Vision 2030

Harnessing the Life Sciences Ecosystem Across and Beyond Massachusetts

October 2024

MASSBIO

About MassBio

MassBio is the driving force behind Massachusetts' life sciences ecosystem, supporting innovation and industry growth by offering best-in-class resources to over 1,700 member organizations at all stages of the biopharma lifecycle. Founded in 1985, MassBio aspires to extend Massachusetts' impact as the global center of excellence in biomedical breakthroughs. Through strategic cost-saving initiatives, robust business partnerships, educational and networking opportunities, and proactive advocacy, MassBio empowers its members to launch the next generation of medical advancements to deliver the cures and therapies that enhance patient lives.

massbio.org

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Letter from the CEO and President

As we embark on the journey toward 2030, I am filled with immense pride and excitement to share our strategic vision for the future of MassBio. In just the past few years, we have seen remarkable growth and impact across the Massachusetts life sciences ecosystem, from tremendous business success to life-changing medications getting to patients. MassBio continues to be an industry leader, respected across the world, and there are limitless possibilities over the next five years to go further and help our members reach greater heights to benefit people with unmet medical needs.

MassBio has remained a driving force in making Massachusetts the top destination for life sciences research, development, and commercialization. Our dedication to a diverse and vibrant industry has ignited groundbreaking initiatives that support our members' growth and sustainability. Through the launch of MassBioDrive, the MassBio Align Summit, and the expansion of Pharma Days®, we have created unparalleled opportunities for innovators of all kinds. Our collaborations with industry leaders, government, and academia have enabled us to offer valuable resources and solutions across the entire industry ecosystem. A shining example of this is Bioversity, our workforce training center in Dorchester where individuals with high school diplomas undertake an eight-week training program to access the skills to land an entry-level job in the life sciences.

For the next five years, we will continue to work on driving innovation, empowering our ecosystem and its companies through all stages of their business life cycle, and expanding access to life-saving therapies worldwide. We're honored to be a trusted partner to the Massachusetts life sciences community in exploring new frontiers in science and technology, leveraging partnerships to accelerate transformative treatments.

Our 2030 strategy is the framework for MassBio's efforts to address the most pressing needs of our industry. It is also a roadmap for fulfilling our promise to our membership that the environment here in Massachusetts is one where they can thrive, and research and development can accelerate innovation to make a difference for patients.

I want to extend my heartfelt gratitude to our members, partners, and stakeholders for your unwavering commitment to our shared mission. Together, we have achieved extraordinary milestones, and together, we will continue to push the boundaries of what is possible in the life sciences. I am confident that our collective efforts will lead to even greater advancements and impact.

Thank you for being an integral part of the MassBio community. Let us continue to pursue our important work with these strategic goals as our guiding light to transform the future of health.

Kendalle Burlin O'Connell
CEO and President
MassBio

Letter from the Chair of the Board

In my role at Alexion, AstraZeneca Rare Disease and as the Chair of MassBio's Board of Directors, I have the opportunity to experience the ongoing biotech growth across the Commonwealth from many viewpoints. It is extraordinary when I think about how MassBio and our members, our state government, and our communities have worked together to create employment opportunities, enhance healthcare access, and foster economic prosperity across Massachusetts.

The Massachusetts life sciences sector continues to lead the nation, comprising 14.9% of the U.S. drug development pipeline and 6.5% of the global pipeline. We do not take this leadership position for granted and will work together to ensure we are positioned to drive the future of life sciences innovation for years to come. We'll do this through advocating for policies that ensure access and opportunity for all patients and communities, supporting incentives that drive scientific innovation, and championing a vision for a more equitable healthcare system. Our goal is to make a meaningful impact on the lives of the patients and families who depend on us. We are fueled by this passion, and it is what drives us forward.

A cornerstone of our strategic approach is the investment in our people. While Massachusetts is home to some of the nation's leading academic and research institutions, it's important to cultivate talent from our many communities to meet the growing demands of our industry. By sourcing talent from diverse backgrounds, we are developing a skilled workforce that reflects the patient populations we serve. The success stories of Bioversity graduates, who have found meaningful careers at companies like Vertex Pharmaceuticals and Foundation Medicine, are a testament to MassBio's enduring impact.

Moreover, the Commonwealth's Clean Energy and Climate Plan for 2025 and 2030, bolstered by the commitment of Governor Healey and her administration, as well as state legislative leaders, lays the groundwork for sustained growth and resilience in the life sciences ecosystem. Together, we are supporting public policies that strengthen the biotech sector and empower innovation.

Looking ahead, I envision a future where our biotech industry thrives in every part of our Commonwealth. This future will be driven by a shared commitment to innovation, access, and equity. We must continue to elevate the story of our industry's invaluable contributions to economies, communities, and patients—not just locally, but on a global scale. So, as we look toward 2030, we want Massachusetts to be recognized not only for the advancements we pioneer in science and health, but also for the opportunities we have created for all.

Tamar Thompson
Chair, MassBio Board of Directors
Vice President, Head of Corporate Affairs, Alexion, AstraZeneca Rare Disease

Executive Summary

Driving Innovation and Advancement as MassBio

The life sciences industry has enabled remarkable advancements in disease treatment to improve patient lives over the past decade. As we look forward to the next five years, the industry will continue to progress, driven by rapid scientific and technological innovations, evolving regulatory and policy landscapes, and increasing operational complexity. As the world's premier hub for life sciences innovation and one of the densest life sciences ecosystems, Massachusetts faces the same challenges and opportunities, arguably more acutely. The Vision 2030 strategy looks at how Massachusetts (and MassBio) can build on its strengths to further support advances across the life sciences industry, within the Commonwealth and beyond.

Figure 1 Opportunity Areas for Impact

Based on a wide range of global and local trends we have identified six key opportunity areas for Massachusetts to focus to further bolster its ecosystem and industry-wide impact:

1 Scaling Innovators

Supporting early-stage biotech startups and their leadership in overcoming challenges in accessing critical resources and expertise to scale their operations

2 Engaging Investors

Attracting a broader range of traditional and non-traditional funding sources for life sciences ventures in Massachusetts, especially for early-stage biotechs

3 Recruiting and Retaining Talent

Addressing ongoing talent gaps at all levels across the life sciences ecosystem while enhancing diversity, equity, and inclusion

4 Expanding TechBio

Fostering partnerships between tech and life sciences players to enable advancements across the value chain, e.g., through AI and digital innovation

5 Building Up Biomanufacturing

Expanding biomanufacturing capacity and enabling local infrastructure funding to meet emerging demand for capacity

6 Radiating Value and Extending Industry Impact

Enhancing public understanding and policy support for the industry's contributions to public health and economic growth

Setting the MassBio Strategy

The MassBio 2030 strategy is the outcome of an extensive, highly consultative process including member surveys, ecosystem-wide stakeholder interviews and highly interactive, rich ideation sessions with leaders representing a cross-section of the life sciences industry. The strategy centers on four guiding principles that help MassBio achieve its mission and vision, leverage MassBio's unique strengths as a convener while focusing MassBio on what it is best suited to accomplish relative to the breadth of available resources and capabilities within Massachusetts:

- **Life Sciences at the Core:** Focus on initiatives that are specific to the life sciences where MassBio can drive outsized influence and impact (vs initiatives in other sectors that could impact the life sciences).
- **Be Needs-Based and Future-Forward:** Combine both external trends and diverse feedback across members to ensure that initiatives address 2030 needs.
- **Partner for Scale:** Harness the ecosystem and leverage partners wherever possible, either with MassBio as lead or MassBio as catalyst to move other partners forward.
- **Long-Term Sustainability for MassBio:** Ensure initiatives are scalable and sustainable for MassBio for longer-term impact (e.g., build on existing capabilities).

Figure 2

MassBio Aspires to Deliver Substantial Impact Across its Four Impact Pillars by Mobilizing the Massachusetts Life Sciences Ecosystem

MassBio 2030 Roadmap Catalysts

Guided by our key principles, MassBio seeks to drive substantial impact in Massachusetts by catalyzing the Commonwealth's life sciences ecosystem in four pivotal areas, creating up to $1 billion in Massachusetts GDP growth via new investments, job creation, and infrastructure:

Early-Stage Catalyst

Support and Grow Early-Stage Biotech Community: Provide access to critical services and increase cross-ecosystem collaboration to accelerate startup growth, create new jobs, and extend Massachusetts' global leadership in early-stage innovation.

Funding Catalyst

Broaden and Curate High-Quality Life Sciences Investors: Enrich and diversify funding sources to address the early-stage funding gap. Establish pathways for non-traditional and international investors, and strengthen the innovation pipeline in Massachusetts.

Talent Catalyst

Future-Proof Massachusetts' Life Sciences Talent Pool: Reinforce Massachusetts' key competitive advantage as a hub for life sciences education and employment by addressing talent gaps and facilitating life sciences ecosystem leaders to future-proof its workforce as well as uplift industry capabilities.

Social Impact Catalyst

Advocate for Life Sciences Ecosystem Needs, Priorities, and Policies: Educate the public on the industry's impact. Help maintain Massachusetts overall global life sciences competitiveness. Champion and catalyze policy changes that support sustainable growth and innovation.

While these four catalysts are key growth and focus areas for MassBio, they do not represent the entirety of MassBio's commitments to Massachusetts over the next five years. MassBio will continue to grow and support our membership, advocate for our core stakeholders, and nurture the Massachusetts ecosystem by staying attuned to industry trends and shifting needs.

2030: What Lies Ahead?

The Life Sciences Industry Landscape

The life sciences industry has demonstrated tremendous capacity for innovation and evolution over the past decade. For example, cell therapy is projected to grow significantly by 2030, becoming the third largest modality after antibodies and small molecules (**McKinsey**). Over the next five years, this capacity to deliver impact amidst unprecedented change will be even more critical, given continued trends including ongoing scientific and technological advancements, evolving policies, growing operational complexity, and shifting economic pressures. Beyond addressing emerging challenges, the industry can also continue to set higher ambitions in terms of its impact on patients and society as well as on how it has developed its capabilities and workforce today.

Evolving Pipeline Productivity and Patient Impact

Over the last 10 years, the biopharma industry has launched more than 500 new molecule entities, many of which have transformed millions of lives, while generics have extended the reach of top-selling drugs to enable broader access to individuals. At the same time, we have seen novel modalities like cell and gene therapy further realize their promise and advance through the clinical pipeline, with 14% of the 2024 clinical pipeline based on novel modalities (i.e., beyond small molecules and monoclonal antibodies). Outside of COVID-19, however, the global biopharma industry has seen persistent challenges in R&D productivity since the 1990s, barely recouping the full cost of capital invested (**McKinsey**). Today there is a 12% chance of bringing a Phase 1 drug to market (**Congressional Budget Office**), roughly unchanged from a decade ago. Moreover, despite increasing growth in clinical trials and in new pipeline therapeutics, there is significant opportunity to further diversify pipelines and address a broader spectrum of unmet needs. Today, eight of the 20 top-selling drugs are for cancer treatments. Hence, while revenue from the top 20, excluding vaccines, rose some 25 percent in the US market to roughly $100 billion between 2010 and 2020, the number of patients receiving those treatments fell by 80 percent (**McKinsey**). In addition, we see a sharp rise in pipeline "herding" with the number of assets being clinically investigated per target increasing 2.5 times overall over the last 20 years, with oncology seeing a fivefold increase (**Nature**). The industry will need to continue to evaluate how best to spur diverse innovation, increase overall probability of success, and enable equitable long-term access to care for patients.

Evolving Operating Model and Talent Needs

As the outlook for reimbursement erodes in major markets (especially with the implementation of the Inflation Reduction Act in the United States) and the impact of patent expirations for several major franchises takes effect over the next five years, it will be increasingly important for biotech and pharma companies to reassess productivity drivers across the value chain. Over the last decade and particularly during the disruptions generated by COVID-19, the industry has worked to build and reinforce new skills across R&D, manufacturing, commercial, and medical domains, to enable more data-driven and agile decision-making as well as more targeted, customer-centric experiences for physicians and patients. This has required investments not only in data, digital, and analytics, but in "rewiring" organizational mindsets, behaviors, and incentives in order to successfully transform each function (**Rewired**).

The operating model changes that biopharma companies are now driving require a reimagining of both "classical skills" (such as those possessed by bench scientists, biostatisticians, sales representatives and business development scouts) and "new skills" (such as those possessed by new platform or modality experts, AI/ML-capable data scientists, and performance transformation leads). Despite this rising demand for new or evolved skillsets, biopharma talent shortages are growing, with significant recruitment challenges seen worldwide across countries and across all major functions ranging from R&D, digital, supply chain, manufacturing, or commercial talent (**Cytiva Biopharma Resilience Index**). Indeed, given recent explosive interest in generative AI, the life sciences industry still has room to grow in attracting and retaining technology talent.

At the same time, while the industry has made strides in diversifying its workforce, there is still clear opportunity to continue to drive inclusivity, especially at the top. In 2021, women held only 14% of board seats at publicly traded bioscience companies, despite a modest increase in women entering executive roles in the life sciences industry (**Life Sciences Leader**).

Massachusetts as the Life Sciences Leader

Today Massachusetts is a leading force in the life sciences both nationally and globally, with biopharma contributing about $35 billion to the state's GDP in 2022. This translates to $5,000 per capita, compared to California's $2,200 per capita (**Bureau of Economic Analysis**). In addition, Massachusetts is home to the highest density of life sciences-related institutions worldwide, including renowned universities, vibrant early-stage startups, biopharma giants, world-leading hospitals, and a robust network of supporting services and capabilities. The collaboration among Massachusetts' diverse array of life sciences players creates a dynamic environment where scientific inquiry and the entrepreneurial spirit thrive and enable further advancements that support society's health and wellbeing.

Figure 3

Massachusetts' National and Global Leadership in the Life Sciences has Contributed Significantly to Economic and Societal Impact Within and Beyond Massachusetts

Life Sciences have Delivered Outsized Impact to Massachusetts...

~ $35B
2022 GDP contribution[1]

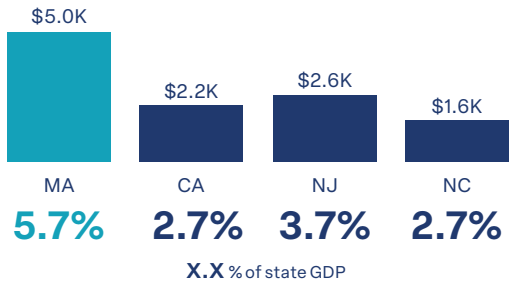
~ 117,000
biopharma jobs in 2023

~ 31%
of all VC dollars invested in the US biopharma industry are received by Massachusetts-headquartered biopharma

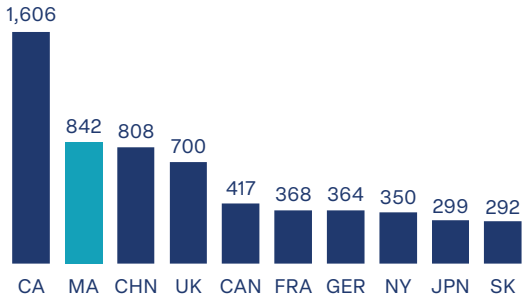
~ 15%
of the U.S. drug-development pipeline

... Propelling Massachusetts to National and Global Prominence

Annual Biopharma GDP per Capita[1,2], 2022 $K



Top 10 Global Biotech Hubs, # biotechs in 2022



[1] GDP includes Biopharmaceuticals and Research Life Science subsectors (NAICS 3254 and 5417 respectively)

[2] Calculation performed by dividing the total GDP from Biopharmaceuticals and Research subsectors by the 2022 population for each state

[3] State is defined by where the biotech company is headquartered. Excludes public funding

Source: **MassBio 2024 Industry Snapshot**, MassBio 2023 Biopharma Funding and Pipeline Report, 2022 Massachusetts Life Sciences Workforce Analysis Report, New JerseyBiopharma Industry, Ring Central report, MassBio Drug Development Pipeline Report, 3BLMedia, Evaluate (Feb 2023), Pitchbook, Moody's, US Census Bureau

This vibrant ecosystem has fostered remarkable growth in employment and funding for the life sciences industry since the launch of the Massachusetts Life Sciences Initiative in 2008. Consequently, Massachusetts now boasts the highest funding received from the National Institutes of Health (NIH) per capita—$501 in 2023, far surpassing California and New York at $136 and $183, respectively. (**MassBio 2024 Industry Snapshot**). The state also accounts for one-third of U.S. expenditure on biotechnology innovation (excluding megacap pharma companies and generic manufacturers). By leveraging its robust ecosystem, Massachusetts can boost its global life sciences impact, enhance the state GDP, and benefit local communities and patients.

Key Opportunity Areas for Massachusetts Life Sciences

MassBio plays a unique role as a convener and catalyst within Massachusetts' life sciences ecosystem. As a prominent voice for the industry and representing 1700+ member organizations, MassBio is committed to lead with forward-thinking strategies to address industry challenges. Based on global and local trends, MassBio has identified six key opportunity areas for focus.

Figure 4

Six Key Opportunity Areas Identified for Massachusetts Life Sciences

1 Scaling Innovators

Supporting early-stage biotech startups in **overcoming challenges in accessing critical resources and expertise** to scale their operations

2 Engaging Investors

Attracting a **broader range of traditional and non-traditional funding sources** for life sciences ventures in Massachusetts, especially for early-stage biotechs

3 Recruiting and Retaining Talent

Addressing ongoing **talent gaps** at all levels across the life sciences ecosystem while **enhancing diversity, equity, and inclusion**

4 Expanding TechBio

Fostering **partnerships between tech and life sciences players** to enable advancements across the value chain, e.g., through **AI and digital innovation**

5 Building Up Biomanufacturing

Expanding **biomanufacturing** capacity and advocating for **policies that fund / support local infrastructure** in order to meet emerging demand for capacity

6 Radiating Value and Extending Industry Impact

Enhancing **public understanding and policy support** for the industry's **contributions to public health and economic growth**

Initiatives under our 2030 Strategy focus on addressing key barriers to achieving these opportunity areas

Opportunity 1: Scaling Innovators

As of 2023, Massachusetts' density of biotech companies was unmatched in the US (MassBio 2023 Industry Snapshot), making it the second-largest biotech hub globally by the number of companies (**BCIQ April 2022, Pitchbook**). The size of the biotech industry in Massachusetts reflects the state ecosystem's strong capacity to envision, incubate, and invest in promising biotech startups. However, biotechs are encountering significant challenges on several fronts:

- **Early/Seed Investment Pressure:** The biotech sector saw a rise in investment, climbing from $6.3 billion in Q1 2023 to $7.4B in Q1 2024 (**Pitchbook**). However, this period also experienced a 24% drop in the total number of biotech deals. Seed-stage startups were particularly affected, with the average seed round for Massachusetts companies in Q1 and Q2 of 2024 dropping down to $10.3 million from $10.5 million in 2023 (**MassBio 2024 Industry Snapshot**).
  - **Scaling and Go-to-Market:** Biotech startups are facing increasing challenges in scaling their operations to bring their first products to market. Only 28% of first-time launchers manage to surpass analysts' pre-launch forecasts, compared to 50% for more established biopharma companies (**McKinsey**). Biotech startups also struggle to access essential operational capabilities (e.g., analytical support, pre-clinical CROs) and expertise (e.g., seasoned CxOs, regulatory specialists, legal support) (**Forbes**).
  - **Talent Recruitment and Retention:** Although Massachusetts boasts a substantial talent pool with over 100 higher education institutions (**National Center for Education Statistics**) producing an average of 7,600 life sciences graduates annually, the biotech and medical lab industry in the Commonwealth retains only 20% of these degree holders long-term (**MassBioEd**). A recent survey found that about two-thirds of respondents expect challenges in recruiting talent in Massachusetts, particularly for senior positions (**Massachusetts Business Roundtable**, total n = 56).

"For smaller companies, especially first-time entrepreneurs, it's hard for them to find resources and access the range of options available for the industry."

VP, Patient Advocacy Group

Opportunity 2: Engaging Investors

$7.7B

USD of VC invested in Massachusetts headquartered biotech, 2023

Massachusetts has consistently attracted an outsized share of investment capital in biotech due to its strong innovation pipeline. In 2023, Massachusetts-headquartered biotech companies received $7.67 billion in venture capital (VC), marking the fourth highest total ever and surpassing the pre-pandemic record of $5.53 billion set in 2018 (**MassBio 2023 Biopharma Funding and Pipeline Report**). In 2023, biotech companies in the U.S. secured 69% of global venture capital funding. Of this, Massachusetts-headquartered biotechs received 31% of the total VC dollars in the US invested in the industry, up from 25% the previous year. This amount places Massachusetts second only to California (38%) and exceeds the combined total of all other states (**MassBio 2023 Biopharma Funding and Pipeline Report**).

At present, we see three key trends impacting Massachusetts life sciences investing.

- **Signs of "Spring Thaw" in 2024 Cycle:** After a decade-long "boom" propelled by early VC funding, many successful IPOs, and widely available post-IPO capital (**Evaluate Vantage 2023**), the life sciences industry entered a "biotech winter" in 2023. In 2024, venture capital investments have notably rebounded, with the biotech sector ranking third out of 11 industries in terms of total VC dollars invested, reaching $5.9 billion in Q1 2024 (**C&EN**). This rise in investment reflects robust support for biotech companies pursuing funding and growth opportunities, particularly in Massachusetts. Despite the state's high business tax rates, which might otherwise discourage relocation or expansion, the sector continues to thrive (**Boston Herald**).
- **Diversified Investor Base:** While venture capital remains the primary source of alternative funding for the biotech industry, there has been growing interest from non-traditional investors in recent years, including venture philanthropy, family offices, and sovereign wealth funds. For example, the Qatar Investment Agency, a sovereign wealth fund, led a $250 million funding round for BridgeBio Pharma in partnership with four of the largest U.S. investment firms (**BridgeBio**).
- **Venture Philanthropy on the Rise:** Venture philanthropy (VP) is an increasingly prominent segment of the investment landscape. Typically, VP involves patient advocacy groups that support research and development often overlooked by profit-driven investors, thereby addressing a vital gap in the funding ecosystem. Over the past five years, VP investments have surged across the U.S., with Massachusetts, home to over 25 venture philanthropies, representing approximately 20% of all such entities in the country (**Pitchbook**).

Opportunity 3: Recruiting and Retaining Talent

In 2023, Massachusetts recorded just under 117,000 biopharma jobs, marking a 2.6% increase from 2022 to 2023. Looking ahead, Massachusetts year-over-year R&D job growth was 3.7%—outpacing California, New York, New Jersey, and North Carolina (**MassBio 2024 Industry Snapshot**). The demand for talent will remain a priority, with shifting areas of emphasis.

- **Skill Gaps in an Evolving Industry:** Recent developments in the life sciences industry has spurred a need for new types of talent across the ecosystem, including but not limited to:
  - **AI and Digital Innovation:** By 2030, approximately one-third of work hours in pharma could be automated across traditional roles (e.g., CMC operations), highlighting the need for digital upskilling (**McKinsey Global Institute**). Advanced analytics skills (e.g., AI / ML) remain challenging to find in traditional R&D talent pools

but are becoming increasingly important for the industry. In Massachusetts alone, job growth for computing and IT jobs in the life sciences industry is expected to grow by 49% from 2022-2032. (**MassBioEd Life Sciences Employment Outlook 2023**).

  - **Technical Drug Development Expertise:** The rise of new technologies has led to a more complex clinical development and operations landscape. Skills that are becoming increasingly important in life sciences job postings include production facilities management, regulatory affairs, quality control/quality assurance, and information privacy. Massachusetts's commitment to grow professional certification programs addresses industry needs for cell and gene technologies, manufacturing, regulatory, quality assurance/quality control (QA/QC), and other manufacturing roles (**MassBio Massachusetts Life Sciences Workforce Analysis Report 2022**).

- **Entry-Level Talent Shortage:** The industry is experiencing a shortage of entry-level research associates, manufacturing technicians, quality control analysts, lab technicians, and similar roles due to small applicant pools and a lack of experience and biopharma R&D-specific knowledge (**MassBio Massachusetts Life Sciences Workforce Analysis Report 2022**). Meanwhile, the emergence of advanced modalities and the growing complexity of R&D pipelines are driving demand for specialized skills that currently exceed the supply of trained professionals in these fields.

- **Scarcity of Executive Talent:** Additionally, there is a notable shortage of senior-level expertise within the industry. A survey of 130 Massachusetts biopharma companies found that over 90% reported difficulties in hiring for non-entry-level positions, with just under 75% attributing the challenge to small applicant pools (**MassBio Massachusetts Life Sciences Workforce Analysis Report 2022**). Furthermore, 86% of life sciences companies lack succession plans for critical leadership roles, underscoring the need to cultivate a more sustainable pool of CxO talent across the industry (**Deloitte**). In Massachusetts, this talent shortage may be further exacerbated by the state's high cost of living and relatively poor infrastructure compared to other states. In a survey conducted by the Massachusetts Business Roundtable, the cost of living in Massachusetts was found to be the factor most influencing organizations' decisions to remain a presence within the state (**MBR Massachusetts Talent and Competitiveness Report 2024**).

"The high cost of living and taxes makes it difficult to hire highly skilled talent and executives [in Massachusetts], especially when they don't already live here."

Executive, Pharma employer

"It's harder than ever to find biopharma executives for open positions, not just because there are so many new companies, but also because candidates have more potential new jobs coming their way than ever before."

CEO, Talent Search Firm

- **Diversity, Equity, and Inclusion:** The life sciences industry also needs to promote greater diversity, equity, and inclusion (DE&I) throughout the ecosystem, particularly in senior roles. People of color are underrepresented in biopharma roles compared to the general workforce, with over 70% of biopharma executives and leaders being White (**BioSpace**). At the CEO and Board levels, less than 5% of leaders identify as Black or Hispanic/Latinx. Similarly, although women make up 50% of the general life sciences talent pool, their representation decreases to 40% among executives. This disparity is even more evident at the top levels, where only one third of Board members in the top 20 companies are women (**McKinsey**).

Opportunity 4: Expanding TechBio

Given its prominent position in both tech and life sciences, Massachusetts is ideally situated to become a hub for collaboration between these industries, providing ample opportunities to influence the entire life sciences value chain. For example, it can accelerate drug discovery via AI, enhance efficiency in clinical trial operations, and enable more precise diagnostics. Incorporating technologies like cloud computing, advanced analytics, and GenAI into life sciences can drive innovation and growth, transforming the sector's future.

- **Growing Interest and Investment from Technology Players:** In healthtech alone, the aggregate value of PE/VC-backed healthcare tech deals investment was $18.8 billion between 2019-2023, underscoring the robust interest in this sector (**Massachusetts High Tech Council**). Leading tech players collaborate with biopharma companies or established healthcare and life sciences-specific businesses to engage with the industry (e.g., Microsoft Genomics, Google Health, AWS HealthLake). Meanwhile, other major tech firms have explored new use cases (e.g., NVIDIA's MegaMolBART deep learning model for small molecule drug discovery and cheminformatics).

- **Rapid Advancements in Generative AI for the Life Sciences:** GenAI is projected to represent $60-110 billion in value across the life sciences sector over the next 3-5 years (**McKinsey Global Institute**). In the pharma and biotech industries, various use cases, such as drug discovery, trial design, clinical development, regulatory operations, and commercial and medical applications, have already started demonstrating impact.

$60-110B

Industry value potential of GenAI applied in life sciences

- **High Variability in Technology Maturity and Adoption:** Notwithstanding the rapid advent of generative AI, we still see significant barriers to adoption, including:
  - **Lack of Forums for Inter-Industry Collaboration:** Currently, there are limited dedicated platforms for collaboration between life sciences and tech professionals. However, successful examples in the healthcare sector, like the VIVE Conference for Health Tech and the TRAIN Coalition for Responsible AI Use in Healthcare, could serve as models for the life sciences industry.
  - **Limited Understanding and Buy-In:** Despite the growth of new technologies, biopharma CxOs often hesitate to integrate these innovations into established processes. Uncertainty at senior levels about the applications and implications of these technologies often slows their adoption in daily operations. This apprehension can also percolate to other levels of the organization.
  - **Barriers to Access for New Offerings:** The adoption of technological innovations has been slow and inconsistent in the life sciences industry, particularly among startups. Early-stage biotechs often lack the resources and expertise needed to acquire and implement new tech solutions. Key challenges include the high cost of advanced tools, a shortage of in-house expertise to set up and manage technologies, competition for talent from the tech sector, and general uncertainty about the value and effectiveness of these new offerings.

Opportunity 5: Building Up Biomanufacturing

The Massachusetts life sciences ecosystem has been ramping up investment in domestic biopharma manufacturing, with numerous new plants recently opened or under construction (**The Boston Globe**). As a result, the state's biomanufacturing industry has seen substantial growth, with its contribution to state GDP doubling from 2017 to 2022 (**U.S.Bureau of Economic Analysis (BEA) / Moody Analytics March 2024**). As the industry grows in Massachusetts, there is greater potential to mitigate supply chain disruptions and enhance the industry's capacity for continued expansion (**The White House Office of Science and Technology Policy**).

- **Capacity Expansion:** The rising demand for biomanufacturing capacity is set to continue growing and diversifying. In fact, global sales of biotechnology-derived drugs, including cell and gene therapies, are now approaching parity with those of conventional drugs, nearing a 50/50 market share split (**Evaluate Pharma 2024**). The industry is strategizing to mitigate risks associated with capacity constraints through several approaches:
  - **Investment in Capacity Expansion:** Many companies are investing significantly in expanding their existing facilities or building new ones, often incorporating flexible, modular designs that can be quickly adapted to different production needs. Total lab and manufacturing space in the Commonwealth of Massachusetts has seen a growth in total lab and manufacturing space to 62.1 million square feet (**MassBio 2024 Industry Snapshot**).

- **Adoption of Single-Use Technologies (SUTs):** SUTs are gaining popularity due to reduced setup times and costs, increased manufacturing flexibility, and decreased contamination risks. Technologies like disposable bioreactors and plastic piping can eliminate the need for stainless steel reactors that must be cleaned and sterilized.
- **Partnerships and Collaborations:** Companies are forming strategic partnerships and alliances with CMOs and academic institutions to pool resources, share risks, and speed up the scaling of capabilities where needed.
- **Advancements in Manufacturing Technologies:** Investment in continuous manufacturing, automation, and artificial intelligence is on the rise. These technologies promise to enhance efficiency, reduce waste, and improve the scalability of biomanufacturing processes.

- **Emerging Policy Support:** In response to supply chain vulnerabilities revealed by the COVID-19 pandemic, there has been a significant increase in policy measures to bolster U.S. biomanufacturing and enhance domestic capacity. For example, the Department of Defense plans to invest $1 billion over the next five years through the National Biotechnology and Biomanufacturing Initiative (NBBI). Additionally, Massachusetts is providing incentives for capital investments in life sciences, promoting both facility expansions and new establishments. The Massachusetts Life Sciences Center (MLSC), for example, has strategically deployed more than $1 billion in Massachusetts, through a combination of grants, loans, capital infrastructure investments, tax incentives, and workforce programs (**Massachusetts Life Sciences Center, 2024**).
- **Shifting Technical Skill Requirements:** Massachusetts, known for its knowledge-driven economy, faces a notable gap between the supply and demand for skilled biotechnicians. Despite this pipeline and relatively strong in-state retention, demographic data suggest that the biopharmaceuticals and medical labs industry that anchors the state's life sciences sector captures just 1 in 5 life sciences and chemistry degree graduates, with 80% choosing other occupations, and all while the industry is projected to grow by 20% in the next 5 years in Massachusetts (**MassBioEd Life Sciences Massachusetts Employment Outlook 2024**). The industry is particularly in need of expertise in cellular and molecular biology, data management and analytics (for optimizing production processes and ensuring product quality), process engineering optimization, and QA/regulatory knowledge.

80%

Share of life sciences and chemistry degree graduates choosing occupations in other industries

Opportunity 6: Radiating Value and Extending Industry Impact

The life sciences industry has developed a thorough and stringent process to ensure the safety and effectiveness of its products before they reach those in need, with a core focus on patient welfare. However, 83% of U.S. adults believe that pharmaceutical profits are the primary factor driving prescription drug prices and the high cost of care (**KFF**). In reality, pharmaceuticals accounted for only 9.1% of total U.S. healthcare costs in 2022 (**Peterson-KFF**). This wide gap underscores the need for clearer communication about the realities of healthcare costs and the benefits of pharmaceutical innovations.

The life sciences industry plays a crucial role in improving public health and well-being through the development of interventions and treatments that have the potential to enhance the quality of life for millions of individuals, contributing to a healthier and more productive society. From an economic perspective, the industry drives growth by creating jobs, attracting investments, and fostering innovation. It also contributes to the overall healthcare ecosystem by supporting research and development activities. These benefits directly enable the four impact pillars of MassBio's Vision 2030 for the life sciences ecosystem in Massachusetts. For the industry to thrive and maintain its positive influence, it is essential to effectively communicate these contributions.

However, despite the industry's positive contributions, there is a prevailing negative perception among the public regarding pharmaceutical companies stemming from the belief that pharmaceutical profits are the primary driver of high prescription drug prices and healthcare costs. MassBio plays a critical role as a champion for patient access and affordability, evidenced in its recent statement on the House prescription drug and PBM oversight bill (**Massachusetts Legislature**). Continued transparency and engagement as well as effective communication strategies that educate the public about the realities of healthcare costs and the benefits of pharmaceutical innovations can further drive the industry's impact.

Negative perceptions can evolve over time. The technology industry, for example, was once viewed with skepticism and concerns of invasion of privacy and job displacement. The computer industry now has a largely positive perception (**Gallup 2023**) due to its transformative impact on various aspects of society. The life sciences industry has similar potential to change public perception by highlighting its positive contributions to patient health and economic growth by actively engaging in dialogue, transparently addressing concerns, and demonstrating its commitment to treating patients and keeping healthy people well.

"Medicines do so much more than help patients get treated today. Accounting for a drug's societal value reveals that medicines are worth a lot more than some give them credit for."

No Patient Left Behind

MassBio's Roadmap to 2030

MassBio's 2030 strategic roadmap was developed through an extensive consultative process designed to gather insights on the priorities and unmet needs within the life sciences ecosystem. This process included a survey of MassBio members, discussions with members of the MassBio Board, a series of ideation workshops, and analyses of industry data and case studies. Additionally, in-depth interviews were conducted with over 20 leaders from various sectors, including large pharmaceutical companies, small and mid-sized biotech firms, CDMOs, venture capitalists, health systems, non-profits, and government officials.

This effort has resulted in the identification of **four major roadmap catalysts** as well as the concrete underlying initiatives driving each. These four catalysts respond directly to the opportunity areas identified for Massachusetts and the broader life sciences industry, and cumulatively are expected to enable significant impact over the next five years, creating up to **$1B in Massachusetts GDP growth** via additional new investments, job creation and infrastructure. Moreover, the roadmap will continue to strengthen Massachusetts' global leadership in life sciences and benefit millions of individuals via innovations from MassBio members.

$1B

Estimated cumulative GDP impact from 2025-30 catalyzed through MassBio strategic roadmap

Figure 5

The MassBio 2030 Roadmap Comprises 4 Roadmap Catalysts and 12 Key Initiatives that Build on its Existing Capabilities and Strengths to Address Identified Opportunity Areas

MassBio by 2030

Impact Pillars

Innovation & Business | **Economic Development** | **Policy** | **Patients**

Opportunity Areas

- Scaling Innovators
- Engaging Investors
- Recruiting and Retaining Talent
- Expanding TechBio
- Building up Biomanufacturing
- Radiating Value and Extending Industry Impact

Roadmap Catalysts

Early-Stage Catalyst

- **Launchpad** for cost-efficient services to early-stage biotech
- **MassBio seed fund** for bridge funding support to MassBioDrive companies
- **"Tech for Biotech" programmatic focus** to infuse AI/ML across all MassBio innovation programs

Funding Catalyst

- **BioReady for alternative investors** to provide accreditation for entrants into life sciences investing
- **Align Summit 2.0** for convening global investors
- **Venture philanthropy navigator** to increase matching between founders and philanthropic sources

Talent Catalyst

- **Bioversity@Scale** for regionalized skills-based training hubs across Massachusetts
- **"TechBio Dojos"** in partnership with existing training programs to increase employee digital/tech fluency
- **Rising star CXO pipeline cultivation** to support next-generation life sciences CXOs

Social Impact Catalyst

- **Impact storytelling** through community engagement on the value of innovation in life sciences
- **Policy support for continued Massachusetts leadership** on ecosystem enablers (e.g., talent, infrastructure)
- **Coalition-building for Massachusetts biomanufacturing** via stakeholder convening and fact-based support

Early-Stage Catalyst

Support and Grow our Early-Stage Biotech Community

Given the significant impact of early-stage biotech companies on innovation in Massachusetts, it is essential to level the playing field for new biotech founders by improving their access to capital, expertise, and other vital resources. Enhancing the success rate of new therapeutics, even slightly, by reducing non-technical barriers can lead to more innovations being developed, manufactured, and made available globally, benefiting physicians and patients. Supporting seed and early-stage biotechs thereby strengthens the entire Massachusetts life sciences ecosystem.

In this context, MassBio could coordinate various support programs currently available in Massachusetts to provide early-stage biotech companies with cost-effective access to essential tools, operational support (e.g., through programs like MassBioDrive, Lab Central, and Landmark Bio), and specialized services (e.g., pre-clinical CROs, analytics). By connecting these companies with key functional talent pools (e.g., regulatory, legal or technology experts), MassBio could also aid in their growth. Additionally, MassBio can foster collaborations between early-stage biotechs and established industry players (e.g., through the Termeer Foundation or academic alumni networks), and facilitate targeted networking opportunities to assist aspiring innovators in navigating the complexities of drug development and commercialization.

By effectively addressing these key needs, Massachusetts can enhance the potential for biotech startups to thrive, overcoming substantial operational and financial hurdles that can otherwise impede growth and scalability.

Impact Aspirations

Increase growth in Massachusetts' GDP and new jobs creation from life sciences	Increase cross-ecosystem collaboration, including with adjacent life sciences services, and technology partners	Expand diversity in the pipeline to increase the availability of promising drugs going to market	Extend Massachusetts' global leadership in early-stage innovation

"I believe that MassBio can help enable biotechs to more effectively tap into specialized advisory and drug development services to drive growth – creating a scalable platform for biotech success."

Biotech CEO

MassBio Priority Initiatives

Launchpad for Life Sciences Services

Build on MassBioEdge with "startup in a box" services that support early-stage biotech founders with critical business needs (e.g., educational programs, supplies, services). Iteratively tailor service package offerings to meet the diverse needs of MassBio members.

MassBio Seed Fund

Extend support for MassBioDrive pre-seed and seed-stage founders via dedicated investment support to bridge initial funding gaps. Establish fully operational seed fund investment vehicle by identifying and engaging a syndicate of investors committed to growing early-stage biotech in Massachusetts.

"Tech for Biotech" Programmatic Focus

Infuse awareness of AI/ML and other technologies into foundational MassBio programs including MassBioEdge, MassBioDrive and more. Roll out MSA-based AI and tech services to MassBioEdge members. Establish a dedicated MassBioDrive cohort on AI platforms, and launch an annual TechBio event series that convenes key thought leaders to help spur adoption of technology in the life sciences.

The potential impact from these initiatives alone includes up to

100-200

pre-Series C companies benefiting from Launchpad services

10-15

seed startups supported by the MassBio seed fund

200+

jobs created from new or more rapidly scaling life sciences startups

Funding Catalyst

Broaden and Curate for High-Quality Life Sciences Investors

The investor landscape in Massachusetts continues to be marked by a mix of funding sources, a cornerstone of the Commonwealth's biotech industry's resilience. To effectively leverage this foundation and continue attracting diverse types of funding, MassBio can consider creating / supporting platforms that facilitate connections between startups and different types of investors. Such platforms could substantially streamline funding processes, e.g., by making the local ecosystem more accessible to non-traditional investors whose involvement is often hindered by the complex requirements of the biotech industry.

MassBio could also develop or support programs to soften the steep learning curve for investors with limited industry or local knowledge, such as international funders and family offices. This support could be crucial for broadening the investor base and fostering a more inclusive investment environment.

Additionally, MassBio could enable continued ecosystem growth by rapidly and efficiently bridging funding gaps for seed and early-stage biotech companies. The Massachusetts biotech investment landscape is saturated with large VC firms, which can block entry for smaller investors and make it challenging for them to compete. This may present an opportunity to enhance industry inclusivity by directing funds to more diverse founders and underserved disease areas or patient populations (e.g., through venture philanthropy).

Impact Aspirations

Enrich and diversify sources of funding for life sciences innovators, with more variety in investor incentives

Enhance matching between non-traditional funding sources and relevant founders / companies

Strengthen pipeline of innovation, including for underserved therapy areas and startups bringing phase 1 drugs to market

"MassBio serves as an ambassador to groups that are not native to the life sciences ecosystem— a 'welcome wagon'—helping startups and companies from other countries navigate the ecosystem and understand the role they can play."

Johnson & Johnson

MassBio Priority Initiatives

BioReady® for Alternative Investors

Certify "BioReady®" investors based on understanding of biotech and adherence to relevant investment guardrails, in partnership with existing investor groups (e.g., New England VC Association). Define certification criteria in consultation with experienced biotech founders, pilot program with local venture philanthropists and family offices, and host post-certification connectivity programming (e.g., pitch events).

Align 2.0 for Convening Global Investors

Engage international investors with mid-sized/scaling biotechs and other strategics through growth and expansion of Align Summit. Consult international investors on key needs, conduct "roadshow" for investors already working with Massachusetts biotechs, and expand scope of Align Summit to attract international investors interested in larger ticket investments (e.g., sovereign wealth funds).

Venture Philanthropy Navigator for Diverse, Flexible Funding

Match venture philanthropic (VP) funders with member biotechs based on relevant needs (e.g., access to funding). Catalog VP funders to identify best-fit pitching opportunities and map potential avenues for engagement, including via thematic connectivity events and online platform building.

The potential impact from these initiatives alone includes up to

$300-500M

additional investments into Massachusetts life sciences startups

25+

BioReady®-certified investors equipped to enter life sciences investing, and increased connectivity and collaboration between alternative investors and MassBio-affiliated innovators

Talent Catalyst

Future-Proof Massachusetts' Life Sciences Talent Pool

It will be crucial for Massachusetts to continue attracting and retaining a range of skilled professionals, given the global competition for life sciences talent. Massachusetts can leverage its top-tier academic institutions as an anchor for early-career talent. For example, the concentration of life sciences degree holders in Massachusetts is five times higher than the rest of the U.S. (**BLS Statistics, Quarterly Census of Employment & Wages**). Additionally, Massachusetts can continue to highlight its dense concentration of biotech companies and institutions—an unmatched opportunity for talent mobility.

MassBio can first identify mismatches between the supply and demand of local life sciences talent across the industry to tailor downstream efforts appropriately. Supporting workforce development programs that align educational outputs with the evolving needs of the industry will be essential, as well as investing in talent attraction and retention. For instance, to enable expansion of the entry-level drug development talent pipeline, MassBio can work with partners to attract non-life sciences degree holders to the life sciences. Fortunately, there are existing upskilling efforts to build upon, with 73% of Massachusetts companies offering their employees access to relevant education and training programs, 55% of organizations partnering with affinity-based or professional development organizations to recruit and train candidates, and MassBio's own Bioversity program enhancing workforce diversity, health equity, and community empowerment in Boston (**MBR Massachusetts Talent and Competitiveness 2024 Report**). The program has doubled the average income of its graduates, 96% of whom are Black and/or Latino, and placed them in full-time life sciences roles at top companies (**Bioversity**).

Impact Aspirations

Reinforce Massachusetts's key competitive advantage as a hub for life sciences education and employment

Accelerate addressing of current and future life sciences employment gaps

Facilitate life sciences ecosystem leaders to **future-proof their workforce and uplift industry capabilities**

"We have way too many scientists. What we don't have enough of is 'drug development talent.' You don't get that from a MD or PhD; it's not about the science, it is about experience with pre-IND meetings with FDA, Quality Control, etc."

Xontogeny

MassBio Priority Initiatives

Bioversity@Scale for Skills Training

Expand Bioversity across the Commonwealth via regional "nodes," providing skill-based drug development training programs based on regional specialization. Engage key regional stakeholders to set baseline with 2035 Talent Map, which will be renewed bi-annually to monitor success metrics of Bioversity trainees.

"TechBio Dojos" to Enhance Digital/Tech Fluency

Partner with academic and corporate stakeholders to provide programs/connectivity that upskill life sciences employees on digital and technology adoption. Support members' fluency of core skillsets with preferred access to existing educational programs (e.g., certification, micro-credentialing), an ongoing roundtable series on strategic implications of new technology, and new educational offerings co-developed to continuously adapt to the evolving technology landscape.

"Rising Star" CxO Talent Pipeline Cultivation

Cultivate next-generation biotech CxOs through leadership excellence training, connectivity events and more to broaden and diversify the talent pool, in partnership with the Termeer Foundation. Identify and support cohorts of incumbent, imminent, and emerging CxO talent pools with events series tailored to tenure-specific needs.

The potential impact from these initiatives alone includes up to

500+

more skills-based trainees across Bioversity and TechBio programs

200+

"rising star" biopharma CXOs supported and connected with one another

2035

and beyond "Talent Map" that consistently articulates Massachusetts life sciences ecosystem talent needs and gaps to help catalyze change

Social Impact Catalyst

Advocate for Life Sciences Needs and Priorities[1]

Recent policy shifts emphasize the importance of balancing affordability with fostering innovation in Massachusetts. The policy environment in Massachusetts is supportive toward the life sciences, reflected by equity being a core pillar for MassHealth and the pending reauthorization of the Massachusetts Life Sciences Initiative. However, due to changing federal drug pricing policies and industry perception challenges, MassBio must deepen stakeholder engagement to represent the industry's impact and needs effectively.

MassBio should continue to engage policymakers in dialogue to help ensure that Massachusetts remains highly attractive to life sciences companies. Given the importance of talent to Massachusetts' life sciences hub, support for initiatives improving livability (e.g., housing, transportation) is essential. In 2024, 83% of surveyed Massachusetts business leaders cited the high cost of living as the top concern affecting job retention. Over 50% of organizations also noted that candidates are unwilling to move to Massachusetts, posing a major recruitment challenge (**2024 MBR Talent and Competitiveness Survey**). These statistics highlight broader concerns about Massachusetts' national and global competitiveness, especially for mid-career talent with specialized skills.

One valuable opportunity for Massachusetts is to invest in higher-yield biomanufacturing for advanced modalities. While Massachusetts excels in R&D and process development, it lags states like North Carolina and New Jersey in retaining biomanufacturing jobs. With increased interest in domestic manufacturing to boost supply chain resilience, fostering local biomanufacturing could enhance local value creation, GDP growth, and economic equity by creating accessible life sciences jobs to non-PhD or MD holders.

Impact Aspirations

Improve public understanding of life sciences industry impact, especially within Massachusetts

Help maintain Massachusetts's overall competitiveness in the global life sciences space

Support change across other state or international ecosystems where relevant

1. We are grateful to McKinsey & Company for their contributions to the data and analysis contained in this report, and for their counsel and deep expertise supporting us in the development of this foundational strategy.

"The [story to tell] is how these medications are life changing for the patients receiving them, and how their quality of life is changed."

The Leukemia and Lymphoma Society

MassBio Priority Initiatives

Impact Storytelling on Innovative Medicines

Engage the Massachusetts community and beyond to understand and support solutions that protect patient access to life sciences innovations in both the short and long-term. Use surveys to benchmark Massachusetts public sentiment on biopharma innovation before and after stories are shared to assess impact and develop playbook with best practices.

Support Initiatives that Enable Continued Massachusetts Leadership

Work with key policy stakeholders to ensure Massachusetts maintains its industry leadership and competitiveness on a national stage (e.g., talent, infrastructure, incentives, innovation). Includes collaborating with the Commonwealth to leverage LSI 3.0, showcasing the Massachusetts life sciences ecosystem to federal stakeholders, and educating members on key state and federal policies to create solution-driven engagement.

Coalition-Building for Massachusetts Biomanufacturing

Enable Massachusetts to be a key epicenter for advanced biomanufacturing in the US by convening and coalescing stakeholders, providing fact-based thought leadership, and enabling policy efforts. Collaborate with CDMOs and biotechs to map local manufacturing supply and demand needs and identify key focus areas, resulting in renewed thought leadership via periodically refreshed public fact base (e.g., supply-demand gap for biomanufacturing for key modalities).

The potential impact from these initiatives alone includes up to

$500M+

in additional GDP from biomanufacturing if local biomanufacturing can be meaningfully scaled

3-5% points

improvement in public perception of biopharma in Massachusetts, and continued maintenance of Massachusetts' leadership as a cutting-edge life sciences hub for the world

Conclusion

As we embark on our journey toward 2030, we have developed a roadmap that builds upon the strengths of the industry and our organization while mitigating our shortcomings. MassBio's Vision 2030 strategy outlines a comprehensive approach to addressing the multifaceted needs of the ecosystem.

By supporting early-stage biotechs with cost-efficient services and strategic partnerships, MassBio aims to reinforce Massachusetts' position as a global hub for emerging innovation. Expanding the investor base to include non-traditional and international funders will ensure a robust and diverse influx of financial support and resources, essential for sustaining the pipeline of groundbreaking research and development. Addressing talent gaps through tailored educational programs and proactive workforce planning will equip the state to meet future industry demands, while advocacy efforts will help amplify the life sciences community's voice on priority issues.

Through targeted initiatives aligned to these focus areas, MassBio aspires to contribute significantly to Massachusetts' GDP and job creation, ultimately improving millions of lives through innovative healthcare solutions. As Massachusetts navigates this transformative period, MassBio's strategic role will be crucial in maintaining the Commonwealth's leadership in life sciences and ensuring the sector continues to thrive and grow.

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