20.9%	-12.8%	7.5%
Bioscience Industry Total (excl. Digital Health)	**254**	**2,100**	**1.37**	**0.81**	**23.2%**	**17.1%**	**12.2%**
Total Private Sector	**15,122**	**129,806**	-	-	**2.4%**	**4.4%**	**4.8%**

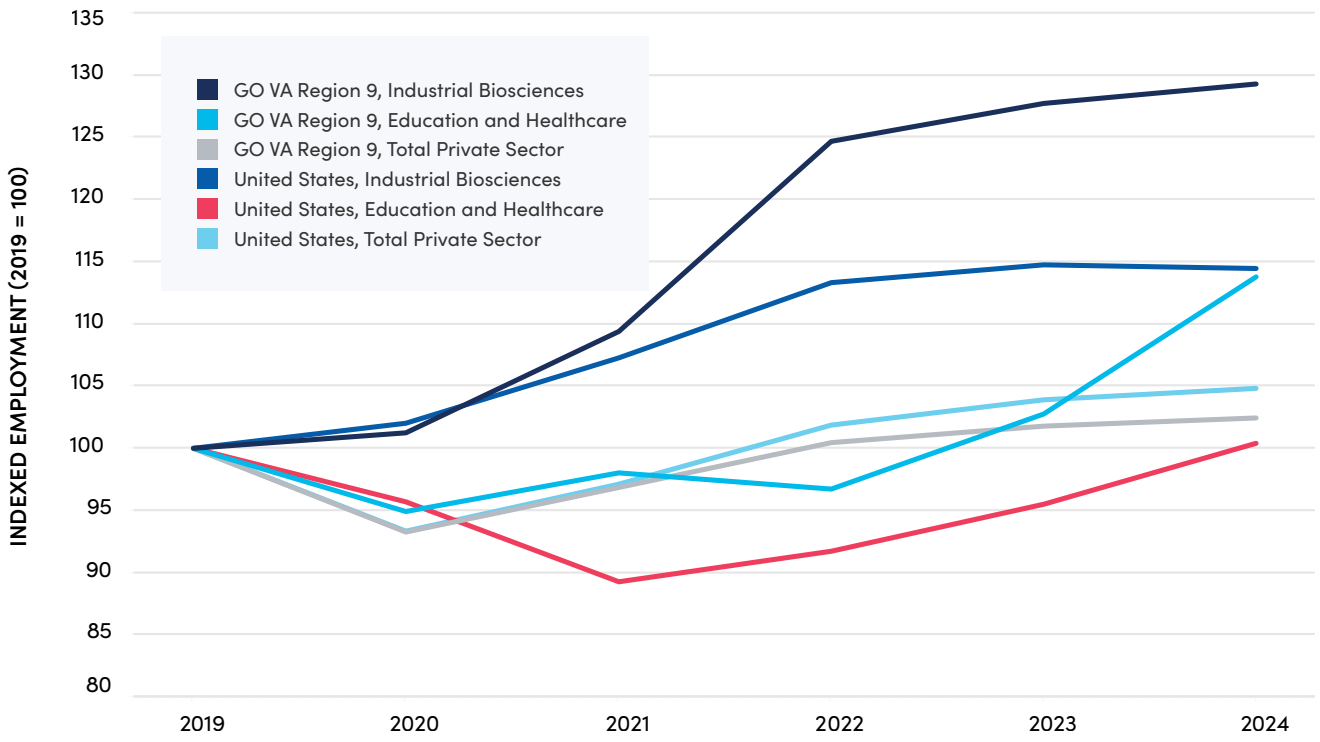
*Note: Digital Health companies identified and employment data estimated through additional sources, including PitchBook, SBIR/STTR databases, Hoovers D&B, CvilleBioHub.
**Note: Includes only the portion of these sectors engaged in relevant life sciences activities, focused on clinical and life sciences scientific R&D-related personnel (i.e., non-clinical and excluding core teaching faculty).
Source: TEConomy analysis of Lightcast (2025.3) QCEW data.

above, in addition to medical devices and equipment (state LQ is 2.81) and pharmaceuticals (state LQ is 1.48). This status emphasizes the importance of Central Virginia to the state's overall biosciences industry cluster and its development.

Central Virginia's recent bioscience industry growth has outpaced that for both the state and the nation, with regional employers increasing payrolls by a net 23% growth rate since 2019. Further, the biosciences have far outpaced overall regional private sector growth (up 2.4% since 2019), confirming the cluster's importance as a significant economic engine for Region 9 that is driving overall regional economic growth (see Figure 3).

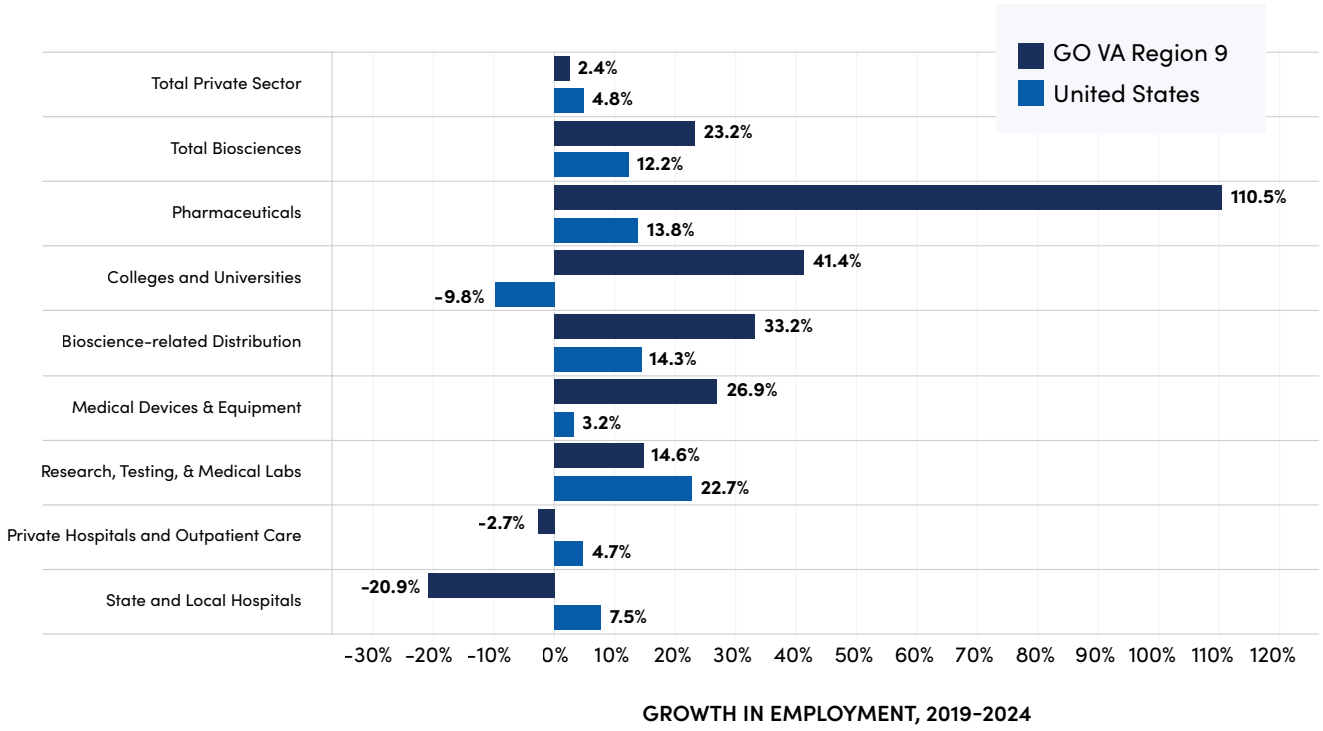
This impressive regional biosciences job growth has been widespread with net job gains since 2019 across six of the eight subsectors for which growth can be measured. While the employment base is modest for some of the subsectors and can translate into very high percent changes, the well distributed job gains are encouraging for the region in the context of a "diversified" portfolio of growth opportunities. Job growth has been led by the industrial biosciences subsectors seeing growth across the board, while the biosciences components of the state/local hospitals subsectors have seen modest employment declines (Figures 3 and 4).

FIGURE 3. BIOSCIENCE INDUSTRY AND PRIVATE SECTOR EMPLOYMENT TRENDS FOR CENTRAL VIRGINIA AND U.S., 2019-2024 (EMPLOYMENT INDEX, 2019 = 100)



Note: Industrial biosciences trend growth excludes the digital health subsector.
Source: TEConomy analysis of Lightcast (2025.3) QCEW data.

FIGURE 4. BIOSCIENCE INDUSTRY AND PRIVATE SECTOR EMPLOYMENT CHANGE FOR CENTRAL VIRGINIA AND U.S., 2019-2024



Note: The AgBiosciences subsector has been excluded due to low employment.
Note: Total Biosciences excludes the digital health subsector.
Source: TEConomy analysis of Lightcast (2025.3) QCEW data.

Planned and Recent Bioscience-Related Investments, Expansions Fueling Both Recent and Expected Future Regional Growth

AFTON SCIENTIFIC: MAJOR EXPANSION ACCELERATES TALENT DEMAND

Afton Scientific has launched a $200 million expansion in Central Virginia, including a new 285,000 sq. ft. sterile-injectable manufacturing facility that will add roughly 200 jobs and significantly increase commercial capacity. The company is also building out new laboratory space to support development and quality operations. The project brings in advanced aseptic manufacturing technologies, raising demand for skilled clean-room operators, aseptic technicians, process engineers, and QA/QC scientists. Afton is coordinating with state and regional workforce partners to meet rising needs for trained biomanufacturing and lab talent as the region's bioscience sector continues to scale.

AGROSPHERES — FACILITY EXPANSION IN ALBEMARLE COUNTY

AgroSpheres is accelerating its growth in Central Virginia: following a $37 million Series B funding round, the company is scaling up its biomanufacturing capacity and expanding its product pipeline. In June 2025, they launched their first commercially available biofungicide, FUN THYME, built on their proprietary AgriCell encapsulation platform — a milestone that shifts them from R&D toward full commercial production. This expansion and commercialization increase demand for specialized staff — from biomanufacturing technicians and formulation scientists to regulatory-compliance and quality personnel — as the company ramps up volume and broadens market reach.

ASTRAZENECA — $4.5B PLANT ADVANCING FUTURE BIOPHARMA GROWTH

AstraZeneca recently announced it is investing $4.5 billion to build two new manufacturing facilities at the Rivanna Futures Site in Albemarle County, Virginia, marking the company's largest single-site investment globally. The plants will produce a mix of drug substances—including small molecules, peptides and oligonucleotides for metabolic/weight-management treatments and antibody-drug conjugates for oncology—underscoring a broad scope of future output. The project is expected to generate about 600 highly skilled direct jobs (engineers, scientists, process facilitators, etc.), with roughly 3,000 additional construction and indirect jobs during build-out. By bringing new sophisticated manufacturing capacity to Central Virginia—supported by state and local incentives and workforce-training programs—AstraZeneca's entry further cements the region's emergence as a national-scale biosciences hub.

BONUMOSE — RARE-SUGAR MANUFACTURING EXPANDS IN ALBEMARLE

Bonumose has opened a 50,000 sq. ft. tagatose production and R&D facility in Charlottesville/Albemarle County, delivering on its $27.7 million-plus expansion plan in partnership with The Hershey Company and ASR Group. The build-out converted a formerly vacant building into a manufacturing hub that has already created dozens of local jobs, and previously committed plans called for adding about 64 jobs as part of the expansion. Beyond tagatose, the facility is intended to support additional rare-sugar and enzyme-derived ingredient development, pointing to growing demand for process technicians, enzyme-engineering scientists, quality-control staff, and supply-chain roles. By anchoring operations in Albemarle and tapping into the region's labor pool — including connections to local universities — Bonumose signals continued commitment to Central Virginia as it scales its manufacturing and commercialization efforts.

BIO-CAT — MAJOR FERMENTATION FACILITY EXPANSION

BIO-CAT Microbials advanced its manufacturing footprint in Virginia with a $35 million expansion of its fermentation facility in Troy, announced in 2022 — expanding capacity by adding an initial 53,800 sq. ft. and room for a further 100,000 sq. ft. build-out. The upgrade supports a more than 400% increase in microbial fermentation output, including expanded manufacturing, quality labs, and an R&D center — enabling BIO-CAT to scale production of its proprietary microbial strains for human, animal, and crop-science markets. As part of the expansion's initial phase, the company planned to create about 20 new full-time jobs in manufacturing, R&D, and quality-control roles, signaling growing demand for trained staff with fermentation, QC, and microbial-production expertise. With this investment, BIO-CAT strengthens its presence in Central Virginia, helping anchor the region's broader bioscience and microbial-manufacturing ecosystem while positioning to support both domestic and export markets.

UVA'S MANNING INSTITUTE — A NEW UNIVERSITY BIOTECH INNOVATION ANCHOR FOR CENTRAL VIRGINIA

UVA is building a 350,000 square-foot, state-of-the-art biotechnology facility at Fontaine Research Park, funded through a combination of a major $100 million lead gift, state support, and university investment. The facility recently reached a "topping-out" milestone (final steel beam installed October 2025), bringing it significantly closer to completion. Once online, the institute will enable advanced research, development, education and training, and manufacturing—including cellular and gene therapies, drug delivery, immunology, and nanotechnology—and aims to accelerate translation of discoveries into patient therapies. Given its scale and ambition, the Manning Institute is expected to attract top scientific talent and catalyze hundreds of skilled jobs.

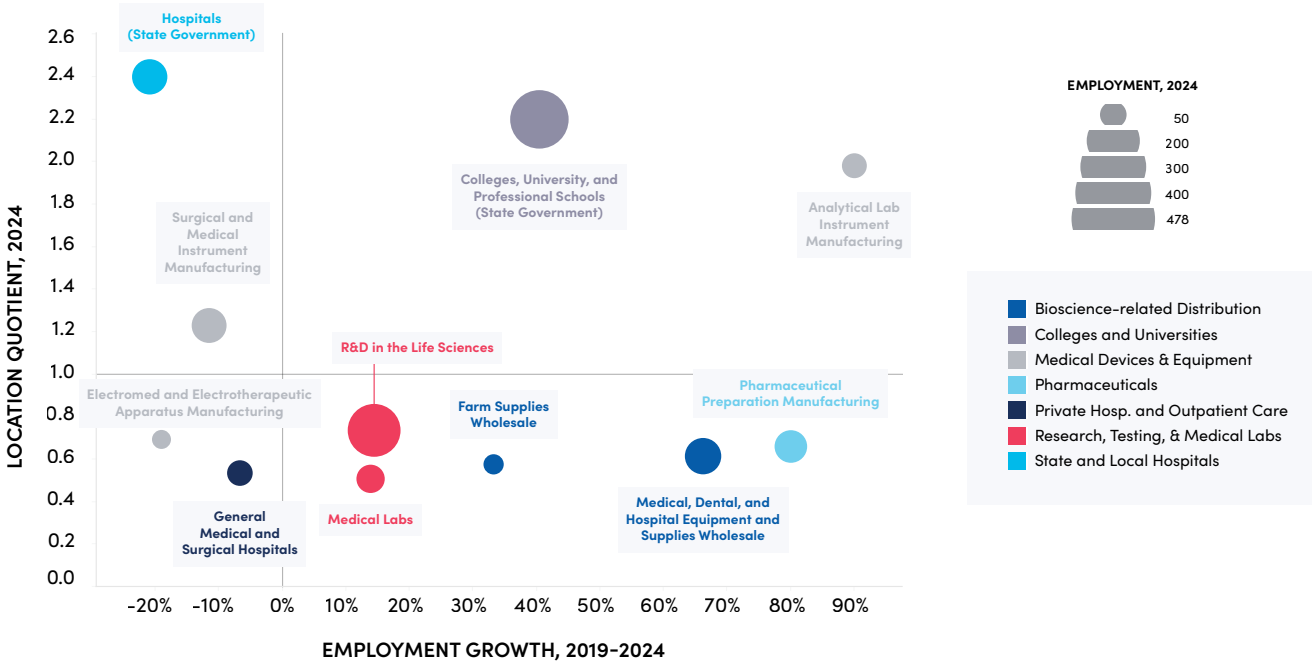
The region's recent growth and unique industry strengths are further illuminated by the performance and position of the detailed industries that underlie each major industry subsector. The "bubble" chart in Figure 5 highlights this positioning of each of Central Virginia's detailed industries with at least 50 jobs in 2024 and color-coded by subsector considering three key variables—the relative employment size of the cluster (represented by the size of the bubbles), the recent net growth rate for employment (plotted along the horizontal axis), and the industry's employment concentration relative to the national average, calculated as a location quotient along the vertical axis.

- **Two industries are positioned in the upper right quadrant of the graphic signaling their status as "star performers" for Region 9—positioned as both an outsized or specialized concentration for the region as well as a growth sector.** These include the bioscience-related components of colleges and universities, where the region's outsized concentration yields a LQ that is literally off the chart at nearly 8 times the national average concentration; and analytical lab instrument manufacturing, which is not only specialized but has grown its modest jobs base by nearly 300% since 2019.

- **A range of several additional industries are "emerging" in Region 9 as they have experienced job growth (in several cases at an especially rapid pace) but are not yet specialized in their employment concentrations.** These emerging areas include fast-growing pharmaceutical production in small molecules; two distribution sectors—for medical devices and equipment and farm supplies which often includes the development and distribution of seeds; medical labs, and commercial R&D in the life sciences. Growth in this last segment is especially encouraging and exciting as it includes pre-commercial development stage biotech firms driving innovation and working toward commercially viable products, it also includes contract research organizations (CROs).

- **Among the industries "diverging" in the employment-driven economic analysis is the region's surgical and medical instruments sector.** The sector, which includes the production of everything from syringes and hypodermic needles to anesthesia apparatus, blood transfusion equipment, catheters and surgical clamps, is specialized in the region with a national LQ of 1.23. Since 2019, the industry has shed nearly 12% of its regional jobs base and therefore represents an important leading strength for Region 9 to monitor. The bioscience-related components of the hospitals sector included in this analysis—which include medical scientist roles, clinical research, lab technicians, data scientists, and other roles that overlap with the industrial biosciences subsectors—have seen net job declines since 2019.

FIGURE 5. POSITION AND RECENT PERFORMANCE OF DETAILED BIOSCIENCE INDUSTRIES (50+ JOBS), CENTRAL VIRGINIA, 2019-24



Source: TEConomy analysis of Lightcast (2025.3) QCEW data.

Looking ahead, current projections for overall bioscience industry employment in Central Virginia point to continued future growth. These existing projections, developed by state and federal labor agencies, however, have not factored in the very recent local announcement of AstraZeneca's manufacturing operations as well as the significant near-term hiring plans associated with the expansion of Afton Scientific or UVA as it ramps up hiring around the new Manning Institute. So, while available projections have the industry continuing to increase its employment base by 15% to 2030, there are already expectations of new job creation in the coming years that will well exceed this growth rate. For example, the AstraZeneca investment is expected to generate 600 new highly skilled jobs in Central Virginia including for engineers, scientists, and process facilitators. This addition alone could ramp up the 2030 regional industry employment projection to a 44% increase from 2024 levels. This emphasizes the need for a focused strategic plan for addressing what is expected to be an even more significant pace of hiring and talent demand over the next three to five years.

What the Region's Occupational Staffing Mix and Job Postings Reveal About the Demand for Workforce and Talent in the Biosciences

Critical for this study and strategic planning effort is understanding the specific occupations and roles that are in high demand and represent a high priority for regional cluster competitiveness and enabling both current and future growth. Several data-driven analyses are leveraged to identify high-demand, high-priority roles, including:

- Industry staffing patterns data, to determine which occupations have grown at significant, rapid rates in recent years within Region Nine's biosciences cluster. Staffing patterns data profile the current occupational employment structure and distribution within a given industry and allow for tracking growth and evolution of that mix over time.

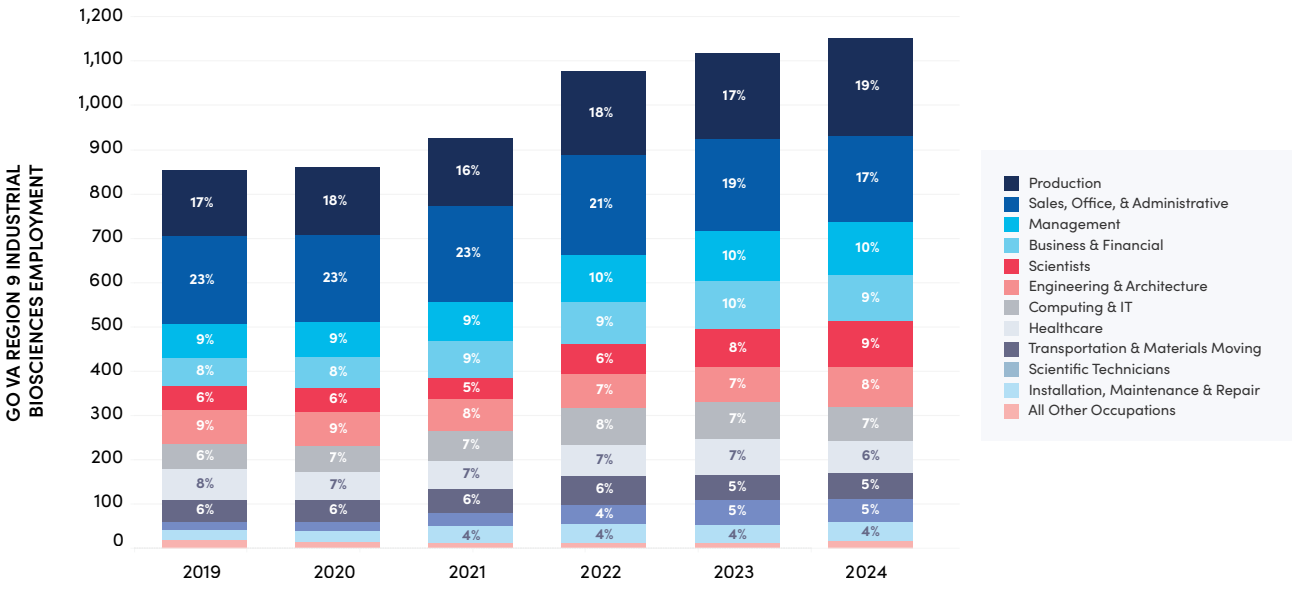
- Industry job postings, which provide insights into the real-time demand for talent and specific job titles and skill sets in-demand by bioscience companies, as well as universities, and health systems relevant for this study.

Ultimately, these quantitative approaches are complemented by the insights and inputs from regional industry executives in a workforce and talent demand survey as well as one-on-one interviews, presented in the next section.

In recent years and amidst industry growth, the region's occupational staffing mix has not shifted significantly, though there has been some evolution. As shown in Figure 6, Central Virginia's occupational staffing within the industrial biosciences component of the industry continues to be led by its deployment of production workers; sales, office, and administrative roles; and management. These are followed by smaller though still significant shares of specialized roles in business functions, scientific, engineering, IT, and other occupational areas.

Since 2019, the skilled production workforce in the industrial biosciences has grown as a proportion of industry employment by 2 percentage points—reflecting growing manufacturing operations and emphasis in the regional biosciences. The industry's deployment of scientists has also increased, with these professionals' share of sector jobs increasing from 6% to 9% over this latest 5-year period. At the same time, sales, office, and administrative roles have declined in their share, decreasing by 5 percentage points. These signal areas of evolving demand as the industry has grown and point to key areas in which to probe and further assess in the qualitative interview and survey components.

FIGURE 6. OCCUPATIONAL STAFFING OF CENTRAL VIRGINIA'S INDUSTRIAL BIOSCIENCE SUBSECTORS, BY MAJOR OCCUPATIONAL GROUPINGS, 2019-24



Source: TEConomy's analysis of Lightcast (2025.3) Staffing Patterns data.

In addition to high-level insights on the industry's evolving staffing mix, industry staffing patterns data reveal what makes the regional workforce and talent blend unique relative to other geographies. This can be affected by the underlying industry mix and value-adding activities ongoing in the region. Figure 7 compares the high level occupational employment groupings of Region Nine's industrial biosciences sector against that for the Commonwealth overall as well as the nation. Central Virginia's deployment of occupations stands out in several ways:

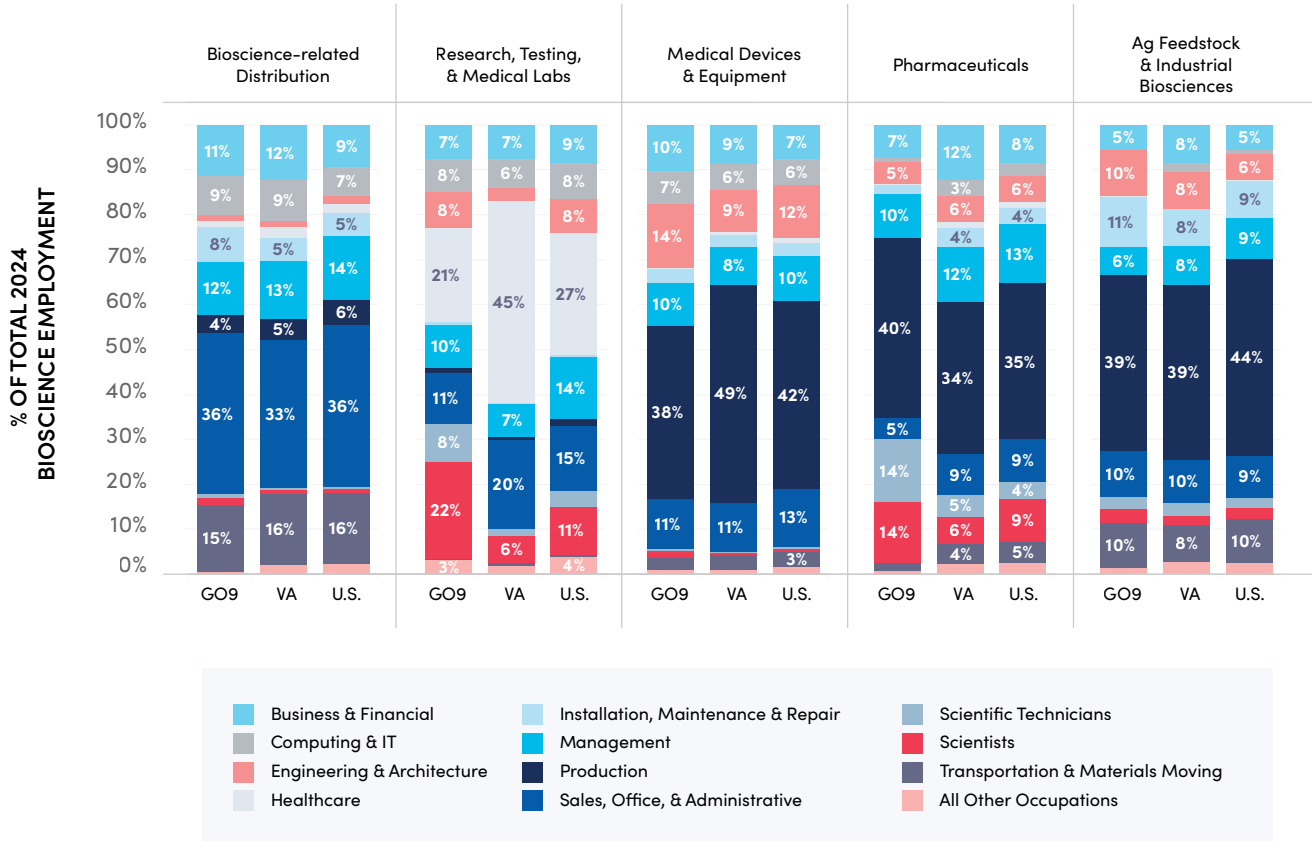
- The region's deployment of scientists in its research, testing, and medical labs subsector is significantly greater than that same share for Virginia overall, and the U.S. At 17% of regional occupations in the subsector, the share of scientific professionals is well above national and state averages and signals a subsector that is significantly more concentrated in high-value R&D and pre-commercial biotech innovation than its counterparts nationally.

- Region Nine's medical device manufacturers are deploying a greater share of engineering professionals relative to Virginia overall and the nation. In an innovative, engineering-intensive advanced industry like medical devices, this outsized employment share—at 13% of total employment—signals a regional subsector that is driving new product development and innovating on process and product engineering.

- In pharmaceuticals, Central Virginia companies are employing greater and more intensive shares of several key occupations including skilled production workers, scientific technicians, and scientists. This is consistent with the region's focus on small to mid-sized early-stage biopharmaceuticals and their production, rather than what dominates the industry nationally with large, often multinational pharmaceutical production operations that include large numbers of management and business functions, sales functions, and transportation and material moving, all areas in which Region 9 has lower shares of current roles.

To ensure an actionable strategy it is important, as with the industry employment analyses, to examine the concentrations and trajectories of the most detailed occupations deployed in the region's industrial biosciences cluster. Each of the major occupational groupings discussed above is comprised of a set of detailed occupations which are presented in the bubble chart in Figure 8, which again utilizes LQs to measure concentration relative to both the nation and the Commonwealth. In this graphic, the LQs are plotted using national comparisons, but those detailed roles that have a "specialized" concentration relative to Virginia averages, are designated with a star.

FIGURE 7. OCCUPATIONAL STAFFING OF INDUSTRIAL BIOSCIENCE SUBSECTORS, BY MAJOR OCCUPATIONAL GROUPINGS FOR CENTRAL VIRGINIA, VIRGINIA, AND THE U.S., 2024



Source: TEConomy's analysis of Lightcast (2025.3) Staffing Patterns data.

While caution should be exercised in over-emphasizing the employment size of individual detailed occupations in what is a relatively modest-sized region, the growth and relative concentrations reveal strong demand dynamics for a number of key occupations in the industrial biosciences, including:

- Medical scientists, where the region has significant employment levels, 44% growth since 2019, and a highly specialized concentration nearly three times national averages.

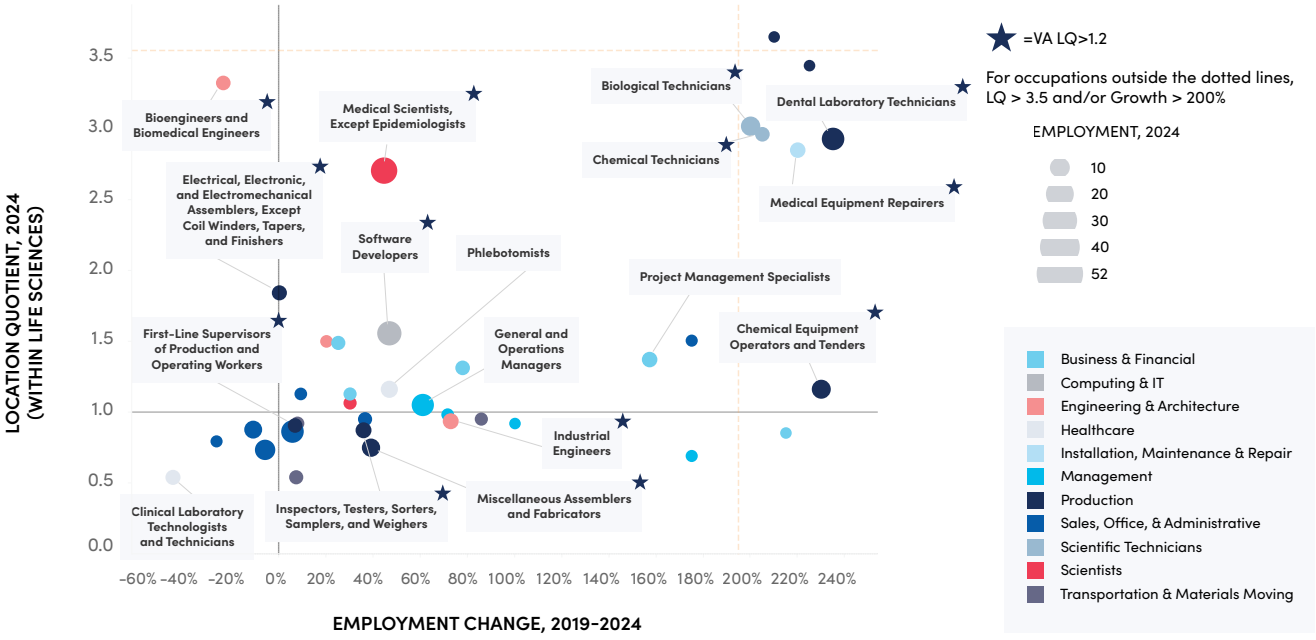
- Several skilled technician roles critical to biosciences lab, R&D, and production operations including biological, chemical, and dental lab technicians, as well as phlebotomists. Each is highly specialized in its concentration of regional jobs and has been growing at an especially rapid rate.

- Skilled production roles that are demonstrating strong growth in the biosciences including chemical equipment operators; inspectors, testers, and sorters (which is inclusive of selected QA/QC roles); and assemblers and fabricators.

- Engineering roles, led by a highly specialized cohort of regional bioengineering professionals, as well as a growing demand for industrial engineers.

- Software development, which has a specialized concentration in the region's industrial biosciences sector and has been growing strongly.

FIGURE 8. DETAILED OCCUPATIONS IN CENTRAL VIRGINIA'S INDUSTRIAL BIOSCIENCES SUBSECTORS—EMPLOYMENT SIZE (SIZE OF BUBBLE), RECENT TRENDS, AND CONCENTRATION, 2024



Source: TEConomy's analysis of Lightcast (2025.3) Staffing Patterns data.

What is not factored into Figure 8 due to data limitations in the state/federal industry staffing patterns estimates is the strong, concurrent demand for many of these roles at UVA and within regional healthcare systems. In many cases, these subsectors reinforce and amplify the demand context for a number of key occupations. The bio-relevant industry employment estimates for the universities and healthcare subsectors presented earlier in this section (refer to Table 1) are indeed that, estimates. These are useful for gauging existing employment and a sense for talent demand at a high level; however, there is no available government data with the granularity in state-federal staffing patterns that is presented here for detailed bioscience-related occupations.

As a strategic partner in this effort, UVA has provided real-time intelligence on recent employment levels and job requisitions for a set of bio-relevant roles to assist in filling the demand-side gaps in the federal data. These are highlighted in the callout below.

Spotlighting Workforce and Talent Demand at UVA and UVA Medical Center: Insights from Administrative Data

Administrative data on several facets of UVA's bioscience-relevant workforce and staffing were provided to TEConomy to better understand overall talent demand dynamics including occupational employment levels, open job requisitions by department, and high-level turnover rates. The data reinforce unique aspects of university biosciences research infrastructure and academic medical center employment composition, as well as the overlapping demand for regional workforce and talent with private sector industry described in this section. UVA Human Resources provided data to TEConomy in mid-2025.

BASELINE, EXISTING EMPLOYMENT INSIGHTS:

In terms of baseline employment in bio-relevant roles and occupations in mid-2025, there are large concentrations of existing employment across UVA's academic research complex in the following areas:

- **Laboratory Research,** with 250 employed in roles such as Lab Research Technicians, Lab Specialists, and Lab Managers; reinforcing the region's significant demand for lab technicians and related expertise and skills.
- **Senior Professional Research Staff,** totaling 243 and inclusive of Research Scientist and Senior Research Scientist Roles specific to life sciences. These are non-faculty roles tied to research grants. These teams are supported and complemented by a very large cadre of Post-Doctoral Research Associates, totaling 450.
- **Clinical Research**, with 121 employed as Clinical Research Coordinators.
- Additional numbers of smaller relevant cohorts, though still significant job totals, for this study which span Animal Caregivers supporting research infrastructure; Biostatisticians; Data Scientists and Analysts, and others.

Additionally, the University has large employment within its academic medical center complex (UVA Medical Center) in particular in:

> **Medical Laboratories,** with just over 300 employed in a variety of scientific, technician, and support roles that span and include Clinical Lab Scientists, Specimen Management Technicians, Phlebotomists, Lab Technologists, Lab Supervisors, Cytotechnologists, and more.

Reconciling these data against the industry estimates of bio-relevant occupational employment presented earlier in this section finds a somewhat greater level of employment revealed by these administrative data relative to the "partial" employment estimated using traditional occupational classification shares. The administrative data have the advantage, however, of being able to bring in large cohorts of Post-Doctoral researchers, which in the state/federal data are blended with non-relevant postsecondary teaching occupations (i.e., professors and general faculty counts). Regardless, the orders of magnitude across the university and healthcare subsectors are, in general, confirmed and reinforced by these totals.

JOB OPENINGS/REQUISITION INSIGHTS:

Data were provided to the project team for valuable insights regarding open positions for which a job requisition is currently posted—a real-time sense for talent demand with associated job profile information for bio-relevant positions. These administrative data total nearly 70 distinct roles and identify significant pockets of current demand for the following types of roles at UVA in its academic and medical center complexes:

- Lab Technicians and related roles that span Lab Specialists, Clinical Lab Assistants, Phlebotomists, Cytotechnologists, Histotechnologists, and others
- Research Scientists, Research Associates, and Senior Scientists
- Clinical Research Coordinators
- Biostatisticians and Data Scientists

Not surprisingly, these job openings are reflective of the university's current employment base and continual need to meet the demand for both new job openings as well as replacements.

In the context of replacements, the rolling 12-month turnover rate reported for these bio-relevant jobs and occupations is 20.5%. This is not especially high relative to industry rates, though it emphasizes the ongoing demand for workforce and talent represented by replacing workers who leave the university for retirement, other opportunities, etc.

Source: University of Virginia, Human Resources.

Insights from Regional Bioscience Industry Job Postings

While the industry's staffing patterns provide a snapshot of Central Virginia's bioscience industry workforce today, job postings activity can highlight forward-looking demand for talent from the region's industry base. Over a three-year period, from early 2022 through early 2025, Region 9 firms in the industrial biosciences segment generated just over 900 unique job postings for positions located in the region that can provide insights on the types of talent and skills that industry needs to maintain its growth.

Recent industry job postings reinforce the demand for several key occupations seen throughout Central Virginia's bioscience cluster (Figure 9), including:

- As with the staffing patterns, medical labs are hiring phlebotomists at a high rate, classified here under the medical technicians grouping.
- Software developers and engineers are also elevated in recent job postings with a steady demand for IT professionals.
- Quality Assurance and quality control (QA/QC) roles are in demand, spanning technicians, engineers, and management functions in regulated manufacturing operations. These roles are classified more directly in the job postings as opposed to being spread across several federal occupational categories.

Who's Hiring in the Biosciences?

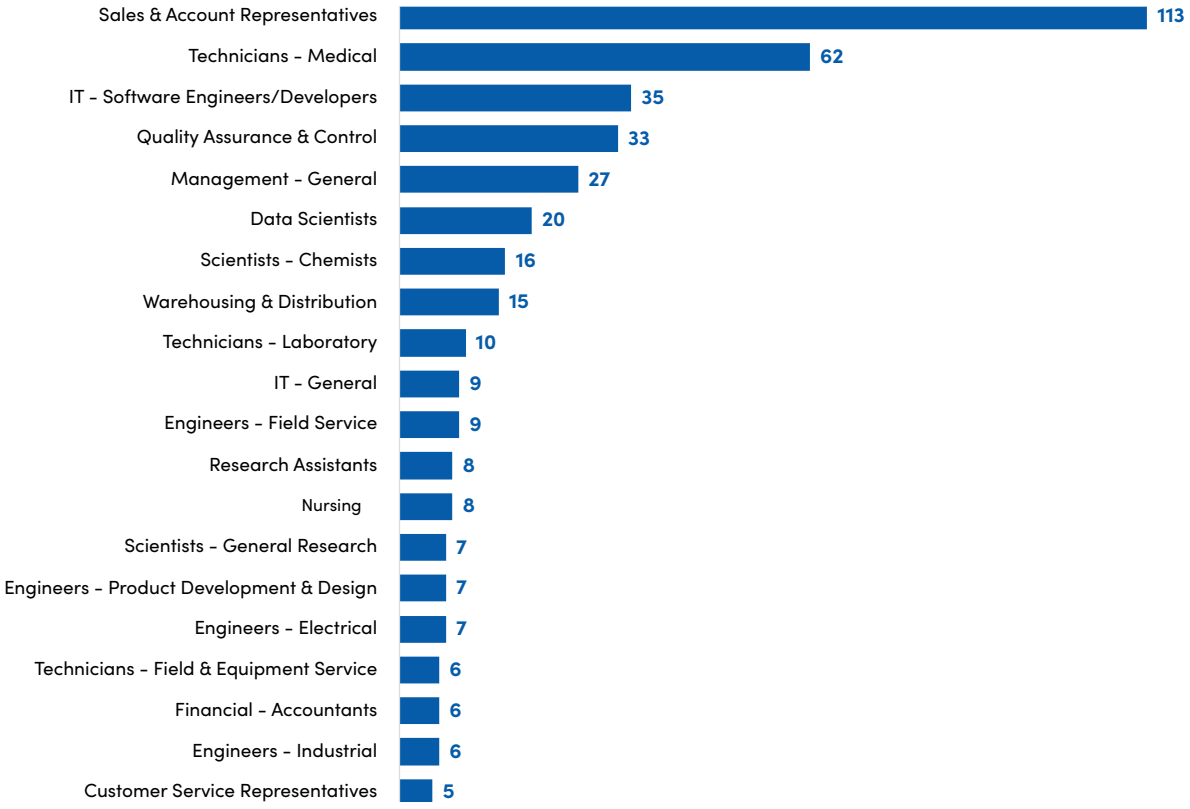
Top Companies by Unique Job Posting Totals for March 2022-March 2025 in Descending Order.

- Abbott Laboratories
- MicroAire Surgical Instruments
- Labcorp
- MRIGlobal
- Stryker
- Quest Diagnostics
- Veralto
- Battelle
- Analytic Services
- Bausch Health
- Johnson & Johnson
- Medtronic
- Icon
- Bio-Cat
- Lighthouse Instruments
- Luna Labs

Source: TEConomy's analysis of Lightcast JPA database, 2025.1.

- Similarly, data scientist roles in the context of job postings are elevated and span demand for job titles such as bioinformaticians, statistical programmers, data engineers, data scientists, and data management roles.
- A high volume of sales representatives is largely indicative of some of the large, national biopharmaceutical and medical device firms hiring for local and regional sales professionals.

FIGURE 9. LEADING JOB TITLES IN CENTRAL VIRGINIA'S INDUSTRIAL BIOSCIENCES JOB POSTINGS, MARCH 2022 - MARCH 2025



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.
Source: TEConomy Partners' analysis of Lightcast, JPA Database, 2025.1.

An additional assessment of job postings is important to pick up the demand for overlapping roles that extend beyond the industrial biosciences. By using a concept of job postings for "primary" life sciences occupations—which span high-skilled life-sciences-specific scientific, engineering, management and middle-skilled engineering, scientific, lab, and medical technician roles—irrespective of industry, the concurrent demand for jobs at UVA, UVA Health, Sentara, and others representing the university and hospitals subsectors is revealed. The demand illustrated in Figure 10 must be thought of as combined demand for workforce and talent with that for the industrial biosciences, reinforcing the demand for roles such as:

- Lab technicians, where extremely high regional demand is evident with more than 450 unique job postings in the last few years for lab techs, lab specialists, specimen techs, pathology and other medical lab techs supporting large university and medical research laboratories in Region 9.

- The strong regional demand for medical scientists driving biomedical research and innovation efforts is further evident in 251 unique job postings, with specialties elevated in the postings that span immunology, neuroscience, pharmacology, toxicology, oncology, and others. Related post-doctoral scientist research positions are seen to have sizable demand as well.

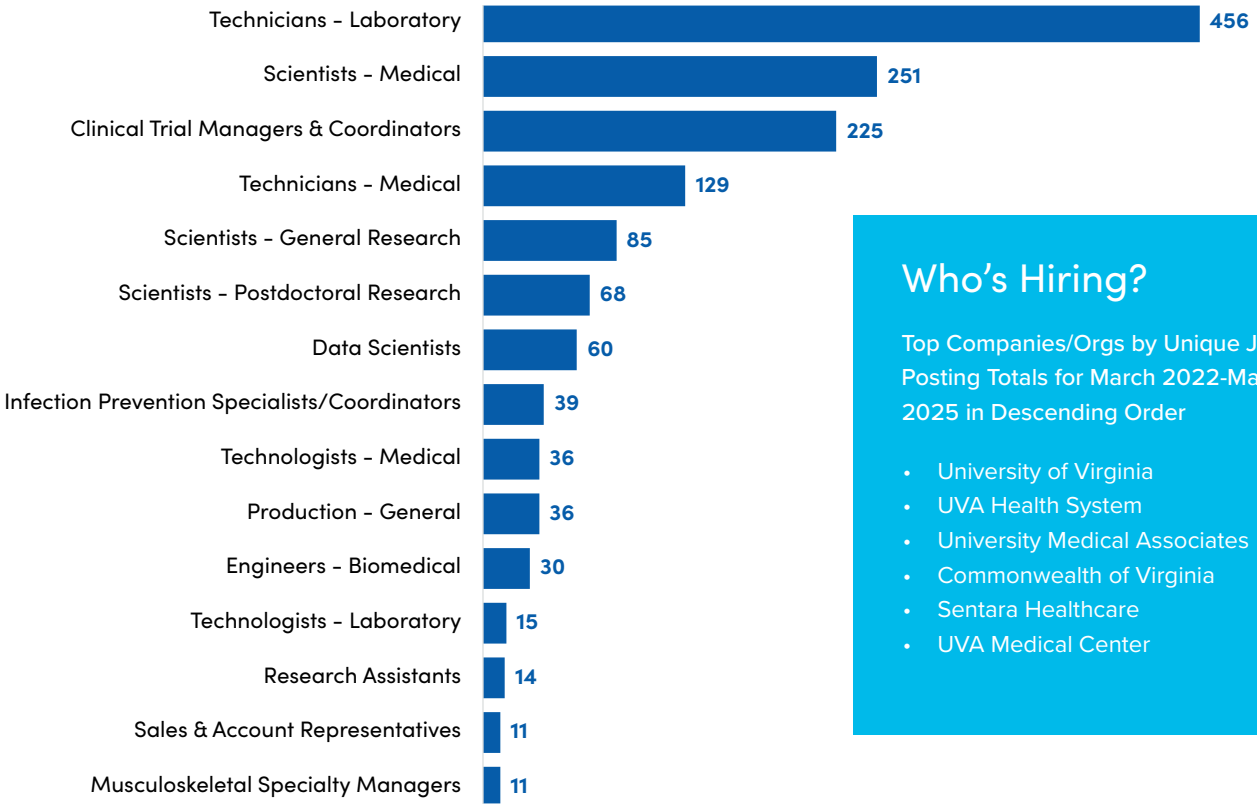
- Not surprisingly, additional unique biomedical research-driven roles are seen from these large employers including strong demand for clinical research expertise in clinical trial managers and coordinators.

- Medical technicians and technologists stand out in this context, with strong demand for histology technicians, cytotechnologists, and related roles.

- Other high-skilled roles with demand that competes with the private sector companies include strong levels of job postings for data scientists and biomedical engineers.

While this job postings query extends beyond just UVA and its academic medical center, the analysis confirms the types of leading roles in open job requisitions provided by UVA in its administrative data described in the preceding callout.

FIGURE 10. LEADING JOB TITLES AND HIRING ORGANIZATIONS IN CENTRAL VIRGINIA FOR PRIMARY LIFE SCIENCES OCCUPATIONS IN JOB POSTINGS, MARCH 2022 - MARCH 2025



Who's Hiring?

Top Companies/Orgs by Unique Job Posting Totals for March 2022-March 2025 in Descending Order

- University of Virginia
- UVA Health System
- University Medical Associates
- Commonwealth of Virginia
- Sentara Healthcare
- UVA Medical Center

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.
Source: TEConomy Partners' analysis of Lightcast, JPA Database, 2025.1.

The Voice of Industry: Complementary Insights from Region 9 Bioscience Employers on Workforce and Talent Demand, High-Demand Occupations

The quantitative analyses provide important insights and signals on the set of occupations that should be considered to be in high demand, but it is vital to have the input of Central Virginia bioscience firms and organizations themselves. Often employers have roles for which the sheer volume of hiring needs and consistent challenges sourcing and hiring candidates represent obvious strategic priorities, while still other times there are key roles for which there is a lesser need in terms of the sheer number of hires, but the role is vitally important for remaining competitive.

Outreach to Region 9 employers, both via a survey as well as through one-on-one interviews with executives, has been key to understanding the signals from the data analyses, but also for allowing them to express the strategic needs for key positions specific to their organization. These key qualitative inputs include:

- **One-on-one interviews with regional private sector bioscience industry executives,** 18 in total; complemented by subsequent interviews with UVA leadership that informed both supply and some demand-related talent aspects.
    - Executives interviewed represent a mix and blend of industry subsectors that span biopharmaceutical manufacturing, medical device manufacturing, pre-commercial biotech, industrial biosciences, instrumentation companies, and contract research.
- **A Region 9 Industry Hiring/Workforce Demand survey, deployed to senior human resources professionals and hiring managers across the bioscience cluster,** completed by 12 companies. The online survey was deployed for 5 weeks in Summer 2025 with a 30% response rate. Responding companies represent 27% of total current regional biosciences industry employment. The survey was designed to inform:
    - Recent hiring trends and dynamics, remote work, the critical nature of key occupations and difficulty hiring, education and skills requirements including the importance of key credentials and specific academic programs, key issues and technologies impacting the workforce, and the use of state workforce programs.

This section focuses on the demand-specific dynamics for talent expressed by regional employers, with the supply side and more complete situational assessment covered in the sections to follow.

Broad-based, demand-related themes that have been elevated by regional bioscience employers in interviews and survey responses include:

- The region's broad, diverse industry base leads to a set of often differentiated, specialized talent demands. The talent and skill needs of Central Virginia's biopharmaceutical manufacturers differ from those of its medical device and MedTech firms, from those of its industrial biosciences firms, etc. This is not unique to Region 9; however, the region's diverse biosciences strengths and corresponding talent demands require attention paid to companies based on unique needs and business situation and maturity (e.g., small startups vs. established SMEs vs. larger more mature companies).

- The nature of demand differs by company stage, with expansion-driven demand seen at mid-sized anchor companies and grant- and project-driven hiring patterns at smaller companies.

- There exists a current, strong demand for numerous roles and skills, some with high-volume needs and others with lower volume demand though of strategic importance and priority to companies.

- The context of the size of firms and demand for talent is important. In the interviews and survey, many Central Virginia bioscience companies are signaling relatively modest demand levels (1-5 hires annually), with more significant hiring potentially driven by planned expansions, regulatory approval, funding, or federal award milestones in the future. This is important to track on an ongoing basis.

- There remains, however, the potential for higher levels of demand to be driven by a select few anchor company investments and expansions and new UVA centers and labs. This has implications broadly on the need to meet both types of demand, with growth across all types of institutions critical to de-risking future talent attraction to the region.

- Regional bioscience employers continue to value and emphasize "soft" or "foundational" skills such as adaptability, cross-functional communication, and mission alignment as retention factors alongside technical proficiency including analytics, digital literacy, and more advanced expertise.

Input from Bioscience Companies, UVA on High-Demand, High-Priority Roles in the Next 1 to 2 Years

Figure 11 highlights the input received from companies as they consider and communicate occupations and roles that for them should be considered high-demand, high-priority. Some have significant levels of demand in terms of sheer volume, while others are more specialized, with lower volumes but representing critical talent demand for ensuring a competitive and viable future for these companies in Central Virginia. University-provided data regarding recent job requisitions represent a critical, complementary input to this assessment and are highlighted in Figure 11 in pink below.

FIGURE 11. HIGH-DEMAND, HIGH-PRIORITY ROLES IDENTIFIED BY CENTRAL VIRGINIA BIOSCIENCE COMPANIES IN INTERVIEWS AND HIRING SURVEY, BY LEVEL OF NEED IN TERMS OF HIRING VOLUME

HIGH-DEMAND, HIGH-PRIORITY ROLES WITH SIGNIFICANT LEVELS OF POSITIONS NEEDED

- Biopharmaceutical Mfg. "Operators"
- Precision Manufacturing Technicians
- Multidisciplinary Engineers
- Field Service Engineers
- Molecular Biologists & Assay Development Scientists
- Customer-Facing Technical Support Staff
- Lab/Research Technicians and Specialists*
- Biomedical Research Scientists/PI's*

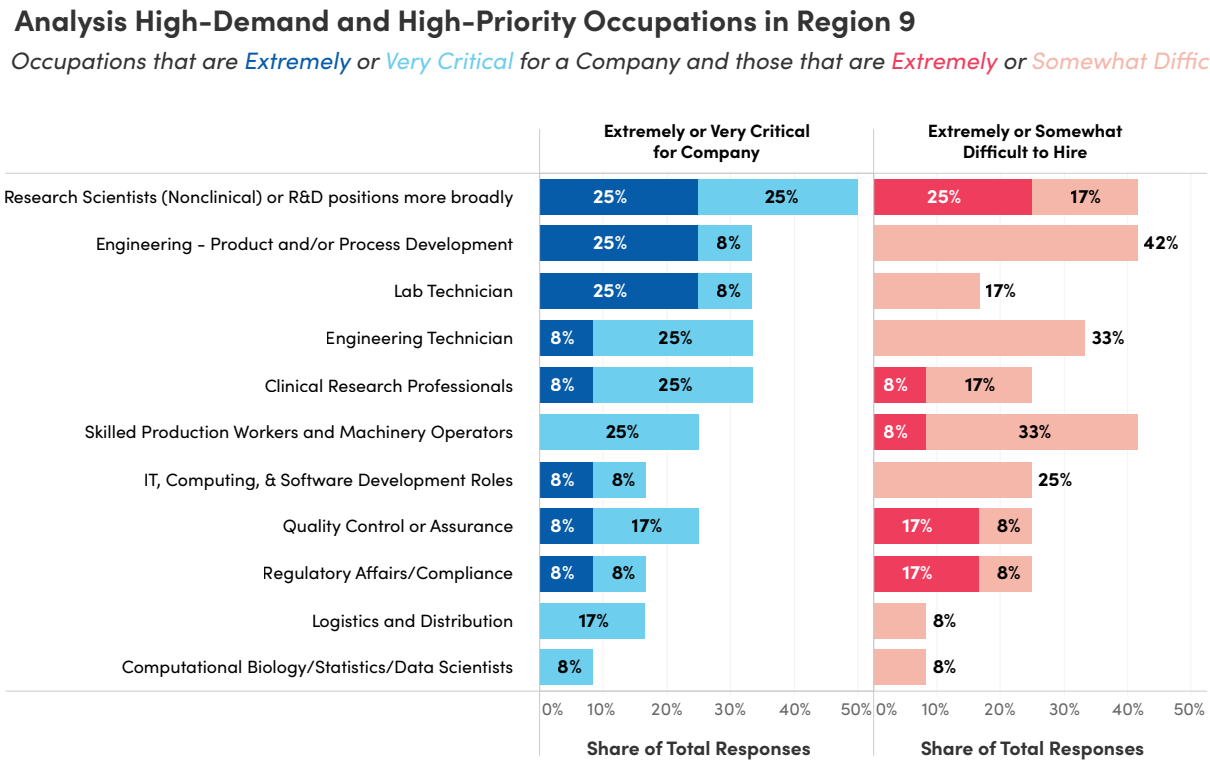
MORE SPECIALIZED, LOWER-VOLUME ROLES CRITICAL TO INDUSTRY

- Regulatory & Quality Assurance Specialists
- Biomedical/Biotech/Drug Sales & Marketing Professionals
- Bioinformatics Specialists
- Clinical Operations Managers
- Project Managers for Translational Science
- Specialized Medicinal Chemistry & Drug Development Scientists
- Industrial Maintenance Professionals

*Indicates demand indicators primarily from UVA job requisitions
Note: pink highlight indicates overlapping demand with UVA hiring based on job requisitions data.
Source: Central Virginia Bioscience Interviews; Industry Hiring/Workforce Demand Survey; and UVA Job Requisitions Data.

Survey results provide important insights into the challenges regional firms are facing in sourcing and hiring for key roles relative to their importance to corporate operations. Figure 12 and Table 2 present and summarize the intersections of the importance of selected roles to firms and the level of difficulty in hiring. While not every conceivable occupation was included in the survey questions, employers report both high-demand dynamics and difficulty in hiring in particular for top talent in research scientist and engineering roles. At the same time, while not considered as "extremely" critical in nature, important skilled production and machinery operator jobs are also reported as difficult to hire.

FIGURE 12. CENTRAL VIRGINIA INDUSTRY HIRING SURVEY—INTERSECTION OF OCCUPATIONAL IMPORTANCE/ CRITICALITY TO COMPANIES AND DIFFICULTY IN HIRING



Source: TEConomy's analysis of Central Virginia Hiring/Workforce Demand Survey.

TABLE 2. SUMMARY OF SURVEY INSIGHTS ON OCCUPATIONAL IMPORTANCE AND DIFFICULTY IN HIRING

Critical for Company, Difficult to Hire	• Research Scientists • Engineers (Process/Product)
Critical for Company, Easier to Hire	• Lab Technician • Engineering Technician • Clinical Research Professional
Less Critical for Company, Difficult to Hire	• Skilled Production Workers

Source: TEConomy's analysis of Central Virginia Hiring/Workforce Demand Survey.

Combining Data-Driven and Qualitative Insights: Identified High-Demand, High-Priority Occupations for Region Nine's Bioscience Industry

Utilizing the varied quantitative and qualitative inputs and assessments that span industry staffing patterns, job postings, employment projections, and input from companies regarding hiring expectations via the survey and interviews, a set of high-demand and high-priority occupations are summarized in Figure 13. Importantly, they are segmented by those with higher-volume demand for talent versus those with lower-volume demand in specialized areas of expertise. The assessment highlights those industry subsectors driving demand for each occupation or grouping, including those identified beyond the industrial biosciences in the universities and hospitals subsectors of the industry via job postings and job requisitions data provided by UVA Human Resources.

In Figure 13, occupations are assigned two check marks for the highest level of significance in the associated data or qualitative input, where there is a clear differentiation of importance based on employment levels or growth, projected growth, or indications of strong demand from job postings and/or from industry input. One check mark signals importance but to a somewhat lesser degree.

Some occupations are showing top-tier significance across nearly all of the inputs to the assessment, including:

- **Medical scientists, biological technicians (aka lab technicians or lab assistants), and medical/clinical lab technicians,** where industrial biosciences firms as well as UVA and the hospitals' clinical research focus are driving significant and broad-based demand. This overlapping demand from private sector employers and the region's university and academic medical institutional context place these roles firmly in the "high volume" categories.

- **Other scientist roles, including chemists, materials scientists, epidemiologists, and microbiologists,** also fall into this context of strong cross-industry demand.

- **Skilled production roles that span machinists, assemblers, inspectors, and CNC operators** in the region's bioscience manufacturing operations also demonstrate high-demand and high-priority across the assessment inputs, with a clear high volume context.

- **In a more specialized, lower-volume context, QA and QC professionals** check nearly all of the boxes in a highly significant context.

FIGURE 13. IDENTIFIED HIGH-DEMAND, HIGH-PRIORITY OCCUPATIONS AND ROLES FOR CENTRAL VIRGINIA'S BIOSCIENCE INDUSTRY

	Occupation/Group	Significant Deployment in Region's Bio Industry	Significant Recent Growth in Region	Significant Projected Growth in Bio Industry	Indication of Strong Demand from Regional Job Postings	Input from Co.'s via Survey, Interviews on Hiring Expectations	Notes
HIGHER-VOLUME DEMAND	Medical Scientists	✓✓	✓✓	✓✓	✓✓	✓	Includes significant demand from Univ, Hospitals Sectors
	Biological Technicians	✓✓	✓✓	✓✓	✓✓	✓	Includes significant demand from Univ, Hospitals Sectors
	Medical/Clinical Lab Technicians	✓✓		✓✓	✓✓	✓	Includes significant demand from Univ, Hospitals Sectors
	Other Scientists	✓✓	✓✓	✓✓	✓	✓✓	Includes Chemists, Materials Scientists, Epidemiologists, Microbiologists
	Skilled Production Roles	✓✓	✓✓	✓		✓✓	Includes Machinists, Assemblers, Inspectors, CNC Operators
SPECIALIZED, LOWER-VOLUME DEMAND	Biomedical Engineers	✓			✓✓	✓	Includes significant demand from Univ, Hospitals Sectors
	IT – Software Development	✓	✓✓	✓	✓✓		
	QA and QC Professionals	✓	✓✓		✓✓	✓✓	
	Other Engineers	✓		*	✓	✓✓	Includes Industrial, Mechanical, Field Svc Engs.
	Data Scientists & Bioinformatics			*	✓✓	✓	Limited but "Emerging" demand in region

*Note: indicates moderate levels of broad-based projected demand not isolated to biosciences industry.
Source: TEConomy's analysis of: Lightcast (2025.3) Staffing Patterns data; Central Virginia Bioscience Interviews; Industry Hiring/Workforce Demand Survey; and UVA Job Requisitions Data.

With the varied demand-side inputs all considered, the occupations identified here represent those for which the region's near-term focus and attention should be attuned to ensure a robust and predictable supply of talent should be met via regional education and workforce training programs and career awareness. This is vital to ensuring regional bioscience firms, UVA, and clinical research talent and skill needs and continued excellence can be met. Ensuring the region is developing, strengthening, and investing in regional talent pipelines for both the high-volume technician, lab support, and related workforce as well as the specialized, high-skilled science and engineering roles highlighted in this section must be a strategic priority for Region 9.

The next section of the report assesses the current situation for the supply side of the regional talent equation and the varied efforts and capabilities in place to meet this need for the regional biosciences cluster.

III. Regional Life Sciences Talent Supply Dynamics

Central Virginia's biosciences workforce ecosystem reflects both significant strengths and emerging challenges that will shape the region's trajectory in an increasingly competitive national bioscience landscape.

The regional higher education ecosystem is anchored by UVA, the region's sole four-year research university, which serves as the primary engine of baccalaureate and graduate-level life sciences talent production, but regional industry also draws from other nearby universities in some key areas of talent demand. Supporting this anchor institution are regional community colleges which collectively serve as the region's principal source of technician-level and middle-skill workforce development, offering associate degrees, stackable credentials, and short-term training programs in biotechnology, laboratory science, and healthcare technologies. Specifically, these colleges include Piedmont Virginia Community College (PVCC), Germanna Community College, and Laurel Ridge Community College.

Complementing these formal degree pathways is a constellation of specialized educational and experiential programs ranging from Career and Technical Education (CTE) and apprenticeship initiatives at the secondary level to bridge programs, internships, micro-credentials, and clinical research mentoring at the postsecondary and early-career stages, each operated by dedicated institutional "champions" and often supported by industry partners and nonprofit intermediaries such as CvilleBioHub.

While this multilayered institutional ecosystem provides Central Virginia with a genuine competitive advantage in breadth and quality of talent development offerings, the region faces a critical operational challenge: these assets remain largely disconnected, with limited formal coordination and insufficient awareness of regional opportunities for life sciences graduates, a challenge now heightened by anticipated demand from major pharmaceutical manufacturing investments entering the region.

University of Virginia as Regional Anchor for Baccalaureate and Graduate Talent Generation

Central Virginia's bioscience talent pipeline is anchored by a strong higher education presence, chiefly UVA. The region has averaged 495 life science graduates per year (bachelor's level and above). These bioscience degrees account for a significant share of all degrees awarded locally (5% of total degrees from 2019 through 2023); however, the growth in life science degree graduate volume in recent years has lagged behind national trends—3% growth for Central Virigina versus nearly 11% increases nationally.

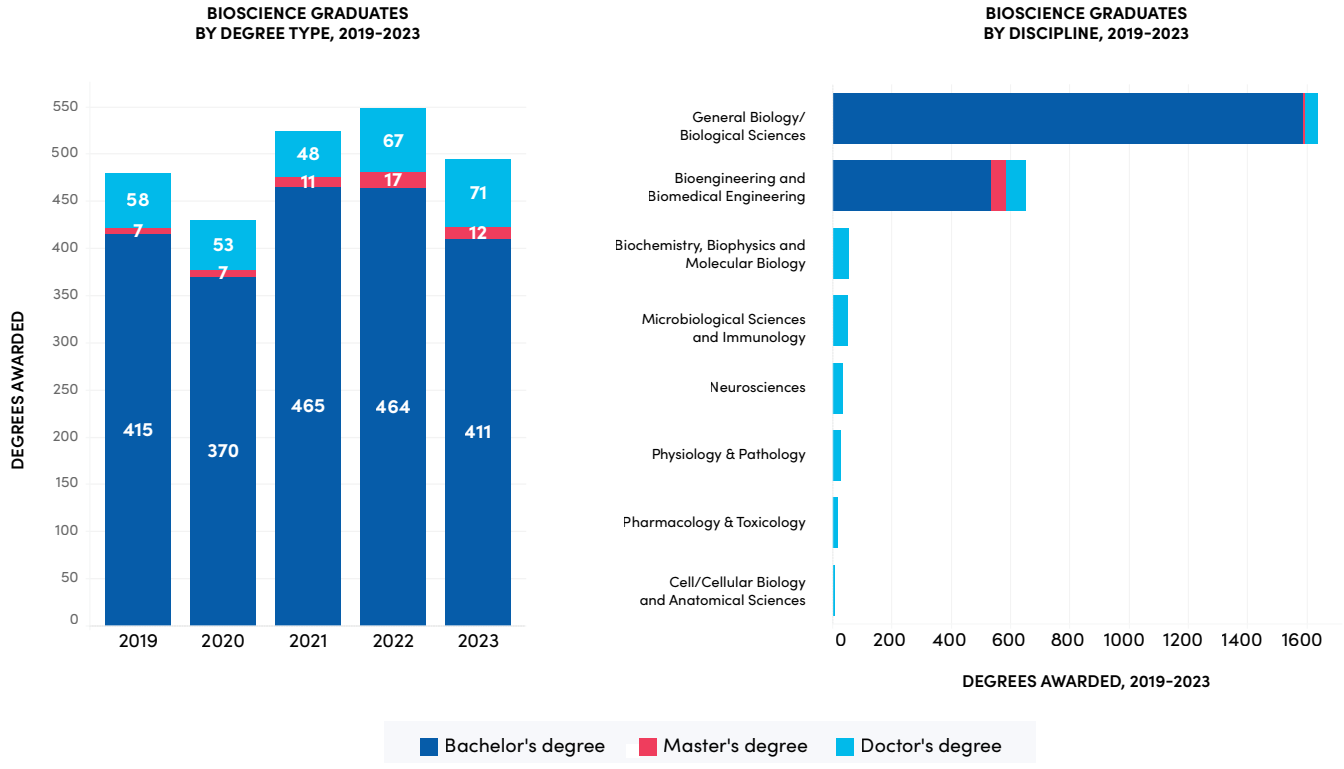
Bachelor's level degrees make up the majority of talent output, predominantly concentrated

in fields like general biology and biomedical engineering with graduate-level degrees focused in more specialized fields.

UVA serves as the primary engine of this baccalaureate and graduate-level talent supply, offering a range of life science and related degree programs. In addition to general biological sciences, stakeholders highlight UVA's strengths in biomedical engineering, pharmacology, chemistry, and related disciplines as key sources of talent for local industry. In particular, UVA's graduate life sciences training encompasses highly specialized disciplinary pathways via the Biomedical Sciences Graduate Program (BIMS), which offers graduate students the opportunity to specialize in more than 15 distinct research areas, including bioinformatics and genomics, biophysics and structural biology, biotechnology, cancer biology, cell biology, computational biology, development and stem cells, epigenetics, genetics, and immunology, among others.

UVA's student and graduate pipeline also extends beyond bench science, as the region benefits from UVA's medical training programs (e.g., MD/PhD and Medical Scientist Training or "MSTP" programs) which produce clinician-scientists as well as UVA's Darden and McIntire Schools, which contribute MBA graduates and professionals in finance, consulting, and management. Educational stakeholders also noted fields in emerging technologies and relevant biosciences skills and capabilities are supported as well—for example, UVA's School of Data Science is beginning to supply bioinformatics and biostatistics expertise through its programming, with additional focus on advanced life sciences degree programs ramping up in the coming years across efforts such as the PhD program in computational biology recently established in 2024.

FIGURE 14. ANNUAL REGIONAL BIOSCIENCE GRADUATES BY DEGREE LEVEL AND DISCIPLINE, REGION 9 (2019–2023)



Note: as sole bachelor's and higher degree granting institution in region, data reflect only UVA graduation trends.
Source: TEConomy's analysis of Integrated Postsecondary Education Data System (IPEDS), National Center for Education Statistics.

Stakeholder feedback also reveals that employers do not rely on UVA alone. Thanks to Central Virginia's proximity to other institutions, companies report recruiting talent from nearby universities such as James Madison University (JMU) and Virginia Tech to supplement the local pipeline. JMU offers a biotechnology program and an Integrated Science and Technology (ISAT) program with a regulatory affairs track, while Virginia Tech produces graduates in areas like agricultural biosciences, bioengineering, and veterinary sciences that can support AgTech and biomanufacturing needs, all of which have been cited as valuable talent sources for Central Virigina bioscience firms.

These cross-regional linkages expand the talent pool, giving local employers access to a wider range of skills. Stakeholders noted other Virginia programs as contributing niche skills, such as Virginia Commonwealth University's pharmaceutical engineering and sciences programs and George Mason University's bioinformatics program. Overall, the presence of a major research university in-region, complemented by proximity to other nearby Virginia universities and colleges, underpins access to a robust supply of technically skilled graduates for the Central Virginia bioscience cluster.

Regional Community College Programs are Producing Skilled Talent to Meet the Needs of Biosciences Companies

In addition to four-year institutions, the region's community colleges and training programs play a critical role in building the technician and skilled production workforce and in providing on-ramps for local students, both for entry into the workforce and for further biosciences education. Collectively, these institutions supply significant levels of talent for the region in fields closely aligned with the biosciences, with the three primary regional-serving community colleges contributing 130 average annual associates level graduates in biological and physical sciences, 67 average annual associate's level graduates in clinical and medical technician programs, and 291 average annual associate's level graduates in nursing (over the 2019 through 2023 time period). The regional community colleges also support other talent needs of local biosciences companies by producing 63 average annual associate's graduates in engineering technician and technologies fields as well as many more graduates who go on to transition to four-year degree programs in life sciences fields.

In response to growing demand in biotech manufacturing and lab support roles, PVCC has expanded its capacity for life sciences educational offerings. PVCC's overall workforce development capacity has been significantly enhanced by the September 2024 opening of the Woodrow W. Bolick Advanced Technology and Student Success Center, a $35 million, 46.5k square-foot net-zero energy facility featuring state-of-the-art laboratories and learning venues. While the Bolick Center's initial programming focuses on advanced manufacturing and engineering technician-related skills and training, these programs have been directly leveraged in partnerships to provide pipelines for expanding regional biosciences companies such as Afton Scientific. The college also offers an Associate of Science degree in Physical and Natural Sciences with a Biotechnology specialization, which prepares students to transfer to four-year biotechnology programs or enter entry-level laboratory positions directly upon completion.

Region 9 Community Colleges Contributing to Bioscience-Related Education and Workforce Training Include:

- Germanna Community College
- Laurel Ridge Community College
- Piedmont Virginia Community College (PVCC)

Additionally, PVCC has proposed new bioscience-focused credentials; notably, the college recently developed a framework for a Biotechnology Career Studies Certificate (with stackable credentials) to train laboratory technicians and biomanufacturing support workers. PVCC is further planning biotechnology facility investments, which would expand capacity for hands-on lab training and offer modular, skills-based courses aligned with life science employers' needs. Likewise, PVCC has piloted FastForward short-term workforce programs (under the Virginia Workforce Credential Grant) and bioscience (Bioscience Core Skills Institute or BCSI) micro-credential bootcamps, which aim to quickly upskill workers in laboratory techniques and regulatory compliance. These programs, though small in scale currently, address specific skill gaps (for example, Good Manufacturing Practice or "GMP" training or clinical lab skills) identified by regional employers.

Investing in the Biosciences Workforce Pipeline: The Virginia Center for Advanced Pharmaceutical Manufacturing (VCAPM)

A transformative regional announcement has accelerated institutional coordination around workforce development and skills training. In October 2025, pharmaceutical companies AstraZeneca, Eli Lilly and Co., and Merck committed $120 million in private industry investment, in coordination with state government and Virginia's higher education institutions, to establish the Virginia Center for Advanced Pharmaceutical Manufacturing (VCAPM). This landmark public-private partnership, anchored in the Richmond-Petersburg-Charlottesville corridor—a designated U.S. Economic Development Administration Tech Hub for Advanced Pharmaceutical Manufacturing—will operate on a hub-and-spoke model, with approximately 90,000 square feet of core simulated training space spanning the region and connections to the community college system. The VCAPM will train 2,000 to 2,500 graduates annually through stackable credentials and degree pathways ranging from technician-level certifications to advanced graduate programs, each aligned with real GMP (Good Manufacturing Practice) manufacturing environments. The center's operations will be led by the Virginia Innovation Partnership Corporation (VIPC) and will include pilot-scale manufacturing suites, analytical labs, classrooms, and flexible training spaces.

The VCAPM's educational partnerships encompass the full regional ecosystem of higher education institutions—including the University of Virginia, Virginia Commonwealth University, Virginia Tech, Old Dominion University, James Madison University, and Hampton University—working collaboratively with community colleges including Brightpoint Community College, Reynolds Community College, Piedmont Virginia Community College, and Blue Ridge Community College. This coordination mechanism establishes integrated pathways from secondary and adult learner entry points through to advanced degree programs.

In addition to PVCC, Germanna Community College and Laurel Ridge Community College also offer relevant two-year degrees or certificates that can feed directly into the bioscience workforce. Germanna offers general science and health technologies programs, including nursing, dental, physical therapist assistant, and clinical medical assistant credentials that are relevant to life sciences employment contexts. Laurel Ridge similarly operates an Associate of Applied Science in Medical Laboratory Technology, accredited by the National Accreditation Agency for Clinical Laboratory Sciences and eligible for ASCP certification, which directly prepares technicians for laboratory-based roles in biopharmaceutical and clinical settings. Both institutions also offer Associate of Science degrees in Biological and Physical Sciences with biotechnology specializations designed for transfer pathways or direct entry into entry-level laboratory roles. While these colleges have not yet proposed specialized biotechnology degree tracks with the same depth as PVCC's emerging offerings, they represent important partners for building talent locally.

Additionally, the concept of "bridge" programs such as UVA's Bridge to Bio initiative is emerging, which is being refined and scaled to create smoother transitions for community college students into four-year bioscience programs or directly into laboratory technician roles. These bridge programs, now increasingly supported by the broader regional workforce development infrastructure, are being positioned as critical mechanisms for fully tapping the talent potential of the community college system, especially as life science companies continue to seek laboratory assistants, quality control technicians, biomanufacturing technicians, and other skilled roles that may not require an advanced degree.

Tables 3 and 4 have been prepared to inform and summarize the typical educational requirements, skills and competencies, and key credentials for the high-demand, high-priority bioscience industry roles identified in the preceding workforce and talent demand section. Importantly, these tables also note and align relevant regional programs and education/training activities identified in Central Virginia. The tables are presented separately to summarize across positions identified with more significant, higher-volume needs, as well as those specialized, lower-volume roles that are critical to meeting industry needs.

TABLE 3. TYPICAL EDUCATION, SKILLS AND COMPETENCIES, AND CREDENTIAL REQUIREMENTS FOR HIGH-DEMAND, HIGH-PRIORITY OCCUPATIONAL AREAS AND RELEVANT REGIONAL PROGRAMS/ACTIVITIES—HIGH VOLUME ROLES

Role	Typical Education Level Required	Key Skills and Competencies	Key Credentials	Relevant Regional Programs/Activity to Build Upon
Biopharmaceutical Manufacturing Operators	High school/CTE certification + IRC training, preference for Associates level (lead operators may prefer Bachelor's +)	GMP environment knowledge and documentation, aseptic/sterile processing and cleanroom training, bioprocess equipment and sampling skills aligned with local industry partner operations, basic FDA-regulated environment knowledge	Community-college biotech/biomanufacturing certificates that emphasize cell culture, GMP, and documentation, MSI certifications, other IRC's (e.g., BACE, BCSI)	Emerging biotechnician programs leveraging BCSI framework and opportunities to create new entry-level pathways at regional community colleges, development of new VCAPM network initiative
Precision Manufacturing Technicians	High school/CTE certification + some applied manufacturing training (OJT included), Associates level technician degree for more advanced roles	Set-up, calibration, and operation of machining, filling, packaging, or assembly equipment, basic metrology/measurement/inspection, GMP/ISO processes, OSHA and lean manufacturing training, PLC/quality systems and preventive maintenance for more senior roles	OSHA and MSI credentials, IRC's in quality and regulatory compliance for regulated production environments (e.g., CfPIE, ASQ), ongoing training via noncredit industry association or community college programs	Potential to embed relevant skills/credentials into existing advanced manufacturing and engineering tech programs in regional CTE programs and at community colleges
Lab/Research Technicians and Specialists	Bachelor's degree in life sciences/chem field, options for Associates level + significant applied work/experience or bridge programs	Core wet lab skills (e.g., pipetting, cell culture, microscopy, etc.), assay development and processing, GLP and documentation procedures, additional specialized skills based on specific lab (e.g., flow cytometry, sequencing, chromatography, etc.)	Significant work in lab environments valued over specific credentials, documented biosafety and human/animal subjects training, potentially more advanced national certifications (e.g., ASCP)	Need for retention of high-quality BS-level biosciences talent from UVA, expansion of "bridge" programs from regional community college programs
Multidisciplinary Engineers	Bachelor's degree in relevant field, increasing emphasis on Master's in specialized life sciences engineering	Specific technical skills dependent on industry, but general need for: regulatory and quality engineering skills, GMP/cGMP, medical/clinical product development and regulatory affairs, field service experience, cross-disciplinary collaboration	Graduate certificates or master's degrees in biotechnology/ device/pharmaceutical engineering, professional certifications in regulatory compliance, process engineering, or quality systems	Ongoing opportunities to retain regional talent from UVA's bioengineering program and cross-skill engineers from other school of engineering programs in life sciences areas
Biomedical Scientists (entry-level)	Bachelor's + degree in relevant field with significant lab coursework	Embedded lab research experience, specialized domain skills depending on role in areas like functional genomics, imaging, immuno-oncology, neurobiology, or other subspecialties	Industry or lab onboarding and technical skills programs, certificates in specialized analysis methods or bioinformatics	Existing pipeline of highly trained entry-level life scientists from UVA biology and medicine programs with anticipated ramp-up in research capacity from Manning Institute

Source: TEConomy Partners' assessments based on regional employer interviews and survey; industry job postings from Lightcast-JPA database; and regional education and training program identification and assessment.

TABLE 4. TYPICAL EDUCATION, SKILLS AND COMPETENCIES, AND CREDENTIAL REQUIREMENTS FOR HIGH-DEMAND, HIGH-PRIORITY OCCUPATIONAL AREAS AND RELEVANT REGIONAL PROGRAMS/ACTIVITIES—SPECIALIZED, LOWER-VOLUME ROLES CRITICAL TO INDUSTRY

Role	Typical Education Level Required	Key Skills and Competencies	Key Credentials	Relevant Regional Programs/Activity to Build Upon
Supporting Industrial Maintenance Professionals	High school/CTE + industrial maintenance or HVAC apprenticeship/technical training, Associate's level required for more advanced cleanroom facility support	Prior work experience in industrial or commercial facilities highly valued, HVAC operation for GMP environments, environmental control systems and monitoring, regulatory documentation, preventive and corrective maintenance	HVAC or industrial maintenance licensure, OSHA credentials, 3rd party OEM training on specific building automation and controls systems based on specific facility	Potential to further embed life sciences relevant skills into existing industrial maintenance and HVAC programs at regional community colleges
Life Sciences Sales and Marketing Professionals	Bachelor's in life sciences or business + MBA or other postsecondary credential in biotech/healthcare business	Extensive industry experience usually desired across multiple prior product development and launch life cycles, technical product knowledge, customer relationship and account management skills, compliance and regulatory policies	No major credentials, prior clinical or lab experience desired	Some pipeline from UVA McIntire and Darden Schools, but need for industry experience often requires recruitment from outside region
Regulatory and Quality Assurance Professionals	Bachelor's in life sciences or other STEM + Master's in relevant regulatory science or quality systems degree	Deep experience with FDA drug/biologics/device regulatory frameworks, quality systems and documentation processes, regulatory compliance reporting and audit preparation	Professional certifications in quality systems and regulatory affairs (CfPIE, ASQ, etc.), graduate certificates in regulatory affairs	UVA degree programs in life sciences and engineering can provide foundation for expanding regulatory postsecondary credentials
Clinical Research Professionals and Operations Managers	Bachelor's in life sciences or healthcare desired for mid/senior roles, but career pathways accessible for variety of backgrounds for entry-level roles	Clinical trial operations/protocol implementation, regulatory compliance and reporting (GCP, IRB), clinical data and healthcare systems documentation, site management and coordination, patient recruitment and relations	IRC's from ACRP and SOCRA widely recognized, institutional training (e.g., human subjects research), specialized coursework in clinical trials management	Ongoing efforts at UVA Health to develop spectrum of entry points to clinical research professional pathways, opportunities for nursing programs at regional community colleges to embed certifications
Bioinformatics and Specialized Drug Development Scientists	Master's/PhD in advanced biology or biostatistics/quantitative life sciences field, potential postdoctoral experience required depending on role	Proficiency in use of relevant statistical software/coding languages and statistical/ML models, large scale bioinformatics data management (e.g., genomics data), familiarity with target identification/lead optimization/biomarker discovery/other relevant approaches to drug development, cross-functional "team science" collaboration skills	Relevant degrees or certificates in bioinformatics or computational biology, participation in research consortia or other large-scale projects	Need for expansion of this talent pipeline and Manning Institute/pharma industry facilities likely to attract some talent from outside region, UVA computer science/data science programs expanding cross-disciplinary focus into this space

Source: TEConomy Partners' assessments based on regional employer interviews and survey; industry job postings from Lightcast-JPA database; and regional education and training program identification and assessment.

Significant Life Sciences Activity Also Exists Across Regional Workforce Development and Training Programs

These assets, including certificate programs, short courses, apprenticeships, and university-led skills training, are not always captured in traditional education data, but they significantly contribute to the region's talent supply by preparing local residents for entry-level bioscience jobs.

Beyond formal degree programs, the region benefits from a variety of non-degree training and experiential learning programs in biosciences and health sciences led by education and workforce organizations. Many of these have arisen organically, championed by individual faculty or program directors in response to industry or internal staffing needs, and have now evolved over time into structured workforce development supports. For example, **UVA's research community offers technical training opportunities through its Core Research Facilities,** giving students and recent graduates hands-on experience with advanced lab equipment to prepare them for internal lab technician roles, but serving as a potential model to be scaled more broadly as an important preparation for industry biotech lab jobs.

Similarly, UVA's School of Medicine has developed clinical research and laboratory research career development programs to both expand the pipeline of entry-level workers as well as help those with science backgrounds transition into clinical trial coordination, lab management, and related professional roles. This approach has included efforts to develop career pathways and "on-ramps" for both clinical research positions that support new and incumbent workers with mentoring, certification, and continuing education resources, while beginning to build out similar efforts for structured career progression in lab research technician roles.

At the same time, PVCC and the Virginia Career Works system have partnered on workforce apprenticeships such as the VirginiaWorks HIRED apprenticeship initiative, which combine on-the-job training with classroom instruction for biotech manufacturing technicians. These assets, including certificate programs, short courses, apprenticeships, and university-led skills training, are not always captured in traditional education data, but they significantly contribute to the region's talent supply by preparing local residents for entry-level bioscience jobs.

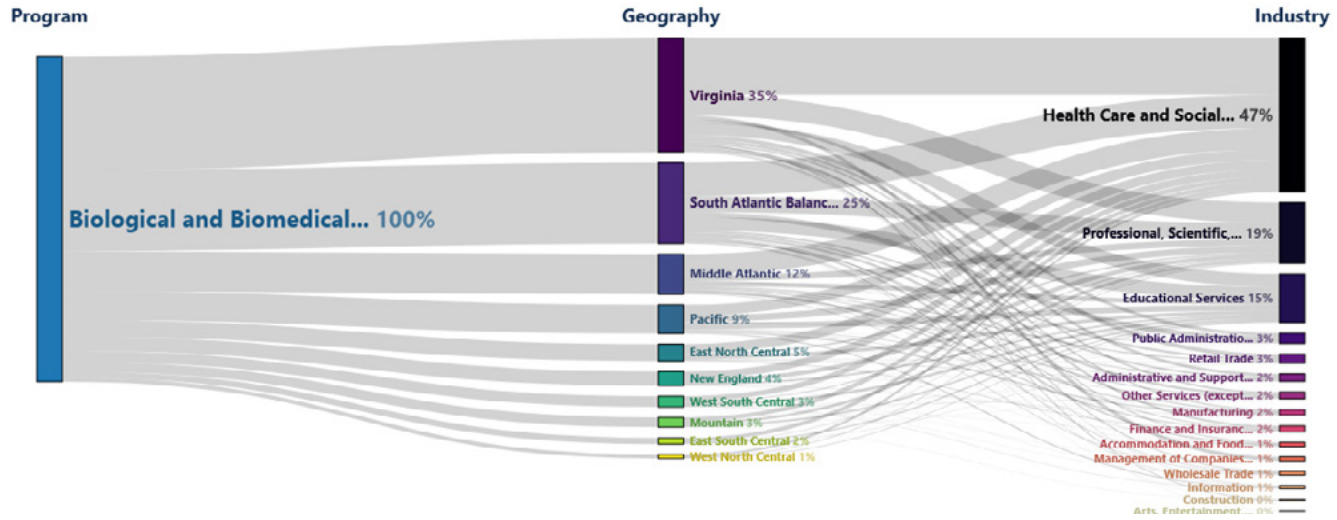
Other third party efforts such as the Charlottesville Biotech Internship Program (CHIP) led by CvilleBioHub represent emerging momentum toward additional ecosystem workforce development resources. The program is a 10-week, paid summer internship that embeds rising second-, third-, and fourth-year undergraduates and graduate students inside regional companies of all stages, as well as early-stage firms at the Commonwealth BioAccelerator in UVA's North Fork Discovery Park. The program combines industry experience with structured professional development through workshops, networking, and community-building activities designed to support long-term career pathways in life sciences and has been received positively by industry. However, stakeholders similarly note that the availability and capacity of these types of resources remain limited in the region outside of formal educational institutions, and expanding these efforts could significantly boost the ability to provide early exposure to local companies and retain students after graduation.

It is worth noting that new third party biosciences workforce providers are expected to scale rapidly in Virginia in direct response to major advanced manufacturing investments by AstraZeneca, Eli Lilly, and Merck. These companies have committed $120 million to create the Virginia Center for Advanced Pharmaceutical Manufacturing, a neutral, industry-led training hub that will deliver stackable credentials and degrees from technician-level certifications through advanced graduate programs. The center, led by industry and administered by the Virginia Innovation Partnership Corporation (VIPC), will operate on a hub-and-spoke model across the Richmond–Petersburg–Charlottesville corridor, offering GMP-simulated training, credentialing, lab-based instruction, apprenticeships, and internships in partnership with universities, community colleges, and innovation ecosystem organizations such as CvilleBioHub and the Alliance for Building Better Medicine. These efforts are expected to catalyze significant expansion of a broader market for third party training providers, bootcamps, and intermediary organizations that can plug into this infrastructure to deliver modular, industry-aligned bioscience and biomanufacturing upskilling programs tied directly to the needs of incoming pharmaceutical manufacturing facilities.

Regional Biosciences Talent Placement and Retention Dynamics

The most critical challenge with respect to biosciences talent supply dynamics for Central Virginia is retention. Data on long-term career outcomes support this conclusion, showing that a large share of the region's life sciences graduates leave the area (and often the state) as their careers progress. For example, of all students who earned a bachelor's degree in biological or biomedical sciences from a regional institution, just 35% remained employed in Virginia ten years after graduation, with an even smaller fraction estimated to be working within the region itself (see Figure 15). Interview feedback suggests that many life science alumni migrate to larger biotech hubs or urban centers for greater job opportunities, resulting in an ongoing dynamic of exporting a considerable portion of the life sciences talent local institutions educate.

FIGURE 15. LONG-TERM OUTCOMES FOR BACHELOR'S-LEVEL LIFE SCIENCES TALENT GRADUATING FROM CENTRAL VIRGINIA INSTITUTIONS, 10-YEAR POSTGRADUATION GEOGRAPHIES AND INDUSTRIES OF EMPLOYMENT



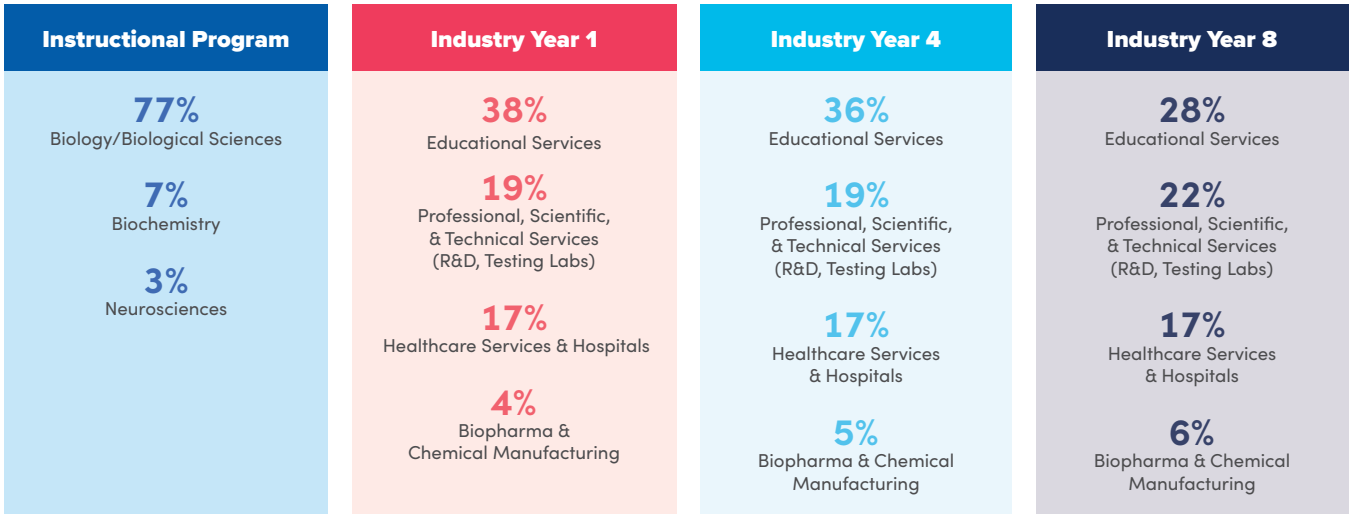
Source: TEConomy's analysis of U.S. Census Bureau's Post-Secondary Employment Outcomes data for GO Virginia Region 9 institutions.

Among all students who earned a bachelor's degree in biological or biomedical sciences from a regional institution, only about 35% remained employed in Virginia ten years after graduation, with an even smaller fraction estimated to be working within the region itself.

The career paths of regional graduates illustrate why retention is such a critical issue. Immediately upon graduation, a significant number of life science degree holders pursue further education or academia, with 38% of Central Virginia bioscience graduates working in educational services one year after earning their degree (likely in graduate studies or academic research roles) and an additional 17% employed in healthcare or hospital settings. Only 19% are initially employed in private scientific R&D or testing lab industries, and an even smaller share (4%) enter biopharmaceutical or medical manufacturing companies at that early stage (Figure 16).

Four years into their careers, these graduates begin to shift out of academia with corresponding increases in those in private sector science/tech services and manufacturing, and by eight years post-graduation, only 28% remain in education, while 22% are in scientific R&D services and 6% in biopharma or chemical manufacturing roles. This trend suggests that as alumni gain experience, more shift toward positions in core life sciences industries, but by that point many have also relocated to take jobs elsewhere. In fact, a considerable portion of those industry transitions were noted to occur to employment destinations outside the region (e.g., in larger East Coast bioscience clusters) given perceptions noted by stakeholders about the limited size and potential for long-term career progression of Central Virginia's private bioscience sector. The end result is that relatively few of the region's "home-grown"

FIGURE 16. CAREER OUTCOMES OF CENTRAL VIRGINIA LIFE SCIENCES GRADUATES AT 1, 4, AND 8 YEARS POST-GRADUATION



Note: Includes only graduates from CIP 26 Biological & Biomedical Sciences; GO VA Region 9 graduate sample size for Associates and higher = 4,877. Data do not include graduates in health professions and related clinical sciences.
Source: VOEE Virginia College and Career Outcomes Explorer. The Virginia College and Career Outcomes Explorer is an analytical tool designed to provide insights into the employment and career outcomes of graduates from Virginia's institutions of higher education. This tool encompasses career data on over 650,000 graduates from Virginia's higher education institutions across a wide range of fields from academic and non-credit cohorts spanning 2008-2022.

life science graduates are embedded within the local talent pool by mid-career.

Qualitative evidence from employers and educators reinforces this narrative. Companies report that while UVA and other Virginia universities produce high-caliber graduates, many of these individuals are drawn to opportunities in Richmond, Northern Virginia, North Carolina's Research Triangle, D.C./Maryland, or other nationally recognized life science hubs and Central Virginia competes with these nearby regions for every graduating class. In recent years, this competition has been exacerbated by broader market conditions – for instance, the national life sciences job market saw a cooling off in 2023–2024, leading to fewer local openings and thus more graduates taking jobs out-of-region where employment prospects were still available and producing further churn in the talent pipeline.

Moreover, the limited number of large anchor companies in the region creates a reported perception among job seekers that career growth locally may be constrained. For example, regional industry executives with longstanding experience in life sciences companies noted that if a young scientist or engineer doesn't find a fit in one of the modest number of mid-sized existing firms or academic labs in Greater Charlottesville, they are likely to look elsewhere, both out of a lack of awareness about further regional opportunities but also due to salary expectations that other smaller regional companies may not be able to meet. These dynamics all contribute to a leakage of talent and reported shortages of key workforce segments amongst employers despite a strong educational pipeline.

Addressing retention will require not only growing the number of local opportunities but also improving awareness of those opportunities and strengthening the ties between students and regional employers earlier in their educational careers. Notably, many Central Virginia bioscience firms report very high retention for those employees who do join them, with several employers highlighting that their experienced staff tend to stay 10 to 20 or more years, drawn by the mission-driven work and quality of life in the region. This suggests that if new graduates can be successfully recruited to local firms and communities and anchored, they often become long-term contributors to the ecosystem. In addition, community college graduates overwhelmingly stay in the state—the retention rate for those with an associate's degree after five years is nearly 78%, and for those with short-term credentials is a similar 76%.[5]

Notably, many Central Virginia bioscience firms report very high retention for those employees who do join them, with several employers highlighting that their experienced staff tend to stay 10 to 20 or more years, drawn by the mission-driven work and quality of life in the region. This suggests that if new graduates can be successfully recruited to local firms and communities and anchored, they often become long-term contributors to the ecosystem.

5 In-state community college retention rates provided by PVCC for this report.

Situational Assessment of Biosciences Talent Supply Programs in Region 9: Insights from Industry Interviews, Survey

Across Central Virginia, a growing array of experiential and skills-based programs are being developed and championed by leaders within regional educational institutions and workforce development organizations, each seeking to equip new entrants with relevant, industry-aligned competencies for life sciences careers. These initiatives include "bridge" programs designed to smooth transitions into biosciences for students with diverse backgrounds, as well as immersive placements and targeted, skills-focused training modules that address regional employer needs ranging from laboratory support to clinical research roles. **High-quality exposure is now available for entry-level candidates, frequently combining academic coursework with hands-on experiences, but the expansion and effectiveness of these efforts is currently limited by inconsistent coordination among regional higher education providers.**

Many stakeholders report a positive climate for collaboration, with institutions indicating willingness to align programming and facilitate seamless student "hand offs" between community colleges, universities, and workforce partners. However, institutional and industry stakeholders also consistently cited a lack of early-stage awareness about bioscience career opportunities and educational pathways, especially at the high school and community college levels, which limits the pipeline into technical and research-oriented life sciences jobs. In response, several institutions are developing enhanced internal career exploration and pathway outreach efforts, especially for entry-level laboratory, clinical research, and regulatory positions, to better address the persistent demand from local employers.

A major challenge remains scaling the engagement between regional educators and life sciences employers beyond sets of individual champions into more structural supports, particularly in networking, internship placement, and curriculum advisory processes. This gap affects the ability of academic programs to stay current with rapidly evolving workforce requirements and to facilitate smooth transitions for students into meaningful industry roles. Retaining skilled biosciences talent is also a pressing concern, with stakeholders pointing to both greater geographic competition for talent from nearby metropolitan hubs and recent volatility in national life science hiring, which together have created significant churn and uncertainty for talent emerging from local programs.

Despite these obstacles, there is a sense among workforce and educational leaders that new market and policy forces have the potential to revitalize the regional life sciences education continuum. Recent demand signals from major employers, the emergence of entities such as the Manning Institute, and high-profile production facility announcements by pharmaceutical companies have accelerated the push for coordinated workforce development efforts. In particular, the VCAPM represents a landmark ecosystem effort while community college partners such as PVCC are planning investments in biotechnology program growth, with expansion into modular, flexible, and skills-based course offerings to meet evolving biomanufacturing workforce needs.

Additionally, CTE and K-12 leaders are increasingly seeking direct input from industry and regional bioscience organizations to inform curriculum and ensure that instruction responds to real employer needs. Regional K-12 schools should be applauded for their focus in biosciences/biotech related initiatives and innovative approaches to career education, including the recent expansion of GO TEC Career Connection Labs in Region 9 with funding from GO Virginia for new labs in all middle schools in Albermarle County, Greene County, and the City of Charlottesville, including modules focused in biotechnology.[6] In response to these emerging dynamics, coordinated, ecosystem-level frameworks will be critical to building robust, sustainable talent pipelines for the future

Positioning Central Viriginia's Talent Supply Ecosystem to Support Growth: Coordinating for Success Across the Talent Pipeline

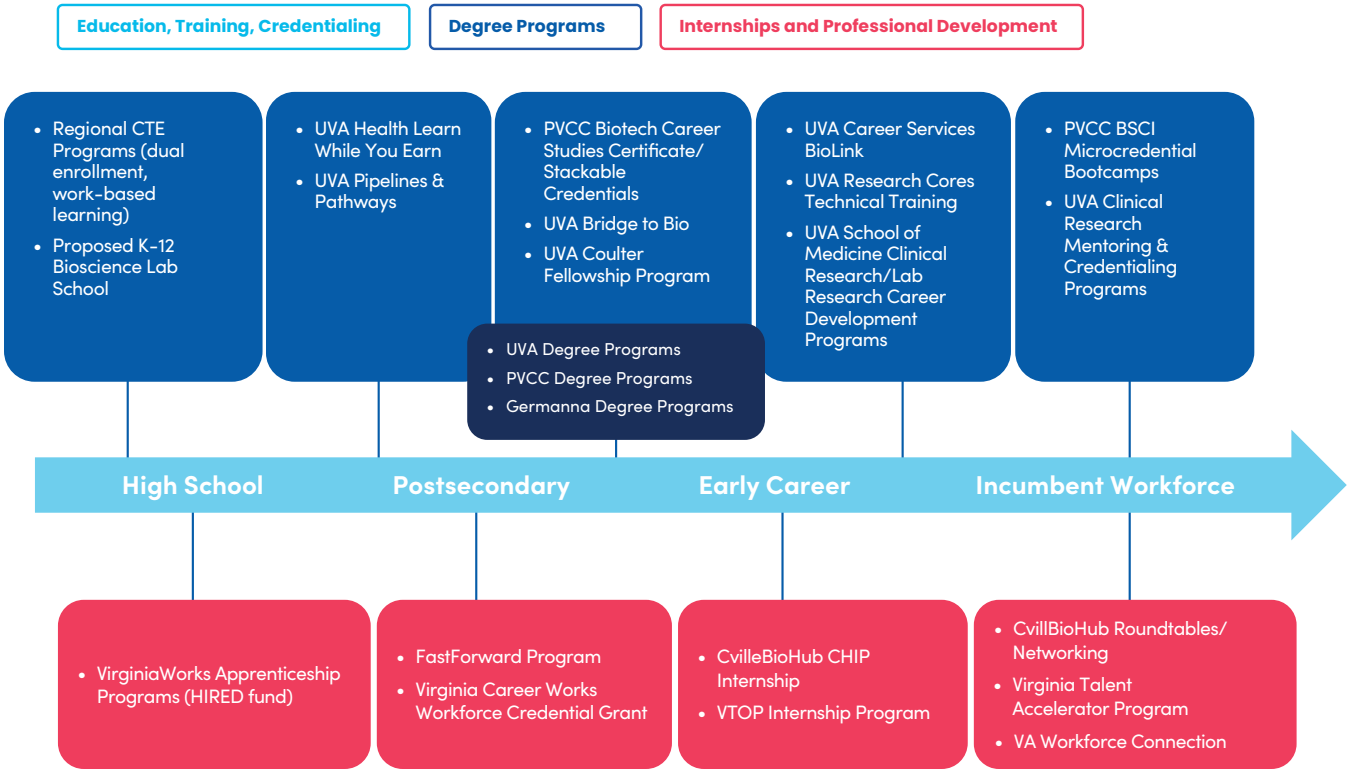
Central Virginia has the successful foundation for a multi-stage talent pipeline in biosciences, as illustrated by the breadth of programming spanning from K-12 through the incumbent workforce noted in Figure 17 below. The region benefits from dedicated "champions" who have established high-quality assets at every developmental stage: high schoolers have access to regional CTE and state-level apprenticeship programs; postsecondary students can leverage community college programs with life sciences and health sciences specializations with several "bridge" programs to further education and exposure; and emerging young professionals are supported by internship and career services resources at both educational and regional organizations.

The presence of these specialized nodes demonstrates that the region possesses the fundamental "building blocks" necessary for a vibrant talent ecosystem supporting multifaceted roles in the biosciences industry. The critical challenge now is weaving these independent initiatives into a seamless, interconnected ecosystem which talent can navigate without encountering barriers.

The presence of these specialized nodes demonstrates that the region possesses the fundamental "building blocks" necessary for a vibrant talent ecosystem supporting multifaceted roles in the life sciences industry. The critical challenge now is weaving these independent initiatives into a seamless, interconnected ecosystem which talent can navigate without encountering barriers.

6 See: https://www.governor.virginia.gov/newsroom/news-releases/2025/december/name-1072761-en.html.

FIGURE 17. EXAMPLES OF REGIONAL PROGRAMS SUPPORTING WORKFORCE SUPPLY IN THE BIOSCIENCES



Source: TEConomy Partners' inventory of regional programs.

To fully unlock this potential, the region must prioritize the "handoffs" between these programs, ensuring that students have a clear, visible pathway into a secondary credential and subsequently into a formal degree or industry role. Currently, while the assets exist, they often function in isolated excellence rather than a unified ecosystem. Best practices from leading U.S. ecosystems highlight potential solutions, where successful regions utilize a "sector intermediary" model to formalize these connections. For instance, organizations such as the Massachusetts Biotechnology Education Foundation ("MassBioEd"), Life Science Washington, and the North Carolina Biotechnology Center (NCBiotech) act as dedicated organizations that do not just run programs but actively manage the transfers and alignment between them. Similarly, organizations such as the North Carolina Life Sciences Apprenticeship Consortium (NCLSAC) have standardized industry-recognized credentials across multiple community colleges and employers, creating a "common currency" for skills that allows talent to move fluidly between learning and work.

By adopting a similar coordination-first approach, Central Virginia can transform its current ecosystem. Empowering a regional coordinating body, potentially leveraged through the new VCAPM structure or other emerging partnerships, to formalize these agreements would ensure that every "exit" from one program is a direct "entrance" to the next. **This shift from program creation to system coordination is the definitive step required to turn Central Virginia's impressive collection of educational assets into a high-performance talent supply chain capable of sustaining long-term industry growth.**

IV. Growing, Enhancing the Regional Biosciences Workforce Ecosystem: Key Themes Inform Strategic Priorities

The current landscape for biosciences talent in Central Virginia reflects a clear duality, but opportunity for near-term transformation: a foundation of high-quality, anchor-led assets operating within an ecosystem that has yet to fully integrate its education and training programs with evolving industry demands.

In light of recent momentum and anticipation of rapid expansion of the pharmaceutical manufacturing industry presence in the region, it is essential to clearly identify and articulate the strategic priorities necessary to position the region as a competitive hub for life sciences growth and innovation, a strategy fundamentally driven by ongoing talent strengths and workforce development.

The combined themes related to both regional ecosystem strengths as well as gaps and challenges elevated out of interviews with industry executives, hiring survey input, and feedback provided by the project Advisory Coalition are summarized in Figure 18 and detailed herein.

FIGURE 18. KEY THEMES RAISED BY REGIONAL LEADERS, STAKEHOLDERS INFORMING STRATEGIC PRIORITIES FOR CENTRAL VIRGINIA

STRENGTHS	GAPS AND CHALLENGES
UVA, other institutional strengths contribute to vibrant ecosystem	Talent Gaps and Recruiting Outside of Central VA
Strengths in particular fields, areas of expertise	Limitations in Local Entry-Level Talent Pipelines
Strong partners for talent connections	Growing Cluster ... but Challenging Industry Dynamics
Other themes: region's quality of life; high retention rates among senior talent, etc.	Limited Use of State/Regional Workforce Development Programs by Companies
High-quality, industry-relevant training programs spanning K-12, higher ed	Current programs operating in silos, limited ecosystem-level coordination

Source: TEConomy Partners, LLC.

Regional Strengths:
A Robust Institutional Foundation for a Complete Life Sciences Talent Pipeline

Across the varied assessments of regional supply and demand for talent, there were several clear strengths that both the data and feedback from stakeholders emphasized:

- **UVA and Other Institutional Strengths Contribute to a Vibrant Ecosystem:** The University of Virginia anchors the region's advanced scientific and engineering talent supply, with recognized excellence in biomedical engineering, pharmacology, and clinical research training. UVA's research enterprise creates a mentorship-rich environment where graduate students and postdoctoral scholars engage in clinical trials and translational science, enhancing the quality and relevance of their skills in the workforce. Beyond bench science, UVA's medical and business schools contribute clinician-scientists through MD/PhD and MSTP programs, as well as MBA-trained managers and leaders. Community colleges—particularly PVCC—also demonstrate responsiveness to employer demands around biotechnology skills and biomanufacturing credentials as well as other supporting needs in skilled trades, engineering technicians, and manufacturing technologies. Meanwhile, organizations such as CvilleBioHub have successfully built bridges between academic programs and industry, rounding out significant ability to train talent, connect it with experiential learning, and provide continuous education opportunities.

- **Demonstrated Strengths in Differentiated Fields and Areas of Expertise that Drive Talent Specialization:** The region demonstrates particular depth in biomedical engineering as well as additional strengths in molecular physiology, biological physics, public health sciences, and clinical research. Other emerging undergraduate and graduate programs signal institutional commitment to interdisciplinary life sciences training, addressing workforce needs in bioinformatics, biostatistics, computational biology, and regulatory affairs. Other expanding biotechnology programs are beginning to offer specialized credentials in laboratory techniques and biomanufacturing support. The region benefits from research-backed training in clinical research coordination, regulatory compliance, and GMP-aligned laboratory practices, ensuring that educational content remains aligned with evolving industry standards.

- **Growing Regional Network of Partners for Talent Connections:** A network of engaged intermediaries and industry partners actively facilitate connections between educational institutions and employers. CvilleBioHub serves as a dedicated connector between academic institutions and the biotech startup ecosystem for experiential learning, while the Manning Institute is engaging employers in workforce development dialogue. Educational stakeholders have expressed general receptivity to collaboration with industry partners, indicating willingness to align programming with employer needs and to participate in curriculum advisory structures. The announcement of the new VCAPM also represents a landmark public-private partnership that has the potential to formalize this type of industry-education engagement at scale.

- **Positive Impressions of Regional Quality of Life and High Retention Rates Among Senior Talent:** Central Virginia's quality of life provides compelling non-wage incentives for attracting and retaining professional talent, particularly among senior-level scientists, executives, and experienced researchers. The region also demonstrates a strong ability to retain established talent once anchored, with experienced professionals and senior managers expressing high satisfaction with the region's livability and community environment. This advantage in quality of life positioning contrasts with the region's relative difficulty in retaining entry-level and early-career talent and higher costs of living, suggesting a demographic retention asymmetry that reflects broader regional labor market dynamics.

- **High-Quality, Industry-Relevant Training Programs Spanning K-12 and Higher Education:** The region's talent supply apparatus spans the full educational continuum from K-12 through incumbent workforce development. High school students have access to dual enrollment and work-based CTE programs, including a proposed K-12 bioscience Lab School. Postsecondary pathways are also available, ranging from PVCC's Biotechnology Career Studies Certificates and associate degrees to UVA's Bridge to Bio program for community college transfers and traditional four-year degree tracks. Early-career professionals can access internships, mentorship programs, and research fellowships despite some gaps in awareness or capacity. Incumbent workers can participate in FastForward micro-credential bootcamps, apprenticeship programs, and upskilling initiatives. Across each stage, individual programs demonstrate high quality and genuine industry relevance, providing the essential "building blocks" for a comprehensive talent pipeline.

Gaps and Challenges: Friction Points in Supply-Demand Alignment

Despite the clear strengths and sense of positive momentum expressed by regional stakeholders, there were also several clear gaps and challenges highlighted across the various analyses of supply and demand:

- **Specific Areas of Talent Gaps and Challenges Recruiting Outside of Central Virginia:** Local employers, particularly those in biopharmaceutical manufacturing, clinical research support, and laboratory operations, frequently report persistent gaps in available talent, forcing them to recruit from outside Central Virginia and neighboring regions. These gaps are particularly acute for both technician-level positions as well as senior scientific positions, life sciences business leadership with industry experience, and medical technology commercialization skill sets, highlighting a dual challenge impacting both the entry level and most senior levels of the career ladder. This dynamic reflects both the limitations of regional capacity and awareness of entry level roles and the challenge of maintaining local talent retention as experienced workers are recruited for opportunities in larger metropolitan hubs.

- **Limitations in Local Entry-Level Talent Pipelines:** While the region produces quality talent at the bachelor's and graduate levels, entry-level technical capacity remains more constrained. Community college completion rates for life sciences programs are modest relative to regional employer demand, even in supporting roles in skilled trades and manufacturing or engineering technician roles within life sciences companies. The gap between available entry-level positions and local talent completion suggests either insufficient educational scale, misalignment between training content and employer needs, or awareness and access challenges that see trained workers unable to participate in local markets. Early-stage awareness about bioscience career pathways remains limited despite receptivity from educators to engagement, particularly at the high school and early postsecondary levels, constraining the pipeline of students entering life sciences career tracks.

- **Growing Cluster, but Challenging Broader Domestic Industry Dynamics:** While the life sciences cluster is demonstrably growing, this growth is occurring within a challenging competitive landscape characterized by both geographic and national dynamics. Competition from established larger hubs including the Research Triangle, Boston, and west coast ecosystems continuously draws talent outward. The national slowdown in life sciences hiring which characterized 2023 and much of 2024, created significant uncertainty and churn within early-stage talent pipelines, with recent graduates experiencing delays in job placement or geographic migration to pursue opportunities. This volatility underscores the vulnerability of regions with smaller, less diversified employer bases to macroeconomic fluctuations in the life sciences sector. However, recent announcements and investments by major pharmaceutical manufacturers have the potential to rapidly shift this narrative and begin to mitigate the challenge cited by many stakeholders of limited anchor companies.

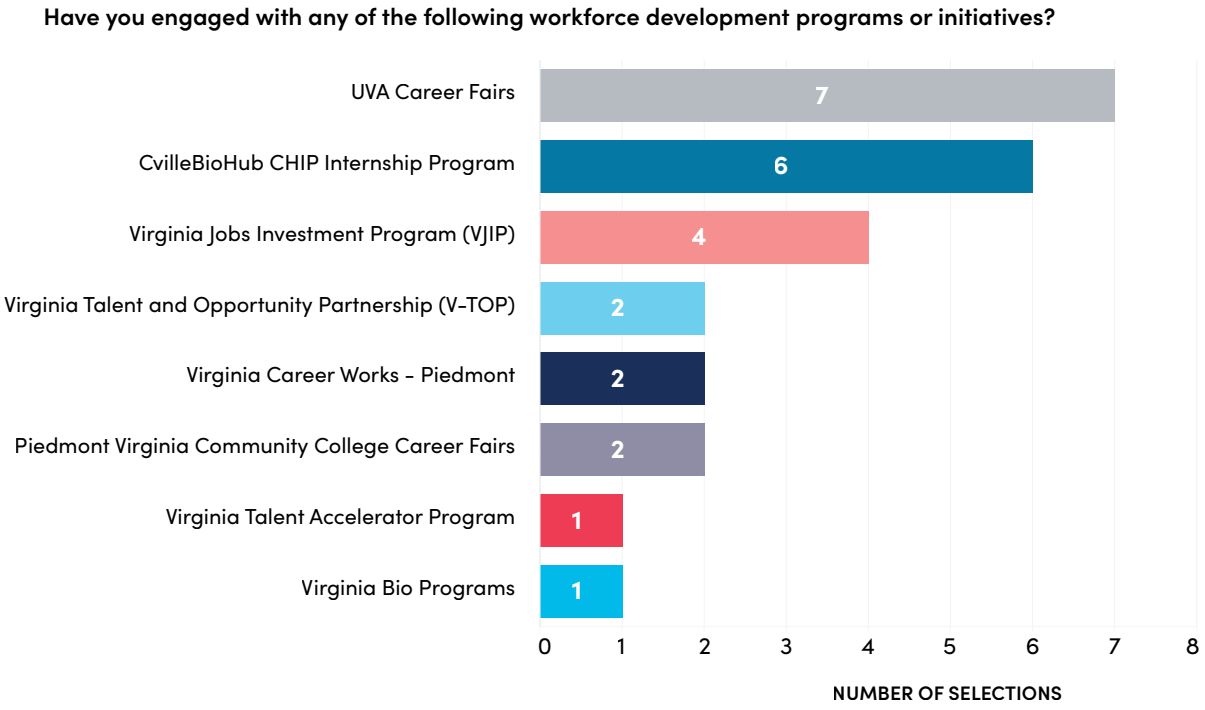
- **Limited Use of State/Regional Workforce Development Programs by Companies:** Despite the availability of Virginia Workforce Credential Grants, apprenticeship tax credits, and other workforce development

mechanisms, regional life sciences employers have historically engaged these resources at limited scale (Figure 19). This disconnect between available resources and employer adoption represents a missed opportunity to leverage public investment for private workforce development benefit and will be critical to address amidst new life sciences industry expansion.

- **Current Programs Operating in Silos With Limited Ecosystem-Level Coordination:** The region's educational and training assets, though individually high-quality and industry-relevant, largely operate in silos with limited formal coordination or ecosystem-level integration. While excellent programs exist at nearly every stage of talent development, the lack of seamless "handoffs" between programs backed by a common dedicated ecosystem support organization creates critical friction points. Stakeholders noted many such cases; for example, a community college graduate may complete a rigorous credential but lack clear visibility into university transfer pathways or employer recognition, or a high school student may complete CTE dual enrollment without explicit linkage to postsecondary continuation or knowledge of opportunities at local life sciences companies for their skill sets. Regional life sciences employers noted the difficulty of identifying talent from educational partners and the absence of regular, structured engagement with curriculum design, while educational institutions report insufficient direct feedback and placement assurance from employers and insufficient coordination with peers to ensure efficient student transitions.

The urgency of addressing these systemic gaps is heightened by transformational announcements reshaping the region's industry landscape. These investments, coupled with anticipated research

FIGURE 19. SURVEY AND INTERVIEW OUTREACH FINDS RELATIVELY LITTLE ENGAGEMENT IN STATE- OR REGION-LED WORKFORCE PROGRAMS



Note: survey sample includes 12 responding companies.
Source: TEConomy's analysis of Central Virginia Hiring/Workforce Demand Survey.

facility expansion at UVA, will dramatically increase demand for talent across entry-level and senior positions. Without ecosystem-level coordination to respond to this demand surge, the region risks continuation of current dynamics, with employers importing talent from outside the region, local educational institutions missing an opportunity align curriculum directly with demand drivers, and potential workforce development benefits failing to materialize for local residents and communities.

As such, this situational assessment reveals a region in the midst of transition. The components of a successful talent ecosystem are largely present across strong anchor institutions, dedicated educational partners, intermediary organizations, and demonstrated commitment to quality and industry relevance. Connectivity and resulting ability to leverage network effects to scale opportunities for talent, however, remains underdeveloped. This situational reality establishes a clear imperative for strategic intervention focused on building the infrastructure of coordination, alignment, and integration that allows existing strengths to function as a unified talent engine capable of rapidly responding to unprecedented industry growth.

Strategic Priorities for Regional Life Sciences Workforce Development

The situational assessment reveals a region with substantial educational and institutional assets but critical gaps in coordination, alignment, and ecosystem integration. The presence of high-quality programs operating independently rather than as a unified system has created inefficiencies in talent flow, employer engagement, and career opportunity awareness. Compounding this challenge is the structural mismatch between the region's talent production and employer demand: while educational institutions generate many bachelor's and higher life science graduates annually, less than a third of bachelor's-level life sciences graduates remain in the region a decade after graduation and entry-level technical talent pipelines are constrained. Simultaneously, unprecedented industry growth driven by signature public-private investments and anticipated facility construction and expansions by major pharmaceutical manufacturers is creating an urgent demand for scaled, coordinated talent development across all skill levels.

Given this landscape, three strategic priorities emerge directly from this assessment and form the basis for subsequent regional strategy to meet demand from industry and build out a lasting talent generation ecosystem:

- **Priority 1: Develop and Strengthen Regional Talent Pipelines for Both Biosciences Technician and Laboratory Support Workforce and Specialized, High-Skilled Science and Engineering Roles.** This dual focus priority acknowledges that regional employers face distinct but equally critical talent gaps. Entry-level and mid-tier technician and laboratory support roles face chronic supply constraints, requiring scaled training capacity, particularly in regulated manufacturing practices, GMP training, and practical laboratory skills. Simultaneously, specialized, higher-volume demand exists for

biomedical engineers, molecular biologists, assay development scientists, data scientists, and bioinformatics specialists, requiring experiential and interdisciplinary programs that bridge research and commercialization. Both types of talent demand enhanced coordination between educational institutions and specific types of training and skills development.

- **Priority 2: Address a Disconnected Ecosystem for Workforce and Talent Development and Enhance Both Career and Company Awareness by Formalizing a Regional Framework for Coordinating Life Sciences Workforce Development Pathways.** Currently, the region lacks formal mechanisms for coordinating handoffs, recognizing credentials across institutions, and providing clear career navigation for prospective talent. This priority calls for developing an integrated regional framework that connects K-12 through PhD degrees and on through incumbent workforce development, formalizes credit recognition and credential "stackability" across educational partners, clarifies pathway options for students and incumbent workers, and creates structured industry-education engagement mechanisms.

- **Priority 3: Develop and Better Tell the Story of Central Virginia's Bioscience Industry and Innovation Strengths for Branding and Specialized Talent Recruitment.** The region possesses distinctive, globally competitive innovation niches including allergen diagnostics, ultrasound-based medical devices, diagnostic assays, and clinical fertility expertise, yet these strengths remain underrealized for talent attraction and regional branding. This priority emphasizes amplifying the region's competitive identity, leveraging niche areas of excellence to build differentiated talent pipelines, encouraging return migration of alumni and experienced professionals from larger hubs, and enhancing visibility of regional companies and career opportunities among prospective candidates. Enhanced branding and targeted recruitment can help de-risk talent attraction, reduce challenges stemming from competition with other regions and states, and build momentum for the broader ecosystem transformation.

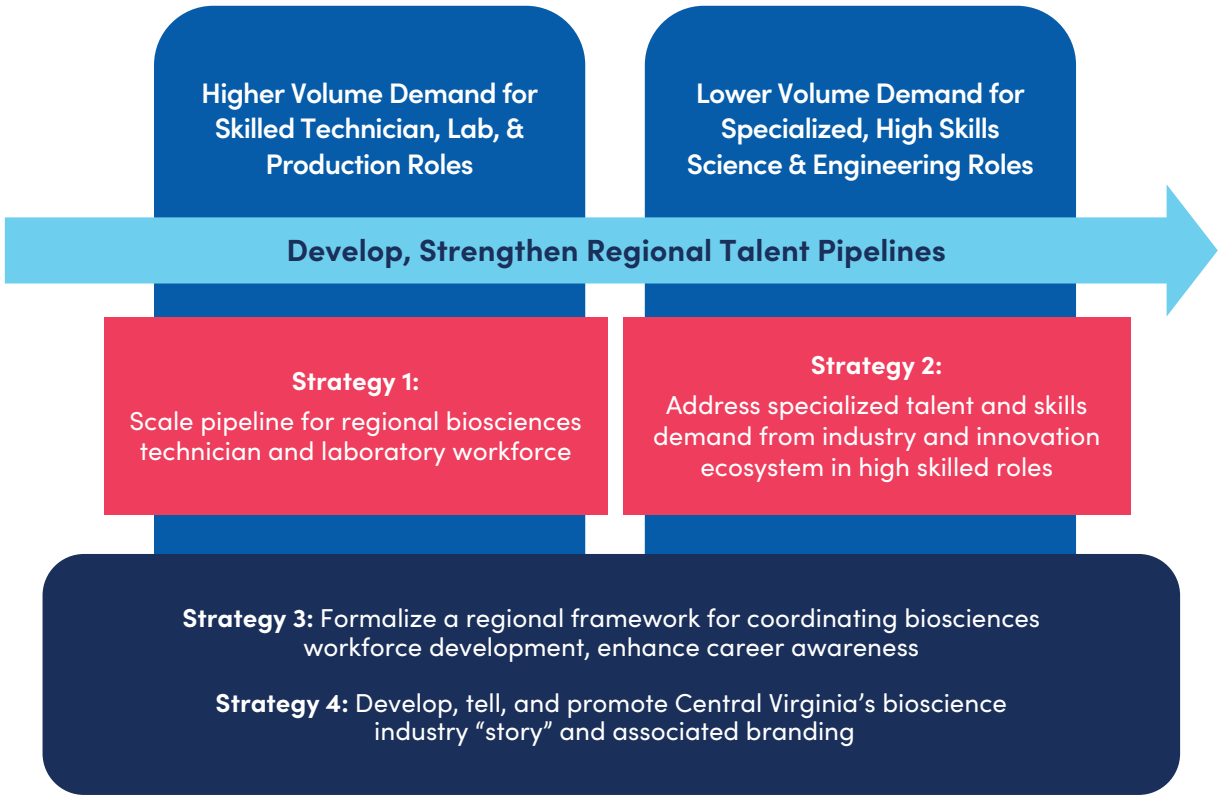
These three priorities are mutually reinforcing. Strengthening talent pipelines requires ecosystem coordination, particularly amidst rapid expansion of employer-driven demand; ecosystem coordination enhances the visibility and credibility necessary for effective development of competitive identity; and effective branding and differentiation of regional competitive advantages accelerates the talent development imperative by making the region's opportunity more tangible and attractive to prospective recruits. **Together, they constitute the basis for a comprehensive strategy for transforming Central Virginia's talent ecosystem from a collection of excellent individual programs into a high-performance, regionally coordinated ecosystem capable of meeting the workforce demands of an accelerating life sciences industry.**

V. Strategic Recommendations to Address Central Virginia's Workforce and Talent Needs and Priorities to Ensure Bioscience Industry Competitiveness Into the Future

Through this strategic planning effort, including extensive quantitative analyses and qualitative input from Region 9 bioscience industry and ecosystem leaders and stakeholders, a set of three strategic priorities have been identified and elevated for recommended strategic interventions.

This section presents four distinct strategies for addressing these priority areas and includes for each strategy a brief rationale, detailed associated actions and recommendations for consideration by CvilleBioHub, CVPED, and their regional workforce and talent-related ecosystem partners, and relevant best practices from other states and regions to inform how others have addressed similar strategic needs.

FIGURE 20. FOUR STRATEGIES DESIGNED TO ADDRESS IDENTIFIED PRIORITIES



Source: TEConomy Partners, LLC.

Strategy 1:

Grow the Pipeline for the Regional Biosciences Technician and Laboratory Support Workforce

RATIONALE AND CONTEXT FOR IMPLEMENTING THIS STRATEGY

Central Virginia faces a critical and growing disconnect between the supply of trained technical talent and employer demand for skilled bioscience workers. While the region produces high-quality talent at advanced levels, the pipeline for technician-level workers remains constrained and insufficient. This gap is particularly acute in roles requiring specialized regulatory knowledge and practical laboratory and manufacturing competency: biomanufacturing operators, quality control technicians, precision manufacturing technicians, clinical research and lab technicians, and aseptic processing specialists.

Employer survey data reveals that companies consistently report difficulty recruiting entry-level and mid-tier technical talent locally, forcing them to invest separately and inefficiently in internal training or recruit from reskilled or non-regional labor pools. Many engineering and science graduates lack foundational familiarity with FDA, ISO, CLIA, or GMP requirements before hire, creating training burdens on employers for rapid workforce scaling needed to meet the need of expansions or new facilities. Furthermore, companies report that specialized life sciences manufacturing and lab operations fields have limited formal training pipelines in the region, with employers developing proprietary in-house programming to address gaps. This dynamic concentrates training investment in individual companies rather than building a sustainable regional asset, and it leaves workers without commonly recognized credentials that transfer across employers or support career mobility.

This challenge is set against a backdrop of unprecedented opportunity and urgency amidst the signature investments by the pharmaceutical manufacturing industry, UVA, and other regional companies signaling transformational demand for exactly the technical workforce the region currently struggles to supply. The anticipated facility expansions and new operational sites across the Richmond-Petersburg-Charlottesville-Harrisonburg corridor will likely increase demand for entry-level technicians by an order of magnitude within 3–5 years. Without deliberate, aggressive action to scale technical training capacity, the region risks becoming dependent on labor supply external to the region, missing the opportunity to create meaningful economic mobility for local residents and to build a sustainable competitive advantage in skilled entry level talent that can in turn attract further employers to the region. Hiring external candidates also exacerbates the cost of housing.

Additionally, demographic and retention data underscore the fragility of the current talent ecosystem. While the region retains established, experienced professionals somewhat more consistently once they are anchored, regional employers report difficulties in managing churn of technician and lab employers after investing in training, while ongoing "leakage" of early-career roles in these positions to other regions suggests that local career opportunities are not perceived as viable long-term pathways or that they do not offer competitive wages for in-region standard of living.

The region possesses high-quality assets, namely PVCC's engineering technology and science programs, UVA's research infrastructure and associated internally developed training programs, and emerging investments in biotechnology credentials. However, these currently operate at insufficient scale and with limited cross-institutional coordination. Strategic action must focus on deliberately scaling technical training infrastructure, improving accessibility for diverse learners, and deeply integrating education with industry needs to build a predictable, local supply of skilled technicians capable of meeting both immediate employer demand and anticipated growth.

ACTIONS NEEDED TO IMPLEMENT THIS STRATEGY WITHIN THE REGION

This strategy centers on scaling the region's technical workforce pipeline through coordinated expansion of training capacity, improved accessibility via multiple on-ramps, and deep industry-education integration. By building robust, aligned technical training infrastructure, the region can:

- Create predictable, local supply of entry-level talent, reducing employer recruitment costs and enabling industry scaling.
- Build portable, recognized credentials, increasing worker career mobility and employer recognition.
- Provide accessible entry points for diverse populations (high school graduates, career-changers, underemployed residents), creating economic mobility.
- Anchor talent locally through professional development and clear advancement pathways.
- De-risk expansion for incoming manufacturers by ensuring ready, vetted pipeline of trained workers.

The region can accomplish these goals via the following specific actions:

Action 1.1: Scale and Support Targeted Technical Training Programs in Partnership with Community Colleges and Regional Workforce Boards

- Expand community college capacity to deliver industry-aligned, modular technical credentials in high-demand areas including biomanufacturing and bioprocessing, aseptic technique, process control and instrumentation, GMP/GLP compliance, quality control and regulated production environment operations, and supporting roles for precision manufacturing.
- Prioritize flexible delivery models such as bootcamps (4–8 weeks), certificates (8–16 weeks), and hybrid formats to accommodate working adults and career transitions.
- Establish formal industry advisory committees reviewing curriculum annually and ensuring alignment with evolving industry practices.
- Embed "real world" training environments through partnerships providing access to pilot-scale manufacturing suites and GMP-compliant facilities.
- Build multiple entry points including pre-requisite bridge programming for those lacking foundational laboratory skills.
- Support additional dedicated program coordinators via funding through state workforce grants, industry partnerships, and philanthropy.
- Establish employer partnerships specifying hiring targets and feedback mechanisms.

Action 1.2: Expand Collaboration and Coordination with UVA Workforce and Training Programs to Complement Regional Training

- Consider opening UVA Research Cores internal technical training processes cited by stakeholders to external learners through a formal "training for external partners" program with sliding-scale fees and potential for scholarship support. Create joint UVA-PVCC technical training modules where UVA faculty approve advanced learning units delivered by PVCC instructors to their students that directly align with Research Core programming.
- Establish clinical research training pathways at community colleges leveraging UVA Health's clinical research infrastructure, including structured clinical research coordinator training and research coordinator apprenticeships combining classroom instruction with paid placement in administering active clinical trials.
- Potential to create MOU or other formal mechanisms between UVA and PVCC and designate a dedicated UVA-PVCC Liaison as well as establishing updated cost-sharing funding mechanisms, digital content, and hybrid delivery mechanisms.
- Scale and expand the UVA "Bridge to Bio" program to serve high school graduates without advanced science background, career-changers from other industries, and underemployed adults who meet technical entry criteria. Develop additional industry-specific bridge programs (e.g., "Precision Manufacturing to Biotech," "Clinical to Biotech") leveraging prior knowledge, and partner with workforce boards and community organizations to recruit from underleveraged populations in the region (e.g. workers in adjacent industries who would see salary benefits).

Action 1.3: Expand Experiential Learning and Lab Exposure Programs for bachelor's Level Students to Better Position Entry-Level Graduates for Industry and Research Settings.

Stakeholders noted the need for additional bachelor's-level talent to support expanding lab and research operations in the life sciences yet struggle with regional recruitment and retention for these "entry-level" positions, while also noting that recent graduates often lack applied lab and clinical research skill sets that enable to them to transition quickly to new roles.

Strengthen structured experiential learning pipelines by formalizing and expanding internship, and lab-based fellowship programs for rising bachelor's and early master's level students, while creating centralized coordination connecting students with experiential placements and removing friction in the discovery and application process (align with later recommended actions around CvilleBioHub and other internship programs).

Expand curriculum-integrated lab experiences ensuring students gain hands-on competency in techniques relevant to industry roles before graduation as well as expanding opportunities within UVA Health and research infrastructure to create embedded research curricula where students work in lab settings alongside clinical and research professionals.

Develop industry-recognized credential (IRC) assessments embedded into coursework or experiential placements documenting skill acquisition and competency development, providing employers with validated evidence of graduate capabilities.

Link experiential placement opportunities and IRC assessment with career ladder advancement and placement levels being developed within UVA research units and UVA Health to better attract and anchor entry-level students with four year degrees.

Action 1.4: Anchor Talent in the Region by Providing Ongoing Professional Development for Entry-Level and Early-Career Workers

Establish mentorship networks pairing experienced technicians and supervisors with early-career workers, providing guidance and career planning support, including development of "soft skills" training modules addressing teamwork, communication in regulated environments, documentation practices, and leadership fundamentals.

Create and publish visible career pathways through career ladder frameworks (leveraging existing efforts underway at UVA Health and other organizations) mapping progression from entry-level roles to senior and supervisory roles across lab, manufacturing, and clinical research positions, documenting required skills and experience at each level and linking to resources for upskilling and IRC's. Organize peer learning and networking events bringing technical workers across the region together.

Provide subsidies/sponsorship opportunities for ongoing professional development in emerging technologies, regulatory updates, leadership development, and IRCs.

EXAMPLES OF BEST PRACTICES AND IMPLEMENTATION EFFORTS TO CONSIDER

NCBioImpact / BioNetwork (North Carolina): Operating since 2002 with sustained legislative funding, NCBioImpact connects industry, universities, and community colleges through standardized, industry-specified training. The BioNetwork delivers the BioWork certificate (136-hour process technician program) across 10+ community colleges, having trained thousands of workers over two decades. North Carolina's position as a global biopharmaceutical manufacturing leader directly reflects this sustained workforce investment.

> *Implications for Central Virginia:* Explore legislative commitment for sustained, strategic public investment; formalize public-private governance; build statewide standardization and scale.

MassBioEd Apprenticeship Program (Massachusetts): This pioneering registered life sciences apprenticeship offers free pre-apprenticeship classroom training (12 weeks) followed by paid, one-year apprenticeships with employers. Outcomes are compelling: 95%+ completion, 97% transition to apprenticeship, 97% permanent job conversion, 89% two-year retention, and 187% average wage increases. The program prioritizes diversity: 73% of cohorts are people of color, 51% women.

> Implications for Central Virginia: Implement earn-and-learn apprenticeship models wherever possible by reducing financial and cost of living barriers; design for non-traditional, diverse learners; measure and report compelling outcomes data.

BioHub Maryland Training and Education Center (Maryland): Opened October 2024, this 8,200-square-foot facility simulates real-world GMP manufacturing with mock clean rooms, gowning areas, and industry-standard equipment. Offers National Institute for Bioprocessing Research and Training (NIBRT) curriculum targeting veterans, people without four-year degrees, and incumbent workers.

> *Implications for Central Virginia:* Develop facility-based training in GMP simulation leveraging PVCC and UVA facilities and potential new developments at North Fork; explore VCAPM hub-and-spoke partnerships for specialized facilities.

Heartland BioWorks / BioTrain (Indiana): Part of a $50M federal Tech Hub, BioCrossroads and Ivy Tech Community College are developing a training institute emphasizing stackable credentials and hands-on training targeting historically underrepresented communities.

> *Implications for Central Virginia:* Leverage opportunities for federal workforce investment; emphasize inclusive talent development and learn-and-earn models.

San Diego Workforce Partnership – Life Sciences Summer Institute: Public workforce board initiative introducing high school students to life sciences through summer lab training, mentorship, and career exploration.

> *Implications for Central Virginia:* Continue to build early-pipeline awareness and foundational skills through K-12 and post-secondary coordination, modeling potential investments in Lab School or other institutional infrastructure after best practices from other life sciences hubs.

Strategy 2:

Address Specialized Talent and Skills Demand in High-Skilled Roles

RATIONALE AND CONTEXT FOR IMPLEMENTING THIS STRATEGY

While Central Virginia produces high quality technical talent, the region faces persistent challenges in specialized, high-skilled roles. Employers report that key roles within STEM-intensive life sciences company operations across experienced research scientists, engineers with experience working in the life sciences industry, and emerging skills sets such as bioinformatics professionals are critical for company success but difficult to hire locally. Unlike entry-level technician shortages that can be addressed through scaling training capacity and access, these specialized roles require deep expertise, advanced credentials, and typically multi-year development pathways.

The challenge has multiple dimensions. First, while UVA produces talent in highly relevant fields, many graduates lack the regulated industry experience and commercialization awareness that employers are seeking to hire. Second, the region experiences significant graduate outflow for talent with the deep educational backgrounds required for these roles, with less than a third of bachelor's-level life sciences talent remaining regionally a decade after graduation. Third, employers report that graduates available for hiring, while technically proficient, often lack understanding of project management, regulatory pathways, market translation, and business fundamentals essential for industry success. Outside of new graduates, stakeholders have noted that the region struggles to attract return migration of alumni and experienced professionals who have built careers in larger hubs (Boston, San Francisco, Research Triangle), despite genuine competitive advantages in quality of life and community.

These challenges suggest that the region must simultaneously strengthen the alignment of training at more senior levels through industry-integrated experiences, build retention through visible career opportunities and professional community, and pursue active recruitment targeting alumni and experienced professionals. Recent announcements and investments by the biomanufacturing industry in the region and the state more broadly may significantly boost the ability to attract and retain advanced talent at scale, making this strategy extremely timely to complement other workforce development efforts being undertaken to support new pharmaceutical manufacturing facilities as well as significant expansion of UVA's research capabilities via investments such as the Manning Institute.

ACTIONS NEEDED TO IMPLEMENT THIS STRATEGY WITHIN THE REGION

This strategy centers on strengthening specialized talent pipelines through experiential and interdisciplinary education, while simultaneously attracting and retaining experienced professionals. By building deep industry-academic partnerships, integrating commercialization and business acumen into technical training, and executing targeted recruitment of alumni and experienced talent, the region can:

- Increase industry-relevance of advanced training by embedding real-world problem-solving, regulatory knowledge, and commercialization exposure into degree and fellowship programs.
- Build career pathways connecting research to commercialization by creating explicit connections between academic research, clinical translation, product development, and entrepreneurship.
- Improve retention of advanced talent by demonstrating clear career trajectories leading to senior roles within the region and building professional community among advanced life sciences professionals.
- Attract experienced talent back to the region by highlighting innovation opportunities, quality of life, and established professional networks available locally.
- Strengthen the entrepreneurial ecosystem by ensuring emerging founders and leaders have access to mentorship, networks, and resources supporting venture creation and scaling.

The region can accomplish these goals via the following specific actions:

Action 2.1: Strengthen Structured Talent Pipelines by Expanding Experiential Learning and Skills-Based Development Programs for Science and Engineering Students

Significantly expand internship and lab-based fellowship programs for bachelor's and graduate students. Create centralized infrastructure connecting students with industry placements in life sciences through a streamlined discovery and application process.

Develop curriculum-integrated lab experiences ensuring students gain hands-on competency in techniques directly relevant to industry roles. Establish clear skills-based competency frameworks defining what graduates should know and be able to do upon completion, explicitly aligned with entry-level industry role expectations, and seek to integrate IRCs into curriculum requirements wherever possible.

Create structured mentorship relationships pairing life sciences students with experienced current or former industry professionals.

Explore options for establishing rotational "study abroad" programs for life sciences students within degree programs where applicants are funded to spend time in a leading bioscience hub undertaking experiential learning activities in industry, regulatory, and life sciences investment environments. Tie application requirements to regional placement commitments after program.

Action 2.2: Fully Reinstate and Fund the CvilleBioHub Internship Program (CHIP) at More Significant Scale and Connect to Other Regional Intern Programs

The CvilleBioHub internship program has demonstrated its value as a critical connector between talent and industry, and it is recommended that the region expand and stabilize this program through multi-year funding commitment, enabling it to serve as the primary internship coordination mechanism for the region. It is also important to increase internship slots from current capacity across a diverse set of companies and research settings.

Integrate CHIP with other regional internship efforts (VTOP, UVA-managed internships, research-based fellowships) to create a coordinated portfolio of opportunities.

Provide interns with structured professional development programming including workshops on regulatory affairs, project management, career pathways, and industry trends. Facilitate peer learning and networking among interns from different companies and institutions.

Support job placement and transition to full-time employment through employer relationships and follow-up. Track long-term career outcomes documenting wage progression, retention in regional companies, and career trajectories.

Action 2.3: Leverage Proximity to UVA Health and Clinical Research Infrastructure to Create Translational Research Fellowships and Joint Industry-Clinician Training Programs

UVA Health represents a substantial asset for specialized talent development in clinical and translational operations skills sets that are increasingly valued by industry. Create or expand structured fellowships and co-mentored training positions combining academic research rigor with clinical relevance and industry awareness. Develop or expand existing translational research fellowships for PhD and master's students for projects with specific clinical and regulatory applications, with mentorship from both UVA researchers and industry scientists.

Create industry-clinician fellows programs pairing relevant regional industry representatives with clinical researchers and physicians, enabling mutual knowledge exchange and awareness of opportunities for translation to industry.

Facilitate joint industry-UVA Health collaborative research projects with regional partners creating learning opportunities for graduate students and early-career researchers. Explore opportunities for "Clinic-to-Industry" convenings bringing together researchers, clinicians, and industry representatives to discuss emerging opportunities and ways to leverage base of clinical trials activity towards new industry and talent development capabilities.

Action 2.4: Build Programs for Interdisciplinary Skill Development that Bridge Research and Commercialization

Develop programs explicitly teaching scientists and engineers business and commercialization fundamentals including project management, regulatory pathways, intellectual property, market analysis, business model development, and fundraising.

Scale certificate or graduate certificate programs combining classroom instruction with case studies, industry guest speakers, and company visits. Embed business/ entrepreneurship modules into existing degree programs (biomedical engineering, molecular biology, etc.), ensuring all graduates have exposure to commercialization and regulatory affairs concepts.

Establish life sciences-specific "Entrepreneur in Residence" or "Business Mentor" programs at UVA where experienced industry professionals spend time with graduate students and early-career researchers, advising on business opportunities and translation pathways. Create associated capstone or thesis projects where students work on commercially relevant problems or use cases with industry guidance (potentially targeting pharmaceutical companies investing in region).

Partnering with UVA business schools and other entrepreneurial programs, develop student exposure programs that leverage embedding with companies' business development, regulatory, and commercialization functions, providing practical exposure to technically trained personnel.

Action 2.5: Encourage Return Migration of Talent by Targeting Former UVA and Other Regional Graduates Now Working in Larger Biotech Hubs

There remains an ongoing need for outreach to alumni and talent with ties to the region who have built careers in larger hubs (Boston, San Francisco, North Carolina Research Triangle) and may be interested in returning to the region. Develop a targeted recruitment campaign highlighting the region's innovation ecosystem, quality of life, emerging opportunities with incoming manufacturers, and established professional networks.

Explore options for providing relocation as well as community integration resources. Feature success stories of returned alumni in marketing and outreach.

Partner with UVA Career Services, class reunion committees, and other data providers to identify target demographics (10 to 20 years post-graduation, mid-career professionals with industry experience in relevant life sciences roles). Create "Return to Central Virginia" program offering career development support, networking connections, and recruitment assistance for alumni considering return. Highlight specific opportunities in startup advisory roles, leadership positions in scaling companies, research collaboration opportunities, sales and product development roles, and entrepreneurship potential, in particular new opportunities with expanding pharmaceutical companies.

EXAMPLES OF BEST PRACTICES AND IMPLEMENTATION EFFORTS TO CONSIDER

Johns Hopkins Technology Ventures (JHTV) / FastForward Incubator: JHTV operates comprehensive incubation and commercialization infrastructure including turnkey incubator space with wet labs, fully equipped with shared instruments. The FastForward program provides legal, accounting, fundraising assistance, mentorship through "Mentors in Residence," and translational grants. Student entrepreneurship operates through Commercialization Academy, FastForward U, and the Pava Marie LaPere Center for Entrepreneurship. Integration into academic culture occurs through "entrepreneurial evangelism" in faculty meetings, invention disclosure portal, and systematic onboarding of students and faculty.

> *Implications for Central Virginia:* Create comprehensive life sciences entrepreneurship and commercialization skills infrastructure spanning physical space, funding, mentorship, and business support services; systematically integrate entrepreneurship into academic culture to boost in-demand skills for senior talent.

Stanford BioDesign Program: This fellowship program explicitly teaches biomedical professionals to identify clinical needs, develop solutions, and translate to market. Combines technical training with business, regulatory, and entrepreneurship education. Fellows graduate with both technical competency and commercialization capabilities.

> *Implications for Central Virginia:* Create structured programs bridging technical expertise with business acumen; emphasize awareness of translational pathways from idea to market.

MIT.nano and Translational Research Programs: MIT's advanced materials and nanotechnology programs integrate industry research partnerships directly into graduate curriculum. Students work on company-relevant problems with embedded industry mentors, gaining both technical depth and commercialization exposure.

> *Implications for Central Virginia:* Embed industry-relevant research into academic training; create structural opportunities for industry-academic collaboration through student projects.

Strategy 3:

Better and More Seamlessly Connect the Workforce and Talent Ecosystem and Resources by Formalizing a Regional Framework for Coordinating Biosciences Workforce Development Pathways and Enhancing Career and Company Awareness

RATIONALE AND CONTEXT FOR IMPLEMENTING THIS STRATEGY

Despite possessing substantial, high-quality educational assets, stakeholders widely noted that Central Virginia's life sciences talent ecosystem currently operates in silos, leading to a lack of overall coordination that undermines the ability of individual components to reach significant scale. Stakeholder interviews consistently surface this fundamental challenge across several dimensions, including unclear pathways and historical disconnects between programs, limited formal mechanisms for handoffs between educational stages, and insufficient coordination amongst institutions. High school graduates completing CTE dual enrollment find no clear awareness or linkage to life sciences careers, community college graduates with life sciences backgrounds often face unclear credential translation to university pathways or employer perception of limited applicability, and internship or experiential program participants gain valuable experience but have more limited coordinated support in transitioning to regional full-time employment. Employers similarly express some frustration about difficulties in identifying talent from educational institutions and absence of structured curriculum engagement around life sciences (although recent efforts and employer partnerships show that this narrative may be rapidly shifting).

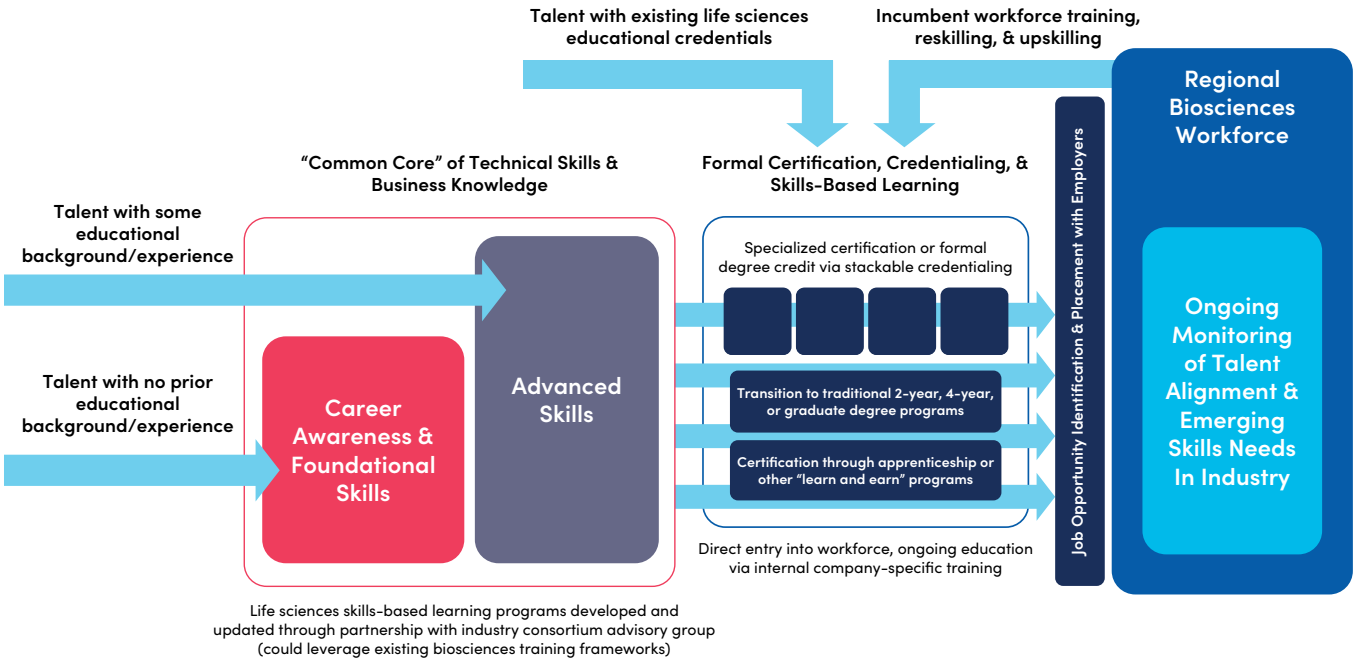
Despite a variety of excellent programs, this lack of connectivity means investments yield lower return in anchoring talent within the region than they otherwise might achieve, and talented individuals are lost in institutional gaps. Additionally, the region faces a persistent awareness problem: early-stage knowledge about regional bioscience career opportunities and pathways remains limited, particularly at high school and early postsecondary levels. Regional companies, especially smaller ones, note that they remain more opaque to potential talent outside immediate networks.

These coordination and awareness challenges are particularly urgent given transformational change ahead. The VCAPM announcement and facility expansions will require a combination of rapid talent development and external recruitment across all educational levels and entry points to the workforce development continuum. Without improved ecosystem coordination, the region may struggle to respond in the centrally coordinated manner which defines leading life sciences industry ecosystems. As a result, formalizing a coordination framework and investing in dedicated coordinating capacity is an essential investment for managing regional economic transformation.

Given the region's rich portfolio of existing programs that operate individually, building the "connective tissue" of the regional ecosystem for life sciences talent can result in outsized gains. Figure 21 below outlines a high-level view of such a successful ecosystem, with interconnected components and coordinated hand-offs at each stage of the career development continuum for life sciences workers. In addition, such a framework supports multiple entry points for programs to meet the needs of a variety of incoming types of talent, ranging from late high school to workers seeking career transitions, and route them to appropriate programming.

Similarly, such a framework also supports multiple successful "exits", ranging from transition to further education and training to entry into the workforce to ongoing assessment of industry-relevant skills to maintain regional workforce relevancy to life sciences employers. Establishing this type of coordination framework will ultimately position the region to fully realize the opportunities stemming from recent investments and position the bioscience industry cluster for long-term attraction and growth of talent.

FIGURE 21. EXAMPLE OF POTENTIAL COORDINATED REGIONAL FRAMEWORK FOR BIOSCIENCES SKILLS & CREDENTIALING LEVERAGING MULTIPLE "ON" AND "OFF" RAMPS FOR TALENT



Source: TEConomy Partners, LLC.

ACTIONS NEEDED TO IMPLEMENT THIS STRATEGY WITHIN THE REGION

This strategy centers on formalizing regional coordination and strengthening ecosystem connectivity through dedicated intermediary functions, aligned governance structures, and enhanced career and company visibility. By building robust coordination infrastructure and actively managing talent flow across institutions, the region can:

- Create seamless talent pathways across educational stages, eliminating gaps and friction that can result in talent "leakages" over time.
- Build shared ecosystem intelligence through formalized labor market analysis and regular assessment of supply-demand alignment, enabling responsive, evidence-based decision-making.
- Improve employer-education alignment through structured engagement mechanisms ensuring training directly addresses industry needs.
- Enhance visibility and awareness of regional bioscience opportunities among students, job-seekers, and the broader community, expanding the talent pipeline and improving talent attraction.
- Strengthen professional community and retention through networking, mentorship, and peer learning opportunities that reduce isolation in a smaller hub and support long-term career commitment.
- Maximize return on educational investment by eliminating duplicative programming, coordinating resource use, and ensuring every asset contributes to a coherent system rather than operating independently.
- Accelerate industry response capability by creating mechanisms enabling the region to identify and rapidly mobilize resources to address emerging talent needs from incoming manufacturers and scaling companies.

The region can accomplish these goals via the following specific actions:

Action 3.1: Establish and Fund a "Regional Biosciences Career Navigator" Function at CvilleBioHub

Create and fund a dedicated full-time role (with additional FTE support as necessary) housed within CvilleBioHub, focused on life sciences, and serving multiple functions: connecting job seekers and students with appropriate training and employment opportunities, helping employers identify talent pools and training partners, and identifying coordination gaps requiring institutional attention.

Provide career counseling and pathway mapping for individuals navigating education and employment, serve as the stakeholder for maintaining a comprehensive, accessible inventory of regional training programs, credentials, and pathways, serve as point of contact for employers seeking trained workers, and identify and elevate systemic areas of demand (e.g., unmet employer needs without corresponding training).

Establish any required physical and digital infrastructure including dedicated office space, catalogue of regional programs and opportunities, regular newsletters and social media presence, and clear contact mechanisms (one model of how this function is resourced is at Shoreline Community College in Washington State).

Action 3.2: Increase Cross-Company Awareness and Collaboration Through Signature Events and Industry-Wide Networking

Expand CvilleBioHub career fair programming from ad-hoc to regular (annual or semi-annual), well-organized events showcasing 30+ companies with company booths, panel discussions, internship opportunities, and networking marketed widely.

Organize regular industry tech tours for high school and college students providing firsthand workplace exposure and host regular company open houses where other industry members are invited for tours and networking.

Expand existing speaker series featuring company leaders, scientists, and entrepreneurs to better showcase regional industry base.

Enhance online directory of regional bioscience companies on CvilleBioHub website featuring areas of innovation and research, job opportunities, internships, and contact information (could be part of responsibilities for role outlined in Action 3.1).

Action 3.3: Expand Networking Opportunities Like Those Offered by CvilleBioHub's CEO Roundtables to Enable Broader Participation and Access

Establish additional roundtable for mid-career professionals bringing together technicians, scientists, engineers, and operations professionals (5–15 years experience) from across regional companies. Seek to deploy specialized programming addressing leadership development, project management, regulatory and compliance topics, and emerging technologies and facilitate peer learning sessions where professionals share expertise and solutions.

Based on demand, explore opportunities to create additional roundtables for specific life sciences communities of practice

Build additional professional community and belonging among professionals through dedicated outreach to smaller organizations.

Action 3.4: Establish a Curated Venue for Emerging Leader Development and Advising to Seed Next Generation of Life Sciences Talent

Create "Emerging Bioscience Leaders Program" providing structured curriculum in business fundamentals, regulatory affairs, fundraising, and commercialization, mentorship matching with experienced founders, peer cohort development, preferred access to professional networks, and ongoing office hours. Employ a rigorous application process targeted at early career technical workers in regional life sciences companies and explore options for funding subsidies for attendance at conferences or other professional development opportunities not otherwise available to early career workers.

Establish additional "Life Science Founder Office Hours" where experienced founders (which are present throughout the region) advise life sciences entrepreneurs and connect them directly to their funding and partner networks. May require proactive outreach and relationship management by CvilleBioHub or others to facilitate connections in early stages.

Host annual "Life Sciences Venture Showcase" pitch events with award funding where emerging founders present ideas and receive investor and mentor feedback (could be tied to other recommended professional development programs noted throughout).

Action 3.5. Develop a Coordination Framework and Working Group Among Regional Workforce Development Stakeholders Which Can Seek to Better Integrate Programming, Avoid Duplicative Functions, and Improve Responsiveness

Form standing life sciences workforce development coordination group comprising a limited group of key stakeholders from K-12 schools (CTE directors, principals), community colleges (PVCC, Germanna, Laurel Ridge), UVA (career services, research cores), industry (large and small company representatives), workforce boards, and intermediaries (CvilleBioHub, Manning Institute, and any others such as VA Bio).

Undertake a rigorous process to define charge and ongoing areas of coordination including curriculum alignment across K-12, CTEs, community colleges, universities, and employers; credential standardization, stackability, and multi-institution recognition; program coordination and handoffs removing administrative barriers; emerging skills identification assessing industry needs and training gaps; data sharing and outcome measurement establishing shared metrics and transparency.

Establish quarterly meetings with rotating hosting, annual stakeholder convening, working subgroups addressing specific issues, and clear decision-making authority.

Seek to couple regional funding and investment in life sciences workforce development with mission and strategy of the coordination group and formalize a coordination framework via MOUs or other partner agreements.

EXAMPLES OF BEST PRACTICES AND IMPLEMENTATION EFFORTS TO CONSIDER

Life Science Washington Operating as state trade association and regional strategy "quarterback," Life Science Washington manages Career Connect Washington initiative convening industry, educators, and workforce partners. Produces strategies and reporting providing data-driven assessment guiding investment priorities.

> *Implications for Central Virginia:* CvilleBioHub or another dedicated regional authority can serve as a centralizing convener and steward of regional strategy, producing regular workforce assessments and leading partner engagement.

Pennsylvania Keystone LifeSci Collaborative: Launched March 2024 as a business-centered, industry-led forum in the Greater Philadelphia region (six-county Southeastern Pennsylvania area) based on the "Next Gen Sector Partnership" model where employers proactively champion shared solutions. Funded by $3.4 million from the American Rescue Plan's Good Jobs Challenge, the collaborative brings together more than 30 companies focusing on cell and gene therapy, biomanufacturing, and broader life sciences. The initiative is guided by a steering committee composed of public and private stakeholder organizations in the Philadelphia region.

> *Implications for Central Virginia:* Properly organized intermediary can operate on demand-driven, employer-led basis while maintaining accountability to broader investment requirements and enabling targeted programming via multi-institutional coordination.

BioCrossroads / Indiana Career Apprenticeship Pathway: Industry association serving as workforce development authority, convening employer steering committees defining competencies and needs, working with Ivy Tech on aligned training, producing workforce reports, maintaining job board. Emphasizes "common language" for skills facilitating credential recognition and talent mobility and has formatted a new professional education and training pathway that combines classroom education with on-the-job training to prepare high school students and adults for careers in life sciences.

> *Implications for Central Virginia:* Industry association structure has potential to reach across institutions to take on sophisticated workforce coordination and training governance.

Colorado BioScience Institute: Workforce arm of Colorado BioScience Association running Life Sciences Employer Talent Collaborative using Talent Pipeline Management framework aligning demand with education supply; extensive K-12 outreach through P-TECH and STEM partnerships.

> *Implications for Central Virginia:* Example of comprehensive approach addressing full talent pipeline from K-12 through incumbent workers.

Strategy 4:

Develop, Tell, and Promote Central Virginia's Bioscience Industry "Story" and Associated Brand Identity for Specialized Talent Recruitment

RATIONALE AND CONTEXT FOR IMPLEMENTING THIS STRATEGY

Central Virginia possesses genuine, distinctive strengths in bioscience innovation: globally recognized expertise in allergen diagnostics (InBio), ultrasound-based medical devices (Rivanna Medical), diagnostic assays (Luna Labs), fertility and reproductive medicine, precision manufacturing, and early-stage biologics development (anchored by the Manning Institute and UVA research). However, potential talent pools are often unaware of the region's innovation ecosystem and career opportunities, while regional companies struggle with visibility in a crowded biotech market limiting their ability to attract specialized talent and compete for partnerships and investment.

This visibility gap has real consequences. For example, a high school student interested in bioscience may envision only traditional paths (becoming a physician, joining a large pharmaceutical manufacturing plant as a line worker) without awareness of the diverse regional opportunities available, while a career-changer considering biotech may dismiss the region as lacking critical mass and be unaware of the cluster's distinctive strengths. Similarly, an experienced professional in another life sciences hub considering relocation may be unfamiliar with Central Virginia's emerging opportunities and quality of life. This lack of awareness directly constrains talent pipelines, business development, and the region's ability to leverage its genuine competitive advantages.

While excitement over recent announcements has built significant momentum, the region to date still lacks a unified, compelling "story" about its bioscience industry identity. While strengths exist, they are focused on individual companies and institutions without a coherent narrative connecting them or articulating the region's distinctive position in the national bioscience landscape. This contrasts with other hubs who have leveraged branded identities to attract industry and talent: Research Triangle for broad-based pharma and device manufacturing; Boston for biotech and drug development; San Francisco for synthetic biology and cell therapy.

The region must address these challenges through deliberate, multi-faceted branding and storytelling initiatives designed to make the region visible, compelling, and attractive to multiple audiences: students and career transitioners seeking to enter the industry, experienced professionals considering geographic migration, employers seeking to attract specialized talent, investors and partners evaluating opportunities, leaders attending international conventions (e.g., BIO), and policymakers considering economic development investment.

ACTIONS NEEDED TO IMPLEMENT THIS STRATEGY WITHIN THE REGION

This strategy centers on developing, amplifying, and strategically communicating Central Virginia's distinctive bioscience identity and innovation strengths to targeted audiences through multiple channels and mechanisms. By building a compelling, data-backed narrative about regional strengths and deliberately positioning the region as a distinctive destination, the strategy aims to:

- Build regional visibility and awareness among key talent audiences about Central Virginia's bioscience opportunities and innovation ecosystem.
- Establish regional competitive differentiation by articulating distinctive strengths rather than competing generically with larger hubs.
- Enhance talent attraction and recruitment by making regional opportunities visible to both local residents and professionals in larger hubs considering relocation.
- Support business development by elevating visibility of regional companies, facilitating partnerships, and enabling recruiting efforts.
- Strengthen entrepreneurial momentum by celebrating innovation successes, building community identity around innovation, and attracting founders and venture-stage companies.
- Leverage regional assets including CvilleBioHub, Manning Institute, new pharmaceutical manufacturing investments, and distinctive company niches as differentiating factors.

The region can accomplish these goals via the following specific actions:

Action 4.1: Leverage Ongoing Identification of Regional Strengths and Growth Opportunities in the Bioscience Industry and Innovation Thrusts Identified in Concurrent Work with CVPED and UVA for the "Innovation Corridor" Effort

The region has undertaken concurrent strategic work through CVPED and UVA to identify distinctive innovation strengths and growth opportunities where the region has competitive advantage and emerging potential. It will be critical to leverage this concurrent work to inform and anchor the regional branding and storytelling strategy.

Ensure that bioscience-specific branding efforts align with and build upon the broader Innovation Corridor narrative. Use innovation corridor assessments to identify distinctive, defensible competitive positions and incorporate data from concurrent analyses into marketing materials, positioning statements, and recruitment messaging.

Action 4.2: Coordinate with CvilleBioHub, CVPED, and UVA's New Manning Institute to Amplify the Regional Research Brand Around Focus on Early-Stage Biologics Development

The Manning Institute represents a unique, distinctive asset as a key research center focused on early-stage biologics development, and in conjunction with recent pharmaceutical investments expected to focus on similar capabilities and potential industry partnership represents a major opportunity to catalyze momentum across the regional ecosystem. Similarly, CvilleBioHub's emerging company focus and associated developments at UVA's North Fork industry park can create distinctive regional positioning around innovation and early-stage company development. It will be critical to develop integrated marketing and branding positioning Central Virginia as a distinctive destination for early-stage biologics development, product innovation, and translational research.

Highlight the Manning Institute, UVA research capabilities, CvilleBioHub support services including the Commonwealth BioAccelerator, and emerging company successes as evidence of regional strength. Organize a signature event or conference focusing on early-stage biologics development and innovation, positioning the region as convener and thought leader.

EXAMPLES OF BEST PRACTICES AND IMPLEMENTATION EFFORTS TO CONSIDER

BioCrossroads "Life Sciences Indiana" Brand Campaign: Coordinates messaging across the state to position Indiana as distinctive bioscience destination. Highlights specific strengths (pharmaceutical manufacturing, medical devices) and uses integrated marketing including digital, events, media relations, and direct recruitment outreach.

> *Implications for Central Virginia:* Develop distinctive regional positioning grounded in competitive advantages; use integrated marketing approach to coordinate messaging across stakeholders.

North Carolina BioImpact and Accelerate NC Outreach and Marketing Programs: Positions North Carolina as global biopharmaceutical manufacturing leader. Campaign includes digital content, events, media relations, and direct recruitment outreach via ambassador programs. Emphasizes unique strengths in manufacturing, workforce development, and innovation ecosystem.

> *Implications for Central Virginia:* Emphasize distinctive innovation strengths and emerging momentum in pharmaceutical investments; develop compelling, consistent messaging using multi-channel approach.

Appendix

TABLE A1. DEFINING THE BIOSCIENCES INDUSTRY—NAICS-BASED INDUSTRY DEFINITION

Biosciences 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
	325315	Compost Manufacturing
	325320	Pesticide and Other Agricultural Chemical Manufacturing
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
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
Pharmaceuticals	325411	Medicinal and Botanical Manufacturing
	325412	Pharmaceutical Preparation Manufacturing
	325413	In-Vitro Diagnostic Substance Manufacturing
	325414	Biological Product (except Diagnostic) 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

Biosciences Industry Subsector	NAICS Code	NAICS Description
Colleges & Universities	611310**	Colleges, Universities, and Professional Schools
Hospitals & Healthcare	621410**	Family Planning Centers
	621420**	Outpatient Mental Health and Substance Abuse Centers
	621491**	HMO Medical Centers
	621492**	Kidney Dialysis Centers
	621493**	Freestanding Ambulatory Surgical and Emergency Centers
	621498**	All Other Outpatient Care Centers
	621512**	Diagnostic Imaging Centers
	621991**	Blood and Organ Banks
	621999**	All Other Miscellaneous Ambulatory Health Care Services
	622110**	General Medical and Surgical Hospitals
	622210**	Psychiatric and Substance Abuse Hospitals
	622310**	Specialty (except Psychiatric and Substance Abuse) Hospitals
Digital Health	N/A***	N/A

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

**Note: Includes only the portion of these sectors engaged in relevant life sciences activities, focused on clinical and life sciences scientific R&D-related personnel (i.e., non-clinical and excluding core teaching faculty).
***Note: Digital Health companies identified and employment data estimated through additional sources, including PitchBook, SBIR/STTR databases, Hoovers D&B, CvilleBioHub.

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