

# State of Possible 2025 Report

June 2020

*Advancing Massachusetts  
Leadership in the Life Sciences*



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## Robert K. Coughlin

*President & CEO, MassBio*



It's an incredible time for the life sciences. Science that's been tested for decades is finally a reality, offering new hope to patients and a better quality of life. We're using the word cures—not as an aspiration but as a reality—and we're changing the course of once untreatable diseases.

Our success is not without its challenges. The pace of innovation has accelerated faster than our healthcare and insurance systems can keep up. We have one-time cures that offer unbelievable potential for patients, but come with higher, one-time costs that our healthcare system is not set-up to absorb. Instead of celebrating this progress, we're battling a worsening image problem for an industry that's historically misunderstood.

The COVID-19 pandemic has brought unprecedented damage to human health and our economy, but it's also reminded the world just how critical our industry is. It is ultimately science and innovation that will lead us through this pandemic, and the entire world is waiting for the biopharma industry to come up with an effective vaccine. The Massachusetts life sciences cluster is playing an outsized role in addressing the pandemic, with over 85 companies in the Commonwealth working on tests, treatments, and vaccines, at the time of this writing. These efforts have undoubtedly improved the image of our industry in the near-term, but it's unclear what long-term effects this will have.

As we enter the next five years, we must address some critical gaps in the industry, in addition to the image problem, or forgo our position as the best place in the world for the life sciences. Our cluster in Massachusetts is growing faster than our state can accommodate it, straining our aging transportation and housing infrastructure. We're creating jobs faster than we can fill them. And we're seeing more funding go to fewer companies.

It's up to us as an industry to come together and ensure our future is as bright as our past. It's been an incredible journey the past decade, and now we must look forward to the next 5-10 years to address key disruptions, but more importantly, to capitalize on new opportunities for growth.

I would like to thank the Board of Directors, the life sciences stakeholders who provided their input, and everyone who contributed to the planning process, along with Deloitte and the MassBio staff for preparing a thorough and thoughtful strategy to accomplish this critical mission.



## David Lucchino

*Immediate Past Chair, MassBio Board*

*Co-Founder, President, & CEO, Frequency Therapeutics*



Where do we go for hope? For patients around the world, the answer is Massachusetts for its world-leading cluster of hospitals, academic medical centers, and universities. For many with a disease that has limited or no treatment options, hope is often in the next generation of therapies that are being researched at a life sciences company here, tirelessly working to find a treatment for a rare disease, cancer, or other chronic conditions.

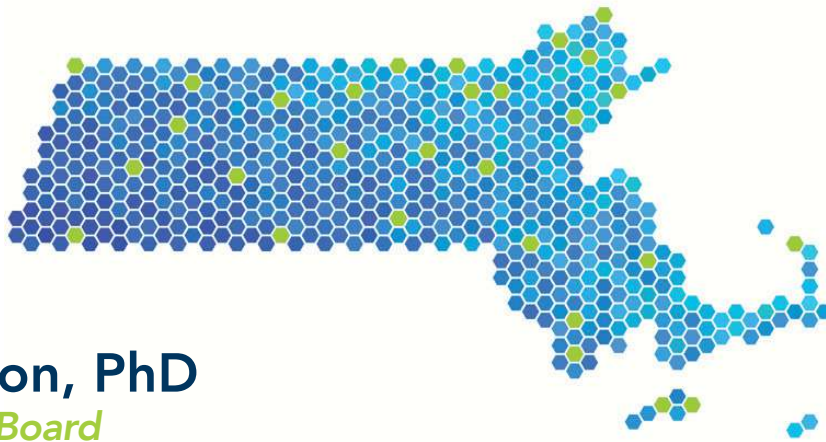
Those companies are moving, growing, and thriving in Massachusetts because of our shared resources—talent, early-stage research, and a partner in government—and because of a collaborative and competitive environment that fosters ideas and discovery. Breakthrough ideas are born here, funded here, and developed here largely by small and emerging biotech companies. Hundreds of millions of people in the U.S. and billions globally have benefitted from our industry's success.

Our hopes have never been more universal than during the current coronavirus pandemic. With dozens of coronavirus vaccines and therapies in development here today, it is our greatest hope that citizens around the world soon will benefit from these innovations. The coronavirus pandemic already is changing the life sciences industry and the role we play—and has built further appreciation for the pace, ingenuity, and creativity with which our industry can respond.

As Chair, it was my pleasure to lead the creation of the State of Possible 2025 Report. It is a roadmap for how MassBio and others can ensure Massachusetts remains the global leader by tackling what is immediately before us, maintaining the strength of our life sciences cluster, and ensuring we remain nimble enough and prepared enough when we need to pivot to meet future challenges.

In the years and decades to come, the opportunities and strategies outlined in this report will remain fundamental to Massachusetts' ability to remain the leader. I look forward to working with MassBio and our Board of Directors in continuing this mission and ensuring that Massachusetts and its thousands of life science companies continue to provide hope for generations to come.





## Chuck Wilson, PhD

*Chair, MassBio Board*

*CEO & President, Unum Therapeutics*



Massachusetts boasts a unique ecosystem of startups, large biopharma, venture capitalists, research labs, and academia that live harmoniously, and collectively bring once inconceivable treatments to patients across the globe. Our leading position in pharmaceutical innovation in areas like rare diseases and oncology is borne from unmatched strength in fundamental biology. At the same time, opportunities abound to make our cluster stronger, broader, and more sustainable. As this report and the state's unprecedented leadership amid the COVID-19 pandemic make

clear, Massachusetts can continue its success by embracing ideas such as expanding our R&D focus, leading the convergence of life sciences and digital health, scaling commercial and manufacturing operations, and strengthening the mini-clusters beyond Cambridge and Boston.

To get there, we must focus on the opportunities that will best support our growth and sustainability. We must strive to own the narrative around the value that novel medicines provide to patients; create new avenues for entrepreneurs to scale their ideas; improve our state's transportation and housing infrastructure so it is no longer a liability but an asset for our state; and champion education and workforce development.

We're looking ahead to support the next decade of biotech innovation, one with significant opportunities for Massachusetts to sustain its foothold as the world-renowned leader in the life sciences and healthcare innovation. The life sciences industry here is poised for unprecedented growth over the coming years, and now is our chance to recognize and act on the opportunities ripe for transformation, and charge toward a new future. We saw first-hand how Massachusetts' R&D capabilities enabled our cluster to speed the development of COVID-19 diagnostics, vaccines, and therapeutics. We must continue to embrace this prowess and bolster our leadership in all aspects of life sciences.

As Chair, I look forward to executing on the foundation this report lays out. Together, we will make sure Massachusetts remains the best place in the world for the life sciences for decades to come.

# Executive Summary

**S**hifts in healthcare and technology, and improved understanding of biology, paint a picture of a life sciences industry and Massachusetts ecosystem at the cusp of significant disruptions. These shifts will not only impact how drugs and devices are discovered and delivered, but also how they are commercialized and the type of transformative technologies that will receive market acceptance. While the change will likely be felt over many years, it is imperative that Massachusetts ecosystem leaders anticipate and prepare for it to create opportunities in the ecosystem in a wide range of areas, including virtualization healthcare and R&D, funding for biomedical research outside of oncology and rare diseases, and paramount public health initiatives. As such, the objective of the State of Possible 2025 Report is to define the future direction and vision of the Massachusetts ecosystem and highlight the many systemic challenges that require attention for the cluster to stay ahead of the curve on scientific innovation.

This report also serves as a call to action to drive cross-industry collaboration in order to overcome shared challenges, and to capitalize on Massachusetts' greatest assets: stellar academic institutions, innovative provider systems, and a wealth of capital that accelerates and promotes entrepreneurship and scientific breakthroughs. Of note, while the report cannot definitively assess the impact of the coronavirus pandemic on the Massachusetts life sciences industry and ecosystem over the next five years—and does not want to draw wide-ranging conclusions based on short-term in-

formation—the 2025 Report does incorporate the sweeping changes brought by the pandemic in 2020 and beyond into its findings and conclusions throughout.

Across the respondents engaged throughout the eight months of research, stakeholder interviews, group discussions, and virtual panels—both from Massachusetts, other U.S. states, and abroad—the consensus continues to be that Massachusetts is the premier global life sciences cluster with a core competency of drug R&D. Therefore, the cluster's foundational and long-term success will undoubtedly depend on a R&D engine that continues to thrive. This will require a commitment to ensure that a broad array of life sciences startups have access to the funding and expertise necessary to grow beyond the seed/Series A stage. It will also require the continuous nurturing and advancement of talent who can lead and grow new areas of science.

While the ingredients for success are well established in the Massachusetts ecosystem, this State of Possible 2025 Report also emphasizes critical structural challenges for the region, mainly costs and affordability. Extremely low vacancy rates and highest in the nation commercial and lab rents in the Cambridge/Boston cluster are crowding out both entrepreneurial and larger companies. The cost of living close to the core of Boston has become increasingly unaffordable for employees and the trend is creating talent recruitment and retention challenges. On the other hand, this trend is fueling the growth of mini-clusters of life sciences firms outside

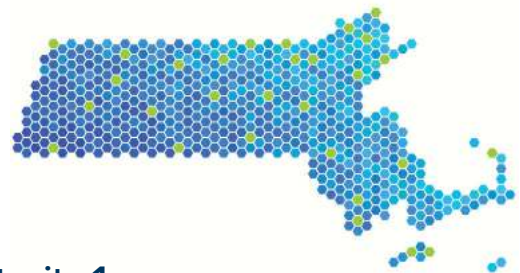
of the core Cambridge/Boston cluster. These life sciences companies across the state are leveraging the affordable and expansive space, and proximity to talent and academia. While R&D is still the strength of Cambridge/Boston, we are starting to see larger labs being developed and entrepreneurs establishing themselves within these mini-clusters. The emergence of these mini-clusters is a clear indication of Massachusetts' vibrant life sciences ecosystem. Nevertheless, further expansion of the life sciences ecosystem in the state will require transportation investments; it is one of the biggest economic development challenge facing the life sciences industry in Massachusetts, leading to issues around talent, and the ability to connect communities of practitioners across mini-clusters to the Cambridge/Boston core. Addressing traffic congestion in the Cambridge/Boston core and in the surrounding communities, along with expanding commuter rail access and improving public transit, will allow entrepreneurs to relocate without the concern of being cut off from the Cambridge/Boston core. This will require the implementation of well-coordinated and complementary transportation policies by state and local governments.

Workforce development and the talent pipeline were also highlighted frequently as potential barriers to future success. Massachusetts' academic institutions continue to provide a pool of talented scientists, especially in the field of core biology necessary for the life sciences industry. However, talent must keep up with shifting industry demand, especially shifts toward the convergence of biotech, medtech, and digital technologies. In addition, the development of talent pools around some of the technical and digital professions will require fostering strong communities, which has remained difficult to achieve. Addressing these skills gaps in dry and wet sciences, such as digital technologies, machine learning, genetics, computational science, advanced manufacturing, and commercialization, will be critical for growth.

Finally, the intensity of the political debate over drug pricing both at the state and federal level is creating a significant challenge to the future success of the industry and will require new approaches. Massachusetts as the hub of R&D early-stage innovation and entrepreneurial biotech companies, could be disproportionately impacted if ill-advised drug pricing policies impede the growth and availability of either public or private funding for such a strategic industry. This would in-turn have a negative impact on worldwide patient access to future therapeutic solutions that could transform lives. The COVID-19 pandemic has put the spotlight on the life sciences industry and created a universal understanding about the critical importance of therapies and vaccines. While public perception of the industry has improved over the past few

months, it is imperative that Massachusetts leads the way in articulating the wide-ranging value and benefits of biomedical innovation on public health and the economy, as well as help better inform the conversation around pricing, value, and patient access.

Within the next five years, the Massachusetts life sciences community is positioned to achieve balanced growth across multiple areas through four key opportunities. Success in these areas will reinforce the long-term sustainability and resilience of the ecosystem.



### **Opportunity 1**

#### ***Expand the R&D Footprint Beyond Oncology and Rare Diseases***

Take advantage of advances in synthetic biology, curative therapies, and focus discovery and development efforts across a wide range of therapeutic areas to reinforce the cluster's impact, societal value, and sustainability.

### **Opportunity 2**

#### ***Position Massachusetts as a Center for the Convergence of Biotechnology, Medical Technology, and Digital Health Applications***

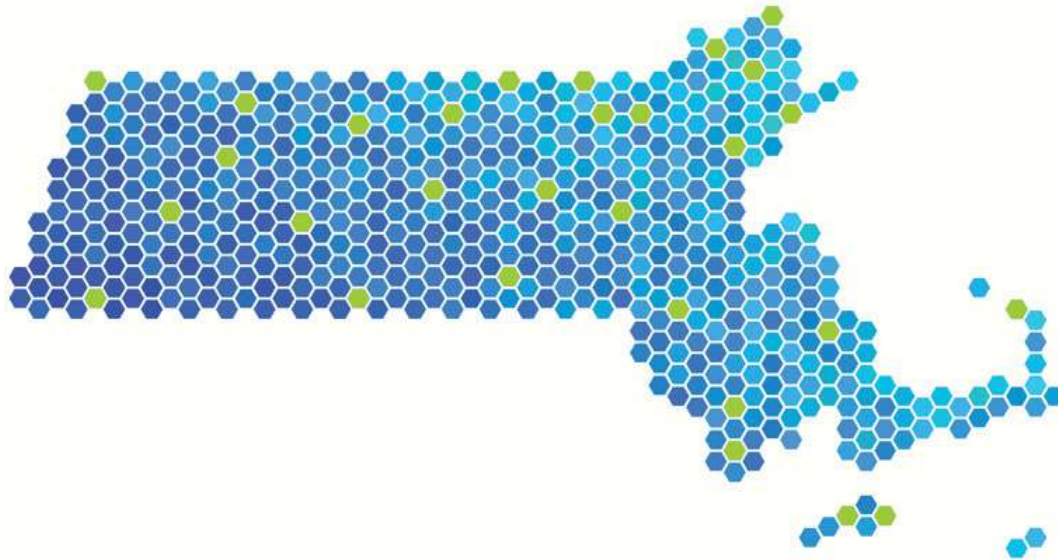
Enable Massachusetts to become the leader of the development and commercialization of technologies that leverage the convergence of digital technologies and pharmaceutical R&D to advance healthcare in terms of clinical and therapeutic delivery.

### **Opportunity 3**

#### ***Make the Ecosystem More Resilient to External Shocks by Growing the Capabilities of Commercialization and Manufacturing of Therapies***

Make Massachusetts an ideal place for R&D startups to transition through the entire lifecycle, including commercialization and manufacturing, and reinforce the depth of capabilities in manufacturing and commercialization.





## Opportunity 4

### Continue to Support Expansion of the Cluster and Creation of Mini-clusters Beyond the Cambridge/Boston Core

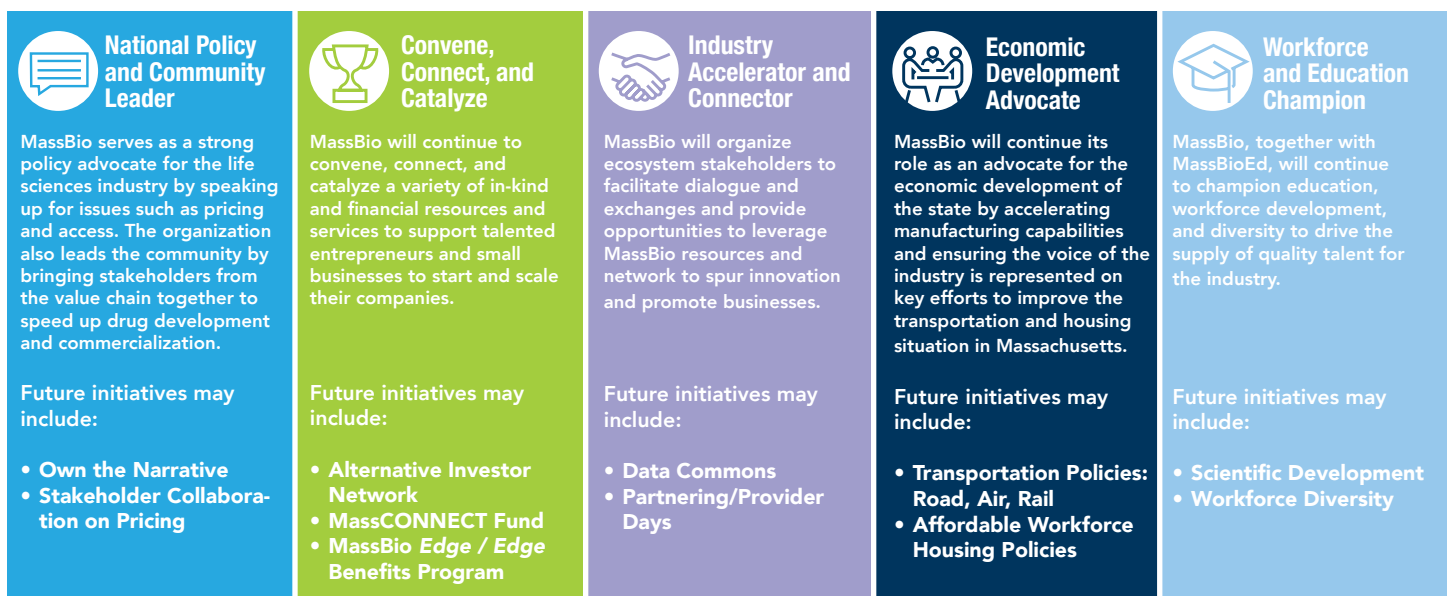
Retain and build on Massachusetts' leading position as a vibrant life sciences ecosystem with geographic specialization and a level of connectivity that provides a seamless network of talented individuals and innovative companies throughout the Commonwealth.

In the near and long-term, the healthcare and life sciences industries will continue to meaningfully transform the lives of patients, especially with an immediate opportunity to

change the world through effective therapies and vaccines for COVID-19. The advent of curative therapies, synthetic biology and trends around convergence, artificial intelligence, and the ubiquity of health data will disrupt the way leading life sciences companies prevent diseases, treat, and cure patients. Setting Massachusetts on a path to realizing these opportunities will require cross-industry collaboration and novel approaches to economic development to support the continued growth of the industry. MassBio, as a key advocate for the industry, its employees, and patients will implement a bold strategic plan to affect changes and ensure future success of the cluster.

(see Figure 1)

## Figure 1: MassBio's Strategies Overview







# Introduction

*“Where do we go for hope?”*

*—such is the visionary promise of the leading life sciences ecosystem in the world.*

**M**assachusetts has been a burgeoning life sciences hub for decades and solidified its position as number one in large part due to state government’s investment in the industry since Governor Deval Patrick’s 10-year, \$1 billion life sciences initiative was passed in 2008. Ten years later, Governor Baker built on that momentum by committing an additional \$623 million to further grow the life sciences over the next five years. The cluster’s unique blend of advanced academic and medical institutions, world-class research and biotechnology enterprises, and critical mass of investors holds tremendous promise for the continued health and wellness of patients, not just in the U.S., but throughout the world.

Through interviews and consultations with government, academic, and industry leaders, this report, prepared by Deloitte, takes stock of where the life sciences and healthcare industries are, and where growth might come from in the next 5-10 years. It celebrates the many achievements of the Massachusetts life sciences community, but more importantly, calls attention to some of the critical gaps and improvements needed for the cluster to thrive and to grow sustainably; mainly,

- The lack of affordable space and efficient transportation system;
- Sourcing essential talent to meet the future demands of the industry;
- Availability of funding options to support entrepreneurs; and
- The ongoing national debate over healthcare costs and drug pricing.

Before diving deeper into these findings that pertain to Massachusetts, it is important to anchor on how fundamental shifts within the global healthcare industry will disrupt life sciences firms both within the Massachusetts ecosystem and nationally and globally. Leaders in Massachusetts need to stay cognizant of these disruptions to stay ahead of the curve on biomedical innovation and focus on shoring up gaps in order to establish a stronghold on worldwide leadership over the next decade.

## The Impact of COVID-19

For the first time ever, everyone in the world is experiencing the same daily hope, concern, and worry about the timely development of new therapies and vaccines for COVID-19 in the same way patients and their families facing unmet medical needs have for decades. This alone has reset the conversation about the challenges, timelines, and costs of drug development. With the expected eventual discovery and distribution of an effective vaccine for COVID-19, the perception of the pharmaceutical and life sciences industry is positioned to shift dramatically from near the bottom of favorability polls currently to much higher. This will impact policymaking, industry communications, and beyond. However, the coronavirus pandemic has the potential to have lasting impacts on the Massachusetts life sciences ecosystem in many other ways from transportation to office space to financing. Yet, being a five-year strategic report, the report cannot draw too many conclusions based on the limited information we’ve gained from the first few months of the pandemic, but the report does recognize the potential for major and minor shifts in all aspects of the industry’s opportunities and challenges as outlined in further detail below.

# Healthcare Disruptions Impacting the Life Sciences



**T**he healthcare industry is experiencing extraordinary disruptions, driven by trends around the democratization of access to care, the advent of precision medicine, the emergence of digital technologies, and regulatory changes. The evolution is inevitable—patients want convenience and real-time access to transformative care, and the healthcare system is demanding better value and outcomes.

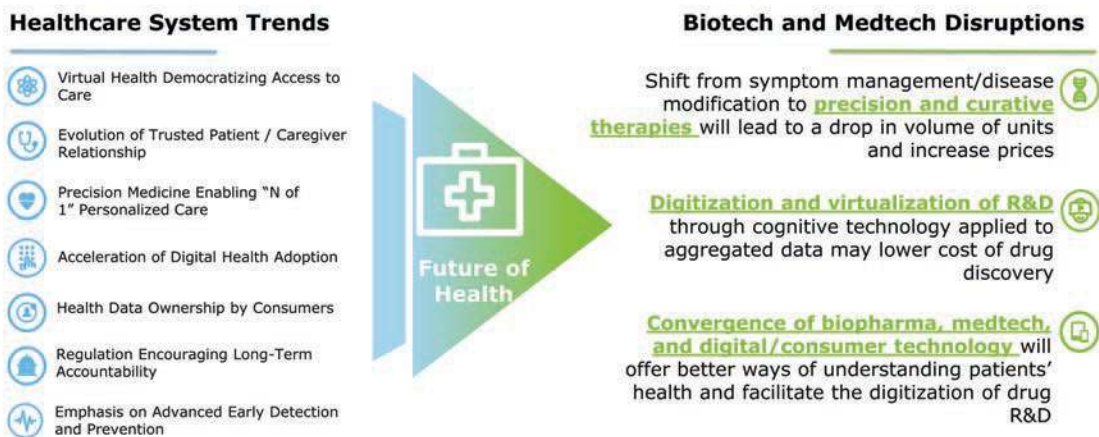
These key healthcare trends will have significant business impact on biotech and medtech companies—many will influence and shape the future of the Massachusetts ecosystem, which must continue to transform to meet patient and market demand, and drive real, positive changes for the healthcare system.

This report focuses on three key disruptive themes that will play a critical role in shaping the future of the R&D core of the Cambridge/Boston cluster and beyond. These disruptions

will transform how R&D is conducted today, the speed in which new drugs will be discovered, the cost of bringing the drug to market and to the patient, how the cluster generates value, and how firms collaborate across the ecosystem to commercialize therapies. In many ways, the COVID-19 pandemic has already accelerated these trends, as we’ve seen unprecedented levels of collaboration and convergence between sectors, increased adoption of digital health, and faster development of tests, treatments, and vaccines than ever before. Specifically, for Massachusetts, these disruptions will influence not only biotech business models, but also the diversity and quantity of talent needed, the types of therapies that will go to market, and how novel technologies will both change the way care is delivered and impact how therapies achieve commercial success. As such, the life sciences industry of the future could look fundamentally different than that of today and it is imperative for Massachusetts to anticipate the coming shifts.

## Figure 2: Healthcare Trends Impacting Biotech and Medtech Industry

Changes are taking place in the healthcare industry, and these large scale trends are driving biopharma and medical technology disruptions in the near term



Source: Deloitte Future of Health Analysis

## Shift from symptom management/disease modification to precision and curative therapies

The life sciences industry has made and continues to make significant investments in specialty and rare disease areas for increasingly personalized and targeted therapies. This trend is resulting in innovative therapies addressing an ever more niche set of patients, and is likely to continue and will be driven by the following factors:

- An exponentially deeper understanding of molecular mechanisms of disease and the impact of genetic and environmental interactions;
- As drug targets shift from symptom management and disease modification to curative and preventative therapies, typical mass-market maintenance therapies will likely become genericized;
- Patients and private and public payers will continue to exert downward pressure on drug prices, including only paying for “high-value” therapies by asking for additional evidence of improved outcomes. This will force companies to focus efforts on first-in-class therapies, effective assets, and rare disorders; and,
- High and long-term cost of chronic disease management.

The core Cambridge/Boston cluster is at the forefront of developing new, first-in-class and curative therapies, especially within oncology and specialty/rare disease areas. In the future, it is likely that curative therapies will be developed for broader and more prevalent and complex diseases, such as type 1 diabetes.

The evolution of curative therapies is likely to pose two types of challenges to the Cambridge/Boston cluster:

- One-time treatments with associated high cost will require new business and reimbursement models (e.g., *installment payments for gene therapy, supply chain and manufacturing, and center of excellence models*); and,
- One-time treatments don't offer the predictable revenues of chronic disease management therapies.

In the long run, balancing the value and volume parts of the equation is seen as a key to a successful R&D business model. As more and more of these therapies are developed, it is likely that they will drive a rationalization of the number of therapies across diseases and impact the types of business models that successfully bring therapies to the commercial stage.

## Digitization of R&D may start to lower the cost of drug discovery

In 2018, the cost to bring a pharmaceutical innovation to market increased to record levels (to US\$2.168 billion) while returns have declined steadily. Based on a recent Deloitte evaluation of the Return on Capital (ROC) of life sciences companies, the ROC among biopharmaceutical companies stands at 11.9% in 2017, declining steadily over the previous seven years (2011: 16.6%) (Teresa Leste, Yakir Siegal, and Maulesh Shukla, 2020). The industry must transform its R&D engine to build efficiency while producing higher efficacy therapies. The integration of digital and machine learning technologies into the R&D process has the potential to ultimately decrease the cost of drugs to the healthcare system and to patients.

The potential impact of digital technology on the current R&D cycle is immense. This transformation will be driven by a deeper understanding of human genomics and biology and by the digitization of clinical research and development. Digital technology can harness the influx of patient generated data to help gather, manage, understand, and derive insights to develop more tailored treatments. In the next 10+ years, the pharma R&D of the future will be able to leverage real-world data to do predictive modeling, in silico testing, and conduct virtual trials. The COVID-19 outbreak appears to be accelerating trends around the digitization and virtualization of R&D. Emerging technologies that support and facilitate accelerated screening or discovery of drugs against key targets, and the virtualization of clinical trials will likely have significant impact during COVID-19 and have a disproportionate influence on how R&D is conducted in the long-term.

### Figure 3: R&D Will Look Very Different in Coming Decades

Biopharma R&D of Today	Biopharma R&D of the Future <i>(over the next 10+ years)</i>
Significant portion of R&D costs are spent on drugs that fail	Availability of data, predictive modelling, and in silico testing improve drug target identification, safety, and efficacy testing significantly eliminating the number of failed drugs, and reducing research time
Large proportion of R&D costs are spent on trial design and labor	End to end automation of the R&D process eliminates the need for labor-intensive processes such as regulatory filings, trial recruitment, monitoring, data capture, and documentation
Fragmented, limited data sets hinder ability to study outcomes and use real-world evidence (RWE) for control purposes	RWE data sets are longitudinal, robust, and updated in real-time; interoperability enables the assembly of RWE with additional data sets such as claims, completed and ongoing studies, and individual health data to provide real-time insights
Barriers to identifying eligible trial participants lengthens study time and limits trial design	Open access to data platforms facilitates easy identification of eligible trial participants and recruitment
Limited and old-fashioned lab spaces hinder collaboration and flexibility to innovate	Digitization of clinical research will allow for execution of R&D to be performed virtually to build efficiencies and reduce cost, and lab design gravitating toward 50% computational space

Source: Deloitte Future of Health Analysis

The transformation of drug R&D will take years to become a reality and will have a long-term influence on Massachusetts' position in the industry. Specifically, we can foresee three types of impacts that will affect Massachusetts in the next 3-5 years:

- Changes in the types of R&D enterprises that are seeded, specifically ones with a greater focus on AI-enabled discovery platforms;
- Quantity and diversity of talent required to drive R&D and computational activities, with a greater emphasis on scientists that are fluent across both wet and dry sciences; and,
- The use of physical environments will evolve, with lower usage for wet lab space relative to total square footage.



## *Convergence of biopharma, medtech, and digital/consumer technology will offer better ways of understanding patients' health to develop and commercialize drugs*

The lack of available, comprehensive, and interoperable health records today, which are mainly captured in the Electronic Health Records (EHR) systems, is a constraint on the realization of positive outcomes for the individual patient. These systems have interoperability and accuracy issues and provide limited visibility into patients' health, which result in waste, potential mismanagement of patient records, limited utility for R&D and target discovery, and most importantly, poor patient experience and outcomes.

The convergence of biopharma, medtech, and digital/consumer technology solutions is paving the way to improve prevention of diseases, the delivery of patient care, drive greater healthcare provider engagement, and treat diseases in fundamentally new ways. This trend relies on the importance of gathering and analyzing new types of data, as well as enhancing the accuracy of health data and how it is collected.

For example, improved remote patient monitoring capabilities, such as mobile health platforms integrated with biometric and implanted/ingested sensors, will extend the reach of

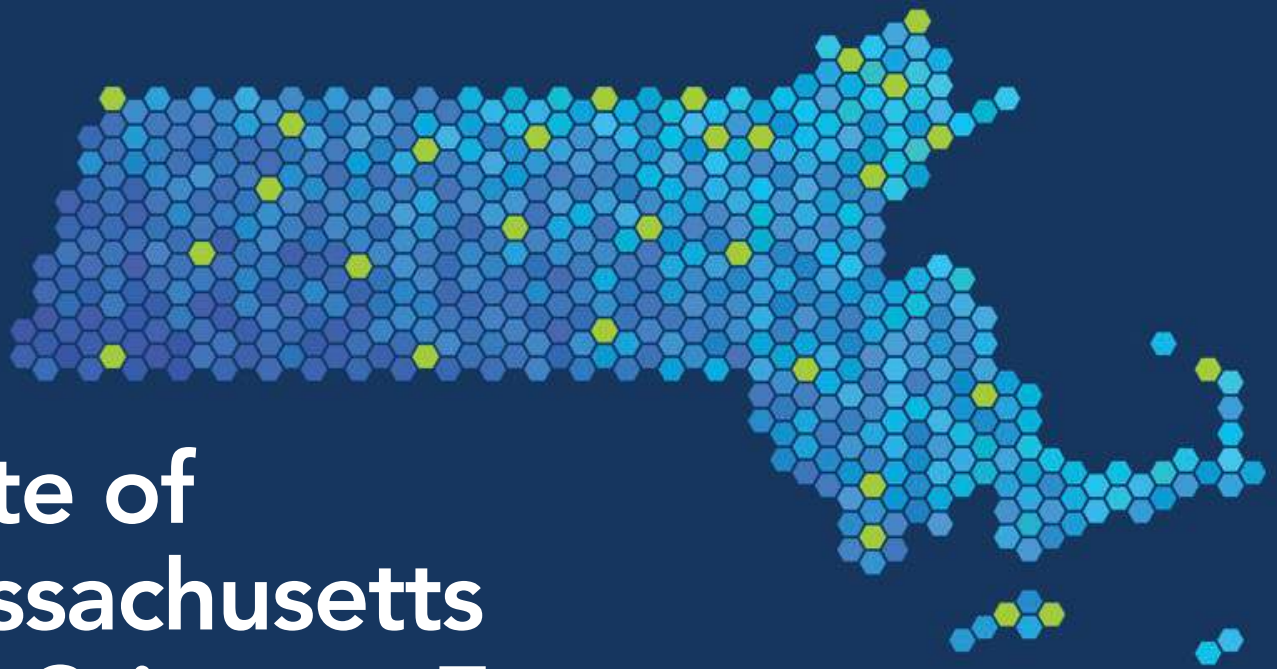
data collected through EHRs. As affordable, commercially available sensors become more precise and accurate, we will have better monitoring capabilities and the ability to capture additional health indicators. Adoption of these technologies will be driven by the need to better understand patients' health status to develop tailored and effective treatments, and to adhere and facilitate self-care management. It will also be driven by the need to find new ways to improve commercial viability and provide better evidence to justify reimbursement.

Beyond therapeutics, it is likely that the next few years will see growth in connected medical devices that enable the management and prevention of disease across broad populations, and in the launch of new digital therapeutics.

For Massachusetts, it is likely that this trend will have significant impacts on:

- The growth of medical technology and digital health companies in the cluster; and,
- The availability of longitudinal data across populations that will inform development and commercialization (e.g., market access) decisions across the ecosystem.





# State of Massachusetts Life Sciences Ecosystem

**A**s a life sciences hub, Massachusetts must recognize the transformation that is taking place in the market and respond accordingly. While macro industry trends will largely shape the future life sciences ecosystem in Massachusetts and its ability to compete with key global and national locations, several cluster dynamics will need to be addressed for Massachusetts to remain the global leader in the life sciences industry and stay ahead of the curve as an R&D hub. These dynamics are around talent, funding, supporting industries, infrastructure that supports the growth of the ecosystem, and finally, political and public support for the industry.

## Key Dynamics of the Massachusetts Life Sciences Ecosystem:

- Unique Size and Scale as a Global Life Sciences Hub
- Investments Needed in World-Class Infrastructure to Drive Growth In and Outside of the Core
- Critical Mass of Funding, but Challenges at the Earlier Stages
- World-Class Talent That Needs to Grow in Advanced Technology and Multidisciplinary Areas
- Industry Needs to Invigorate Efforts to Gain Political and Public Support

## *Unique Size and Scale as a Global Life Sciences Hub*

Massachusetts ranks as the top location worldwide for the life sciences industry. This recognition, as exemplified by the presence of multiple large pharma research centers, a growing medical device sector, leading academic institutions, and academic medical centers, is enviable but not easy to maintain.

Within biopharmaceuticals, Massachusetts has a leading position across R&D. Oncology continues to be the most frequently researched therapeutic area in Massachusetts, representing 34% of the total pipeline, followed by neurology at 13%, and infections at 8% (Massachusetts Biotechnology Council, 2020).

In medical technology, Massachusetts has made progress in establishing several anchor companies. According to the State of the Massachusetts MedTech Industry Report, 2018 is the fourth year in a row that Massachusetts ranks first in terms of total medical device exports as a percentage of total state exports (23%) with a value of \$6.13 billion. When considering total medical device VC investment in 2018, the state ranks second with \$499 million from 23 deals compared to California at \$1.6 billion from 76 deals. This is critically important given the rise of convergence as a leading trend for the future of the industry and indicates a real need for the state to continue pushing investments in the medical technology field to stay competitive.

The Commonwealth is also a growing hub of biomanufacturing development and facilities. Over the past five years, more than \$1.9 billion has been invested in new or expanded biomanufacturing facilities by companies and academic centers (Massachusetts Life Sciences Center). Several centers contribute to this success, including:

- Massachusetts Biomanufacturing Center at UMass Lowell;
- Massachusetts Accelerator for Biomanufacturing at UMass Dartmouth; and,
- Worcester Polytechnic Institute.

Despite this success, there is a perception that Massachusetts still lacks capabilities on the manufacturing side (compared to the Research Triangle and Pennsylvania, for example) and to a lesser extent, on the commercialization side (compared to Tri-state/NJ area and California, for example).

Yet, the opportunity exists to further expand manufacturing capabilities in Massachusetts. With the healthcare system shifting to personalized medicine and value-based care, manufacturing must also innovate to keep up and enable the development of novel modalities (e.g., cell and gene therapies) and the convergence of digital device and therapeutic drugs. Additionally, there will be a near-term pressing need to quickly manufacture a large supply of COVID-19 vaccine, and a longer-term move to manufacture more drugs in the U.S. due to disruptions in the supply chain from COVID-19. In both cases, Massachusetts should look to take advantage of its R&D leadership to push forward with manufacturing capacity and expertise.

*“ Massachusetts may be vulnerable because we are a research hub, not a full life sciences hub. Becoming more commercial is an important aspect of our growth. ”*

*—Director, Academic Institution*

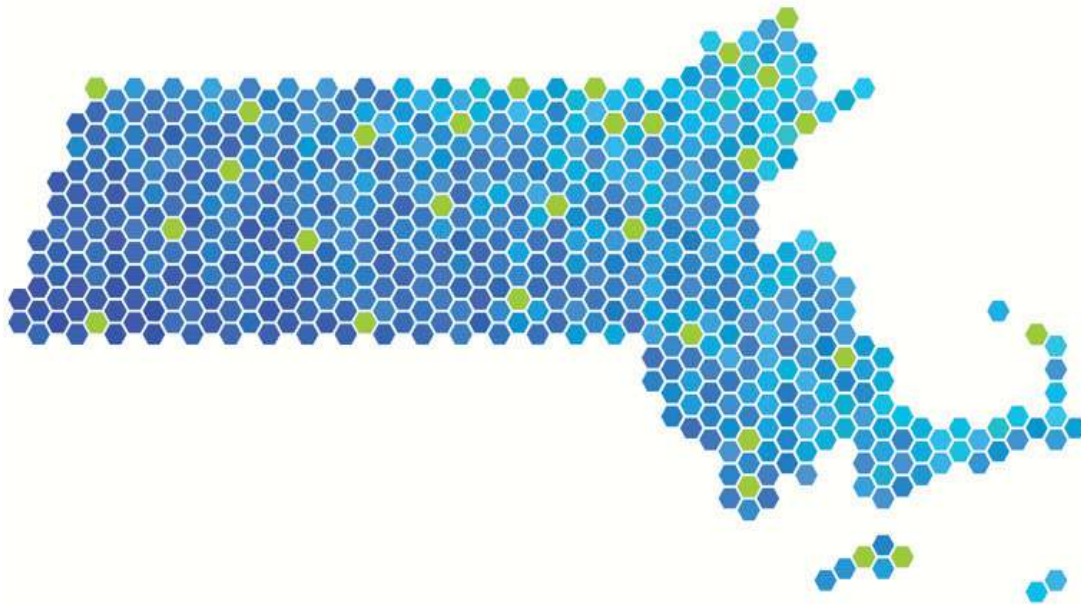
*“ Massachusetts has the world’s most talented workforce, but we subject that workforce to worst-in-the-nation traffic congestion and an antiquated transit system that sap our productivity. If we want to maintain our economic edge, we must fix these problems. That means adopting new public policies to make our transportation system more resilient, more accessible, more efficient, and fairer. Let’s start by borrowing ideas that have worked well in competitor regions like Seattle and Washington, D.C., where bus lanes and equitable road pricing mean more people are moving in fewer vehicles. We owe it to ourselves and our Commonwealth’s future to change the status quo. ”*

*—Chris Dempsey, Infrastructure Expert*

### *Investments Needed in World-Class Infrastructure to Drive Growth in and Outside of the Core*

The Greater Boston economy’s rapid growth over the last 10 years has put increasing pressure on the state’s infrastructure, including housing, office/lab space, and transportation. Proximity to the core Cambridge/Boston cluster is no longer an affordable option for many companies. According to Cushman & Wakefield Research, the average asking rents of East Cambridge is reaching \$97.97 per sq. ft., and the average gross rent in Boston has reached \$108 per sq. ft. While rent costs continue to rise, vacancy rates steadily decline. In Boston, only 0.8% of lab space is still available and East Cambridge reports a vacancy rate of 0.0% (Tong, 2020). Compared to the 7.1% vacancy rate average across the 12 major life sciences clusters in North America, Cambridge/Boston is unaffordable and unavailable for many of the entrepreneurs and small companies operating in the R&D and innovation space. It remains unclear if this situation will be altered significantly because of the current COVID-19 pandemic, but there will likely be some change given return-to-work decisions being made with social distancing guidelines remaining for the considerable near term.





**Figure 4: Rent vs. Vacancy Comparison (Cambridge, MA)**

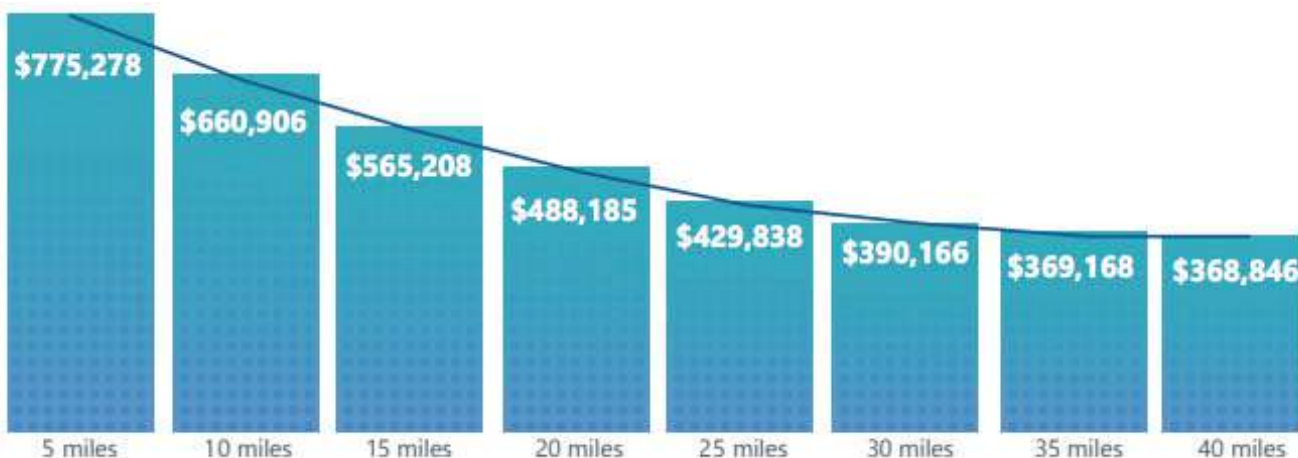


Source: Cushman & Wakefield Research

As a result, the MetroWest corridor (e.g., Waltham, Lexington, and Woburn) and the western part of the state are becoming a more attractive option than in the past. For example, the average commercial rents in Worcester is 22% less than the Metro Boston Region and ranks third in number of biopharma companies in Massachusetts.

At the same time, the increase in residential property prices and rents is also driving employees outside of the Cambridge/Boston core, leading to greater commuting times, and in some cases, talent retention and recruitment challenges for companies. It also makes the creation of strong communities of practitioners around specific skills/professions more difficult to achieve and maintain and could impact knowledge

**Figure 5: Median Housing Price vs. Distance from City of Boston in Miles, 2017**



Source: Massachusetts Department of Transportation Congestion Report, 2019



absorption. This is leading some organizations to establish outside of the core and adopt virtual business models, something that may be accelerated due to COVID-19 implications at least for the near-term, that require less in-person interactions, which is creating potential talent pools that can feed the emerging mini-clusters.

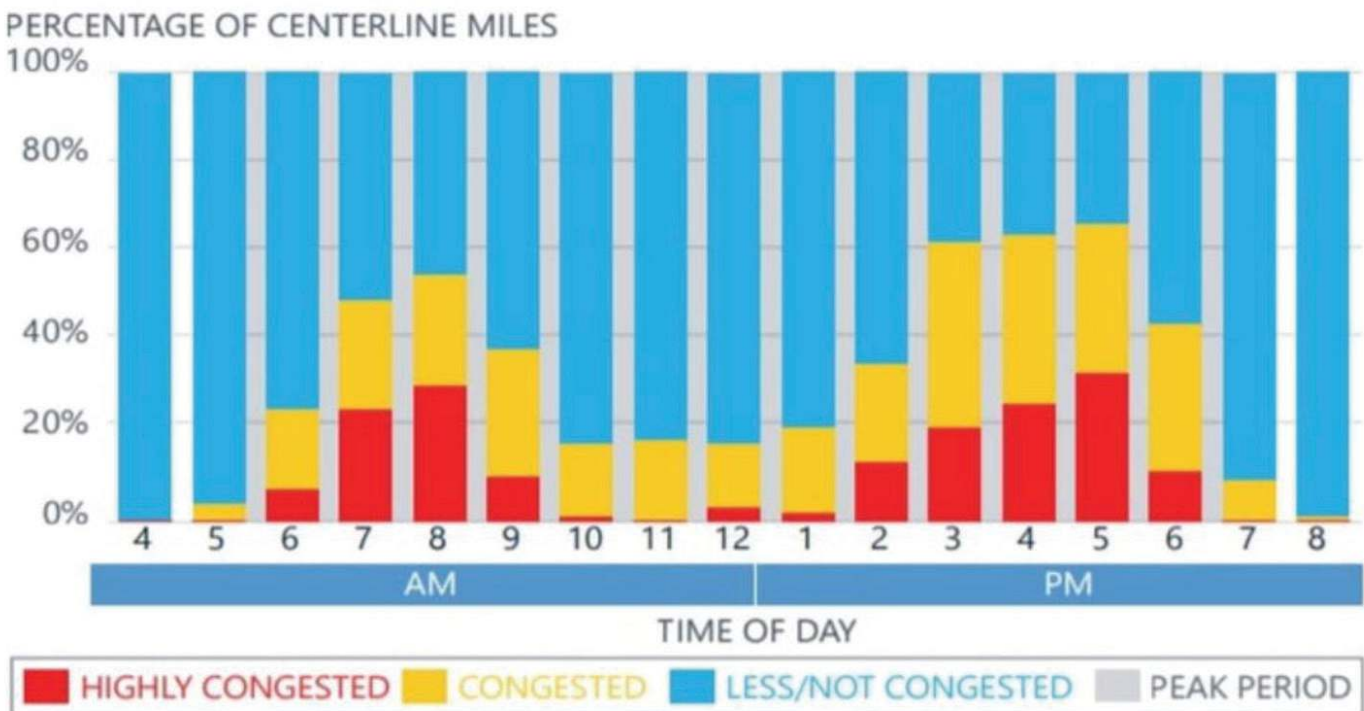
In total, these dynamics are putting increasing pressure on the state’s transportation system which has reached a crisis in its ability to efficiently transport people across the state.

There is a clear need to reexamine infrastructure policy and investments in Massachusetts to meet the demands of economic growth and local industries. There is growing consensus that new public funds are necessary to help modernize the existing transportation system statewide as well as consider future improvements and expansion. Transportation policies such as congestion or corridor pricing are one of many public sector solutions that may alleviate some of the congestion around the core of the cluster while generat-

ing needed new revenues to fund transportation projects. Of the 10 largest metropolitan areas in the country, the only one that does not enforce corridor pricing to regulate traffic flow is Boston (Massachusetts Department of Transportation Congestion Report 2019). Other possible changes include:

- Increased use, efficiency, and frequency of commuter rail system, especially during peak service times;
- Frequent shuttle bus service on the Grand Junction route, connecting North Station to the future West Station through the MIT/Kendall neighborhood;
- Promote rapid bus transit to connect the various life sciences clusters; and,
- High-speed intercity express rail – one stop from Logan to South Station.

**Figure 6: Percent of Congestion on Study Roadway Miles, Boston Region Inside Route 128**



Source: Massachusetts Department of Transportation Congestion Report 2019

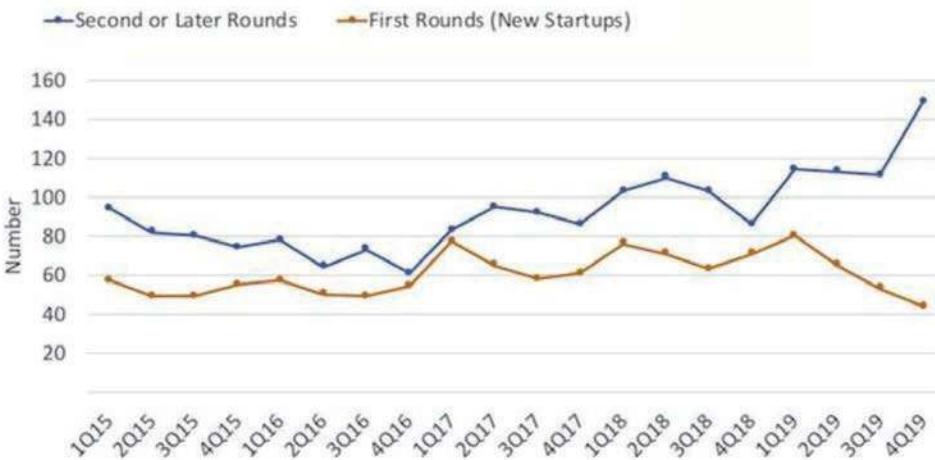
## Critical Mass of Funding, but Challenges at the Earlier Stages

Massachusetts has a world-class pool of life sciences investors and is one of the leading states in total biopharma funding. A 2018 ranking of the top 10 biopharma clusters in the U.S. by Genetic Engineering & Biotechnology News listed Cambridge/Boston as number one with \$6.1 billion in total VC investment and \$2.5 billion of NIH funding, just in front of San Francisco and significantly ahead of NYC/NJ. Entrepreneurs benefit from local access to capital and best-in-class biotech creation expertise through a variety of methods, namely a very effective and beneficial VC-creation model and significant federal funding to pursue and incubate innovation.

Nevertheless, this positive picture must be contrasted with the funding challenges for non-VC created startups in the state. These organizations seem to struggle to get enough

**Figure 7: Decline in Creation of Startups**

Number of U.S.-based Biotech Funding Rounds Per Quarter



Source: Pitchbook

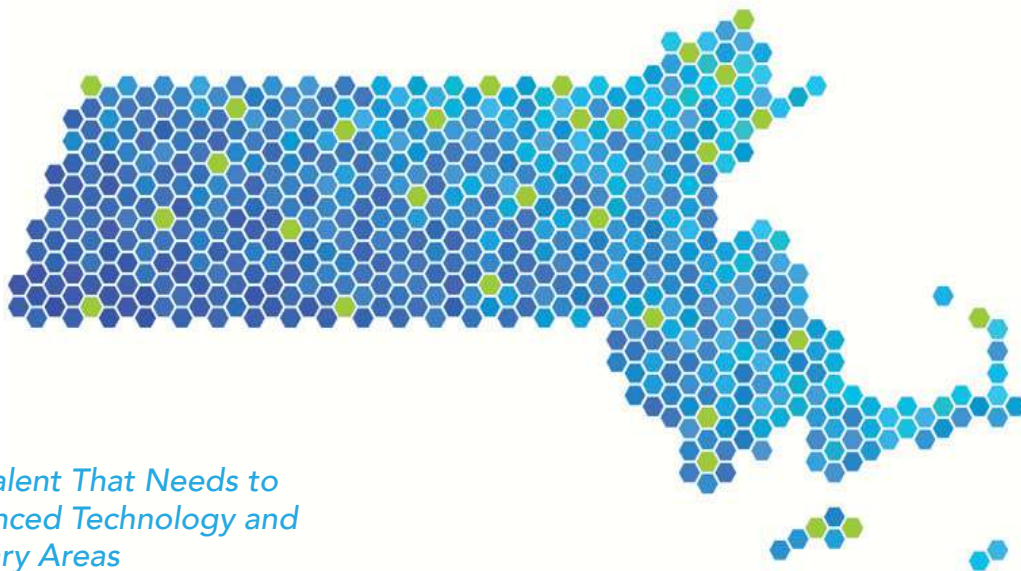
**“ We are seeing the venture creation model become bigger and bigger, it just makes less money available from venture capital for others because they are creating their own companies. ”**  
**—CEO, Biotech Company**

**“ I’m currently not finding any Series A investor interest in Massachusetts. [...] I can get a \$10m grant from that state. If I don’t find funding, I will take the grant and move there. ”**  
**—CEO, Biotech Company**

support (in-kind and financial) to scale their businesses, including strong in-state investors to guide them. These startups are critical to the translation of academic innovation to the commercial world. As businesses in Massachusetts experience potential constraints to secure series A funding, entrepreneurs are forced to consider relocation to be closer to funders in other geographies or because of the availability of non-dilutive funding in other locations.

Although difficult to quantify, this issue is widely recognized by key stakeholders in the state. For reference, the total VC funding raised by therapeutics companies in the U.S. has increased significantly since 2009, with 2018 (\$12.3B) representing an increase of 56% (\$4.4B) from the prior record set in 2017 (\$7.9B) (Wessel, 2019). At the same time, the number of preclinical and clinical companies receiving venture funding has remained relatively steady, ranging between 300-400 companies per year, and the top 40 companies raised more than 50% of all U.S.

venture capital, indicating that the increase in total funding is not being spread out over a proportionate increase in companies receiving funding (Wessel, 2019). More alarming, 2019 saw a decline in the amount of companies announcing first rounds of funding across the nation below what historical variations and the bull market would suggest (see Figure 7: Decline in Creation of Startups). This trend could be the result of several factors including, the above-mentioned, a more bearish outlook from investors, and potential changes in the way academic institutions think about company creation and the greater involvement and financial return they seek.



### *World-Class Talent That Needs to Grow in Advanced Technology and Multidisciplinary Areas*

The presence of world-leading academic institutions in the cluster provides an ongoing supply of talented professionals with proficiency in wet sciences. According to Integrated Postsecondary Education Data System, Boston ranks first for producing the greatest number of life sciences PhDs annually with 1,317 graduates, which compares to San Francisco in second place with 1,065 graduates and Los Angeles in third at 1,052.

Despite the continuous influx and production of talent, there is a growing need for new skills and professionals with diverse backgrounds as the industry shifts towards convergence of various disciplines within healthcare, such as bio-engineered products ushered by advanced synthetic and systems biology. A common understanding across participants in the report is that there are key talent gaps in the dry sciences (e.g., computational biology) and advanced technology field (e.g., 3D printing) with a limited number of professionals who have

*“ We are lacking workforce at the scientist level and the next level down in cell engineering and 3D printing, mid-tier professionals around precision manufacturing and lab technicians. ”*

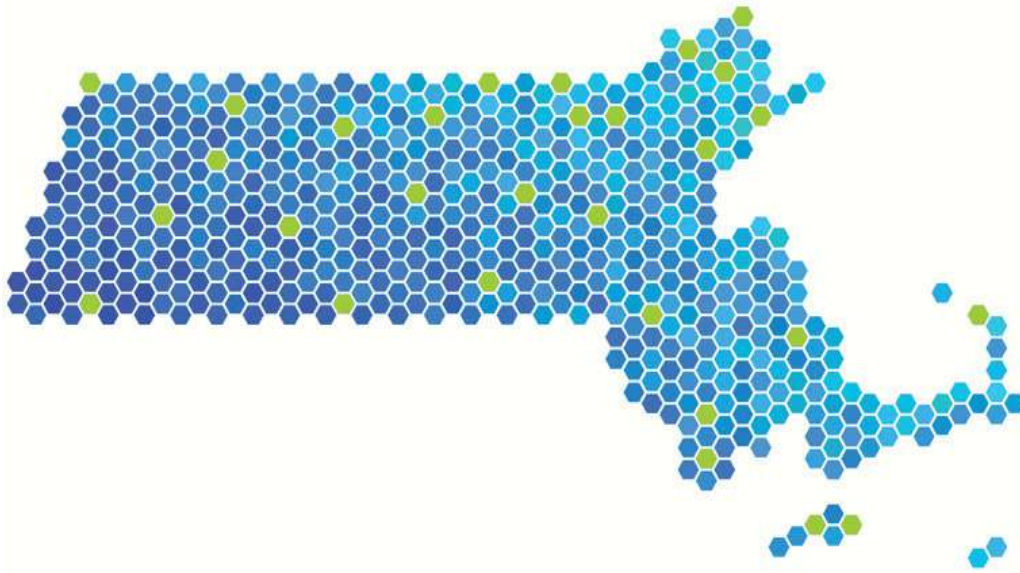
*—CEO, Biotech Company*

*“ I would say the challenge is to identify people who are masters of wet and dry sciences, those people will lead the world. I’m convinced that to position my trainees to lead, they need to be able to do both, being bilingual is in demand. And our institutions here should promote this. ”*

*—Life Sciences Professor, MIT*

skills across both wet and dry sciences. According to Society for Industrial and Applied Mathematics, when looking at states within the U.S. that have three or more universities offering computational science degrees, the ranking of Massachusetts falls behind that of California, which has six universities offering Computational Science degrees. It is critically important to have proficiency in multiple overlapping areas to successfully innovate in this segment. Likewise, many professionals in the state that operate in this segment criticize the lack of a feeling of community in these new fields, which is incidentally a strength of California and some other clusters.

Finally, diversity and inclusion will be a key factor in the cluster’s sustainability and ensuring a diverse supply of talent in the future. From a workforce development and talent pipeline perspective, the industry must look everywhere to find the best talent.



### *Industry Needs to Invigorate Efforts to Gain Political and Public Support*

Despite the raft of new therapies and cures reaching patients for many diseases once untreatable, the biopharma ecosystem increasingly suffers from a poor public understanding of the value of innovation and from heightened political pressure to lower drug prices. That may be changing due to the COVID-19 pandemic and the hopeful creation of effective therapeutics and vaccines to treat and prevent the coronavirus, but it's unclear if this will last.

In the coming years, state and federal political efforts to lower drug pricing will act as a damper on the industry's growth with potentially less funding available for innovation from private sources, and possibly, from public sources. With a bipartisan view that drug prices are too high, it is necessary for the biopharma industry to educate policymakers, patients, and the public about the value of cures and therapies to the healthcare system. The acceleration of the number of curative therapies in the development pipeline creates a demand for a shared understanding of value and pricing to enable full commercialization of these transformative and life-saving solutions. This will remain true despite any positive benefit gained by industry innovation around COVID-19 therapies and vaccines.

There are also major questions around how to pay for curative therapies, what patients should pay out-of-pocket, and how to measure a cure's value based on effectiveness and durability. An organized voice around access, reimbursement, and cost-sharing is vital if the biopharma industry wants to expand patient access to curative therapies, and to do so, will need to encourage industry engagement with other stakeholders (e.g., payers, providers) and with state and federal governments to productively find a path forward without a regulatory overhang

*“ Neither side is coming to the table, pharma is not saying they are going to lower the price, payer is exposing patient to high priced pharmaceuticals.*

*We need to work across the aisle. ”*

*—CEO, Biotech Company*

dictating the way the industry should operate.

The value of the biotech cluster is often underestimated, even in Massachusetts, as is the value of innovation taking place to produce effective and novel therapies and diagnostics. The race to produce a treatment, vaccine, and diagnostic tests for COVID-19, which over 85 Massachusetts companies are involved in at the time of this writing, is the root for a positive shift in public opinion. To build on this emerging positive momentum, the industry should seize this moment as an opportunity to rebrand itself and buttress the conversation related to innovation, drug pricing, and reimbursement with the input of other stakeholders, including clinicians, health systems, and state government. Companies in the industry should not only look for short-term gains, but also work on longer-term research programs on infectious disease to improve public health. Collective efforts are needed to ensure that the residents of Massachusetts, and the broader public, clearly see the value of life-saving innovation and how they directly benefit from biotech companies' R&D advancement in their communities and the strategic importance of the industry for the economy, and improvements in people's health and livelihoods. The industry has a head-start from the positive attention it's gaining around development of a COVID-19 vaccine.



# Opportunities for Massachusetts

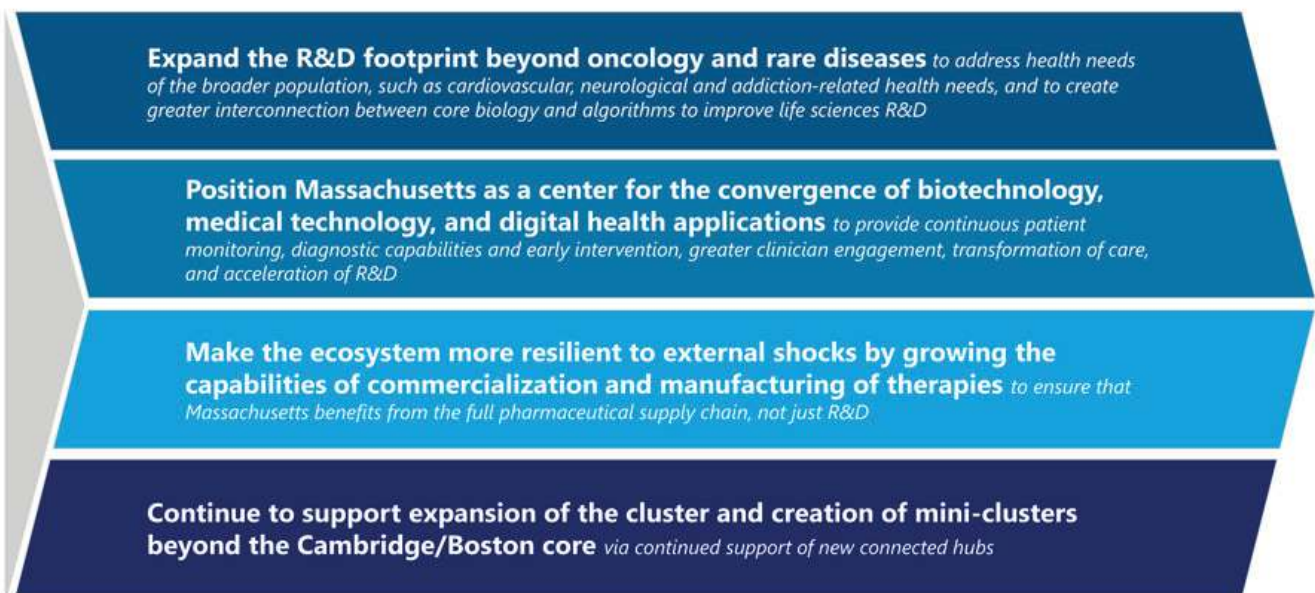


**T**he Massachusetts cluster is well positioned in the life sciences industry and has excelled across many different areas of the industry. These positive elements will continue to support the growth of the ecosystem, provided practical answers are given to the capabilities, talent, funding, infrastructure, and policy questions that the cluster is facing today. The life sciences industry is also entering an unprecedented era of disruption that will impact the scope of the Massachusetts ecosystem for years to come. Harnessing these opportunities for change and continuing

to nurture areas of strengths for Massachusetts will ensure a prosperous bio-economy and a future of sustainable and balanced growth.

Based on the report's findings and the views of multiple stakeholders, over the next several years, we believe that significant growth in jobs, economic output, and shared prosperity will come from positioning Massachusetts to capture the following opportunities:

**Figure 8: Balanced Growth Map for Massachusetts**



## Opportunity 1 *Expand R&D Footprint Beyond Oncology and Rare Diseases*

Aligning to the healthcare system’s emphasis on early prevention and precision medicine, the Massachusetts cluster is at the forefront of biopharma R&D, tackling some of the most difficult diseases, such as Alzheimer’s, coronavirus, and rare disease. There is an opportunity here to expand R&D to focus more on the bigger challenges in public health. As illustrated by Figure 9, the investment community is focused on oncology and neurology, whereas the diseases with the highest economic cost to society, such as addiction and cardiovascular disease, receive less attention and financing. As COVID-19 has demonstrated, there is also a need now more than ever to focus on infectious disease prevention and research.

The solution is far from simple; it requires the ecosystem’s collective effort and the right incentives to identify commercial pathways for highly priced curative therapies and to promote a culture of risk and an innovation engine that will foster and fund companies that are researching therapies to tackle broader public health issues.

The Massachusetts cluster’s core R&D activity stems from its strength in biology, and increasingly the interconnection of biology, technology, and algorithms. The growth of systems biology and synthetic biology R&D, which is the interdisciplinary area that involves the application of engineering principles to biology, is presenting an overwhelming array of new possibilities for enhancing human health and wellness.

“ *Cardiovascular disease, Alzheimer’s, all the big, hard ones... It’s easier to fund a rare genetic disorder than it is to fund something that’s going to affect a sizable percentage of the population.* ”

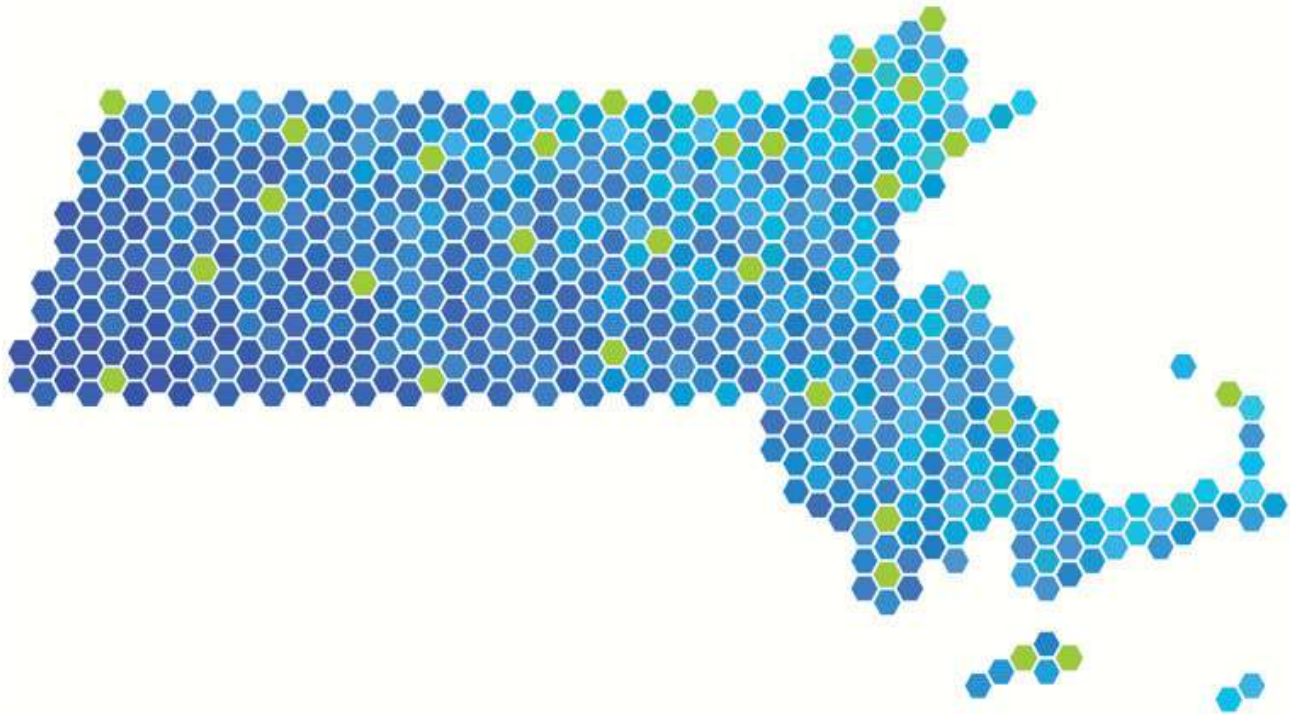
—CEO, Biotech Company

**Figure 9: U.S. Therapeutic Company Venture Funding by Disease, 2009-2018**

Disease Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Oncology	\$919	\$616	\$923	\$740	\$1,045	\$1,225	\$2,011	\$1,570	\$3,009	\$4,434
Neurology	\$532	\$314	\$219	\$313	\$355	\$456	\$1,000	\$684	\$843	\$1,452
Platform	\$221	\$250	\$146	\$286	\$341	\$886	\$1,020	\$512	\$450	\$1,020
Infectious	\$452	\$323	\$383	\$167	\$350	\$535	\$574	\$782	\$959	\$372
Other	\$225	\$320	\$206	\$367	\$283	\$333	\$474	\$323	\$676	\$934
Endocrine	\$176	\$77	\$279	\$284	\$157	\$305	\$372	\$887	\$686	\$508
Metabolic	\$162	\$176	\$241	\$371	\$265	\$161	\$433	\$176	\$396	\$714
Immunology	\$157	\$152	\$57	\$148	\$171	\$262	\$260	\$332	\$194	\$737
Cardiovascular	\$167	\$141	\$256	\$283	\$177	\$56	\$245	\$51	\$127	\$850
Ophthalmology	\$196	\$92	\$216	\$107	\$275	\$272	\$166	\$231	\$215	\$206
Respiratory	\$106	\$154	\$106	\$65	\$60	\$59	\$210	\$138	\$170	\$428
Gastrointestinal	\$39	\$67	\$66	\$67	\$52	\$18	\$76	\$18	\$70	\$466
Psychiatry	\$50	\$39	\$58	\$111	\$44	\$154	\$49	\$201	\$35	\$179
Hematology	\$90	\$104	\$91	\$150	\$90	\$42	\$162	\$66	\$48	\$27
Total (\$M)	\$3,491	\$2,826	\$3,247	\$3,479	\$3,665	\$4,765	\$7,050	\$5,970	\$7,879	\$12,328

Source: BIO





The state is already seeing the benefit of such technology as result of the race to find advanced tests, vaccines, and treatments to the COVID-19 outbreak. This public health emergency has increased the need for industry leaders to develop novel technologies and solutions, and to move candidates through the R&D and regulatory process in an unprecedented pace and in a virtual environment. We anticipate that the industry will see new business models emerge to leverage the convergence of biology, technology, and algorithms that will cross boundaries and industries to improve the human condition. There is great potential in gene editing, 3D printing, organoids, and cell-based therapies to treat and cure diseases and extend lifespan. The integration of biology and technology is also fueling the growth of agricultural biotechnology, performance materials, and other industries in the state. There is significant competition in this space from other states, such as California, and other nations, such as China. Growing Massachusetts' attractiveness in this space may require the launch of a major industry conference around these technologies, in the model of SynBioBeta which is held in the Bay Area.

Expanding the R&D footprint will require strategies such as further investment in the development of talent. It will also be necessary to lead the conversation around ethical challenges and dilemmas with regards to gene editing and more broadly biological engineering. It is fundamental that Massachusetts drives significant support to those technologies to further differentiate the cluster, grow the bio-economy, and retain its position as the leading-edge cluster of advancing human health.

“ *Synthetic biology is the engineering language that powers the emerging bio-economy. This new paradigm combines scientific advances in genomics, systems biology, DNA synthesis and computation, in order to provide the means to re-program the genetic operating system of any living cell or organism. This will help address critical unmet needs in Health, Agriculture, Chemicals, Materials, Energy, and the Environment. As we strive to design and implement a sustainable economy for all in the twenty-first century, synthetic biology principles and technologies will drive this transformation.* ”

—Nevin Summers and Ron Weiss, MIT

## Opportunity 2 *Position Massachusetts as a Center for the Convergence of Biotechnology, Medical Technology, and Digital Health Applications*

The convergence of biotechnology, medical technology, and advanced technologies/computer sciences will drive innovation forward in the next 5-10 years as the healthcare system transforms.

Digital health and life sciences coming together will propel the transformation of the healthcare delivery system by offering better ways of understanding the patient and shifting points of care. Massachusetts has room to improve its positioning for digital health investment, which will be an important success factor as the trend of convergence continues to grow. In 2018, Boston totaled 44 investments in digital health companies for a total of \$1.7 billion compared to 131 deals/\$3.8 billion in San Francisco and 88 deals/\$2.4 billion in New York City (Startup Health, 2018). As Massachusetts seeks to grow its digital

health cluster, it must understand and develop a culture that can merge digital transformation with the benefits and risks of pharma R&D. The recent dissolution of many high-profile life sciences/med tech partnerships, as well as departures of top digital executive from the industry, may be symptomatic of the difficulty to incorporate digital into life sciences companies' strategies and operations.

Other geographies, such as Israel, offer the opportunity for collaboration across clusters to help offset gaps and enable cross-pollination of skills across biotech, medtech, and digital health. By leveraging talent and knowledge from international clusters with complementary capabilities, Massachusetts can be better positioned to stay ahead of the competition in digital health. In addition to international collaboration, strategies emphasizing and investing in Massachusetts talent pool and improving gap areas such as technology expertise and digital investment will accelerate the advancement of convergence in the Commonwealth and establish a community for such talents.

**Figure 10: U.S. Digital Health Funding By City (2018)**



Source: Startup Health Global Digital Health Funding Report 2018



### **Opportunity 3 *Make the Ecosystem More Resilient to External Shocks by Growing the Capabilities of Commercialization and Manufacturing of Therapies***

The R&D engine of the state is highly dependent on external sources of funding, including the federal government, through the NIH, for its success. Potential changes in the allocation of such funding create a risk for the sustainability of Massachusetts, which is highly focused on academic innovation and venture-backed commercialization of innovation. The state can become more resilient and sustainable by fostering favorable conditions for the development of biomanufacturing and commercialization capabilities.

The manufacturing of therapeutics is a critical component to the success of commercialization. The Massachusetts cluster is home to multiple manufacturing facilities and has received significant investment including more than \$1.9 billion over the past five years in new or expanded biomanufacturing facilities at companies and academic centers (Massachusetts Life Sciences Center). The growth of curative therapies, and other leading-edge areas, such as the microbiome, is creating opportunities for biomanufacturing to be positioned and seen as an area of strength within the state due to the proximity of innovators, and the broad availability of specialized talent.

Nevertheless, Massachusetts is facing fierce competition in the manufacturing space from abroad (e.g., China) and from other U.S. states (e.g., North Carolina and Pennsylvania). We believe that the U.S. will see a gradual increase in manufacturing, which may be partially driven by greater diversification of manufacturing and supplier base due to COVID-19 restrictions, especially precision manufacturing. Massachusetts could capitalize on the trend to not only continue to manufacture leading edge medical and therapeutic technologies, but also by supporting the scaling of innovative manufacturing process technologies, such as continuous manufacturing. Given the level of competition in the space, driving growth in manufacturing will require a commitment to development of manufacturing at the state level, including through the design of specific incentives to drive adoption and growth of new manufacturing ventures and technologies.

While the ecosystem already has several fully integrated companies, the cluster will continue to benefit from greater investments and job creation in the commercialization and manufacturing of innovations from its R&D engine.

The long-term vision is for Massachusetts to become an ideal

*“ In terms of advanced manufacturing we have two programs that are part of the Massachusetts Manufacturing Innovation Initiative, which is part of the Manufacturing USA program. So, we’ve committed \$100 million in grants to some of the advanced manufacturing institutes. UMASS Lowell has been a big recipient [...] One of the biggest investments made in the last few years was \$13 million to the Berkshires Innovation Center, we are pretty active trying to foster rural manufacturing and life sciences growth. ”*

*—Economic Development,  
State Government*

place for R&D startups to move through the entire life cycle and become iconic companies in the life sciences industry. Commercial and manufacturing capabilities in the state have improved and further growth should accrue if that trajectory is maintained. In order to achieve this vision and to continue building on the existing progress of the state, further support of the strategic growth of the mini-clusters around the state in terms of real estate and infrastructure development, funding, key talent, and diversity of skills will be crucial.

### **Opportunity 4 *Continue to Support Expansion of the Cluster and Creation of Mini-clusters Beyond the Cambridge/Boston Core***

As Massachusetts’ ecosystem continues to expand and the Cambridge/Boston area continues to saturate, growth will come from mini-clusters in other parts of the state.

**Figure 11: Densification of Bio-Medical Activities and Creation of Mini-Clusters**



Source: Massachusetts Biomedical Initiatives

The increase in the number of life sciences companies in the cluster, especially the growth of virtual companies, indicates the physical ecosystem must expand to accommodate further progress. The COVID-19 pandemic may have lasting impact on the future of work as more and more companies leverage virtual and remote collaboration tools to enable flexible work arrangements. This would alleviate some of the office space constraints in the Cambridge/Boston core and traffic in and out of the city. However, lab space in the core will still be in high demand as virtualization of pharma R&D is years from being the norm. The value of being in the Cambridge/Boston core is the congregation and clustering of R&D expertise, and that will remain a major strength, but it is likely that the growing mini-clusters will specialize in specific technologies or capabilities, such as biomanufacturing.

The goal is for Massachusetts to become a vibrant life sciences ecosystem with geographic specialization and a level of connectivity that provides a seamless network of talented individuals and innovative companies. State and local economic development support for the expansion of the mini-clusters that are outside of the Cambridge/Boston cluster will be crucial to drive growth and ensure companies are established in Massachusetts. World-class universities, such as UMass, Worcester Polytechnic Institute, and Amherst College, also provide a supply of talent that could be employed locally.

Effective transportation strategies and a resilient infrastructure will connect the different clusters and continue to reinforce knowledge absorption from the core Cambridge/Boston cluster regardless of geographical location and should

make the creation and reinforcement of strong communities of practitioners around specific professions easier to achieve. With a strong academic network across the state, world-class talent, the proximity to Cambridge/Boston, and the presence of incubators, the growth of mini-clusters is likely to be a significant source of expansion for the life sciences ecosystem in the state.

*“ There are big opportunities beyond the state’s biotech core, which are becoming increasingly popular among companies that are looking to save money, while retaining quality and access. The 495/MetroWest Corridor, a cluster of 22 communities west of Boston, offers an existing ecosystem of big and small biotech players that is similar to the one found in Boston and Cambridge, but that allows them to pay up to three times less for the same quality of commercial property. ”*

*—Meredith Harris, Executive Director Marlborough Economic Development Corporation*

# The Road Ahead: Key Strategies to Achieve Growth Opportunities



**S**etting Massachusetts on a path to realizing those opportunities will require cross-industry collaboration and the development of a new approach to economic development. This prompts MassBio to adopt a new, bold vision, strategies that cut across multiple opportunities, and renew its role and commitment to facilitating the growth of the industry and the economic development of the state.

As healthcare innovation continues to advance across several different clinical and therapeutic areas and with the patient being in the center of our healthcare system, several strategies should be considered to improve the cluster's current positioning to enable sustainable growth.

## MassBio's 2025 Vision Statement

*“MassBio represents the premier global life sciences and healthcare hub, with members dedicated to preventing, treating, and curing diseases through transformative science and technology that brings value and hope to patients.”*



### National Policy and Community Leader

MassBio serves as a strong policy advocate for the life sciences industry by speaking up for issues such as pricing and access. The organization also leads the community by bringing stakeholders from the value chain together to speed up drug development and commercialization.

Future initiatives may include:

- Own the Narrative
- Stakeholder Collaboration on Pricing



### Convene, Connect, and Catalyze

MassBio will continue to convene, connect, and catalyze a variety of in-kind and financial resources and services to support talented entrepreneurs and small businesses to start and scale their companies.

Future initiatives may include:

- Alternative Investor Network
- MassCONNECT Fund
- MassBio Edge / Edge Benefits Program



### Industry Accelerator and Connector

MassBio will organize ecosystem stakeholders to facilitate dialogue and exchanges and provide opportunities to leverage MassBio resources and network to spur innovation and promote businesses.

Future initiatives may include:

- Data Commons
- Partnering/Provider Days



### Economic Development Advocate

MassBio will continue its role as an advocate for the economic development of the state by accelerating manufacturing capabilities and ensuring the voice of the industry is represented on key efforts to improve the transportation and housing situation in Massachusetts.

Future initiatives may include:

- Transportation Policies: Road, Air, Rail
- Affordable Workforce Housing Policies



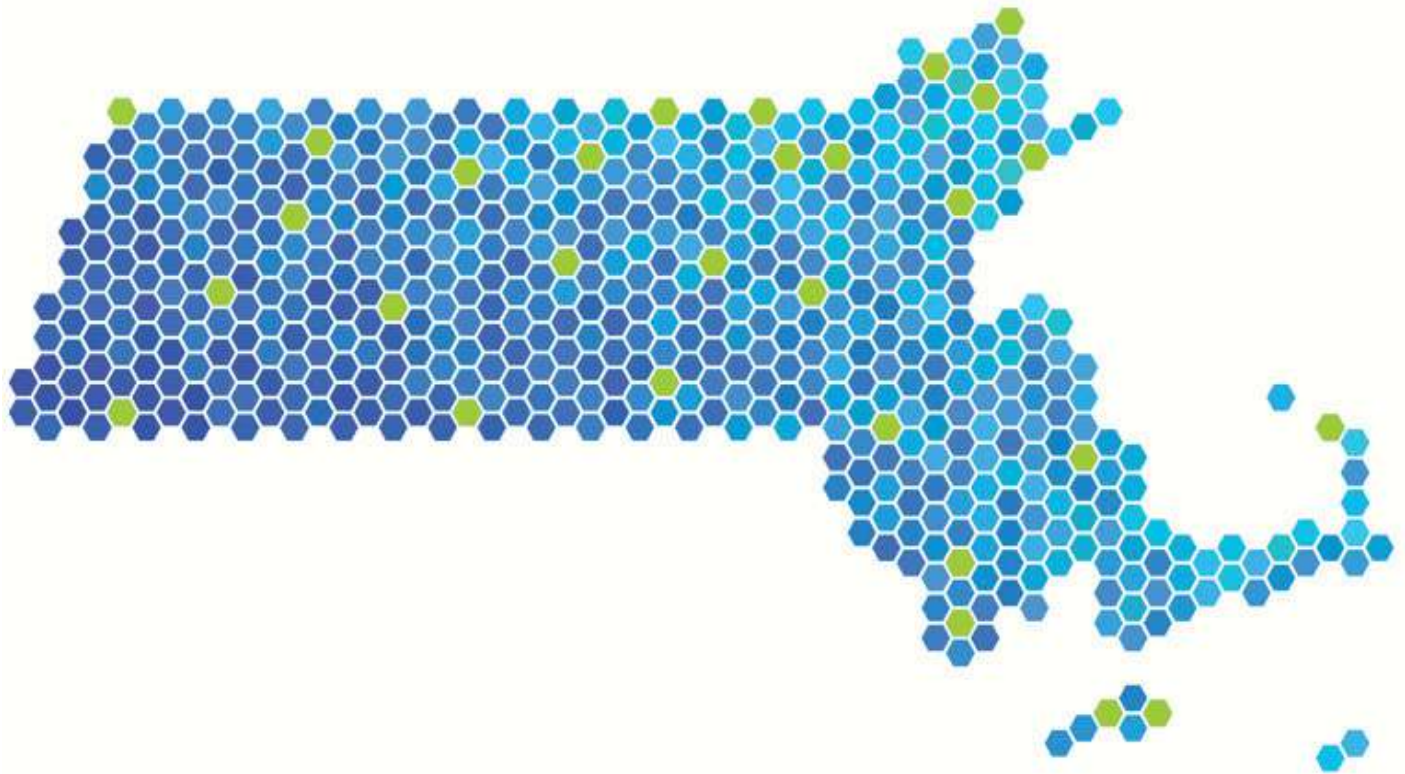
### Workforce and Education Champion

MassBio, together with MassBioEd, will continue to champion education, workforce development, and diversity to drive the supply of quality talent for the industry.

Future initiatives may include:

- Scientific Development
- Workforce Diversity

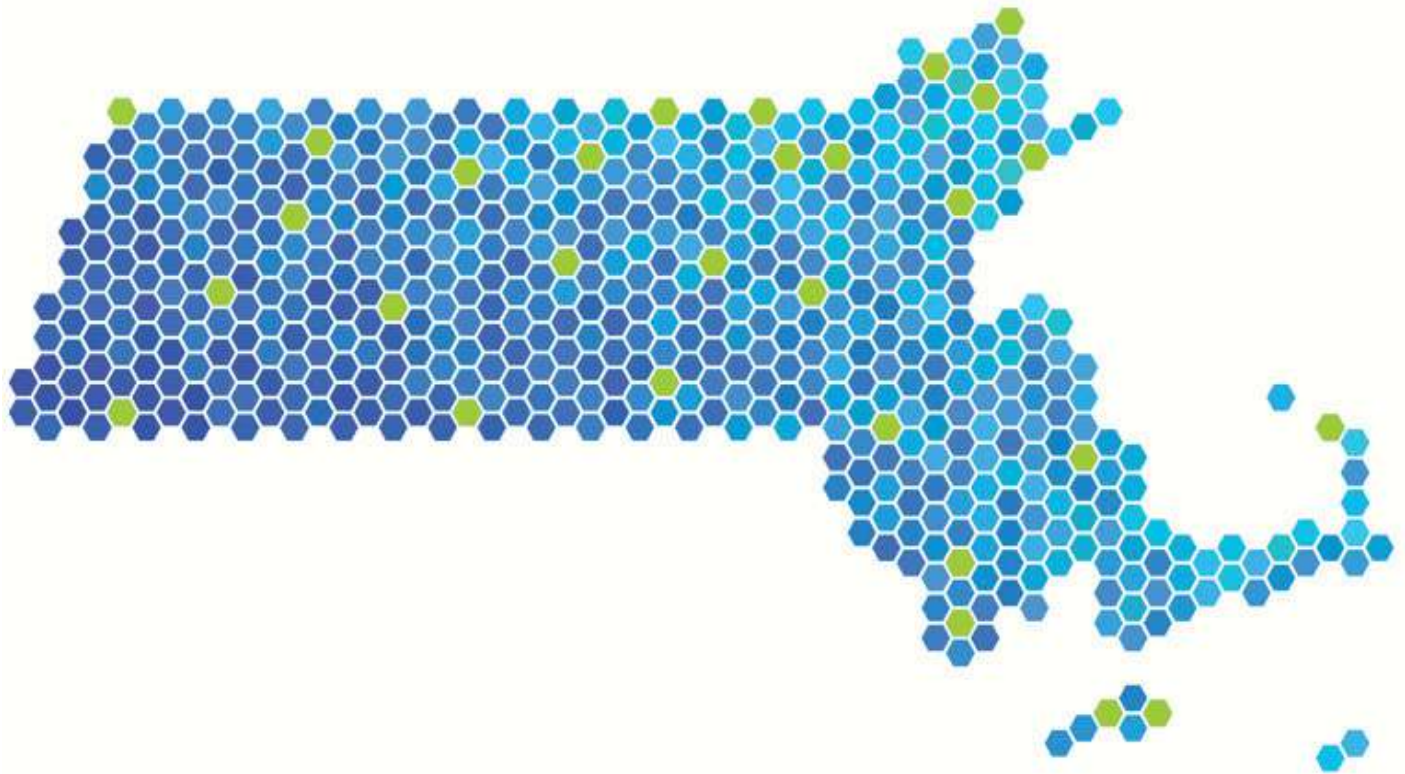




## Strategy 1

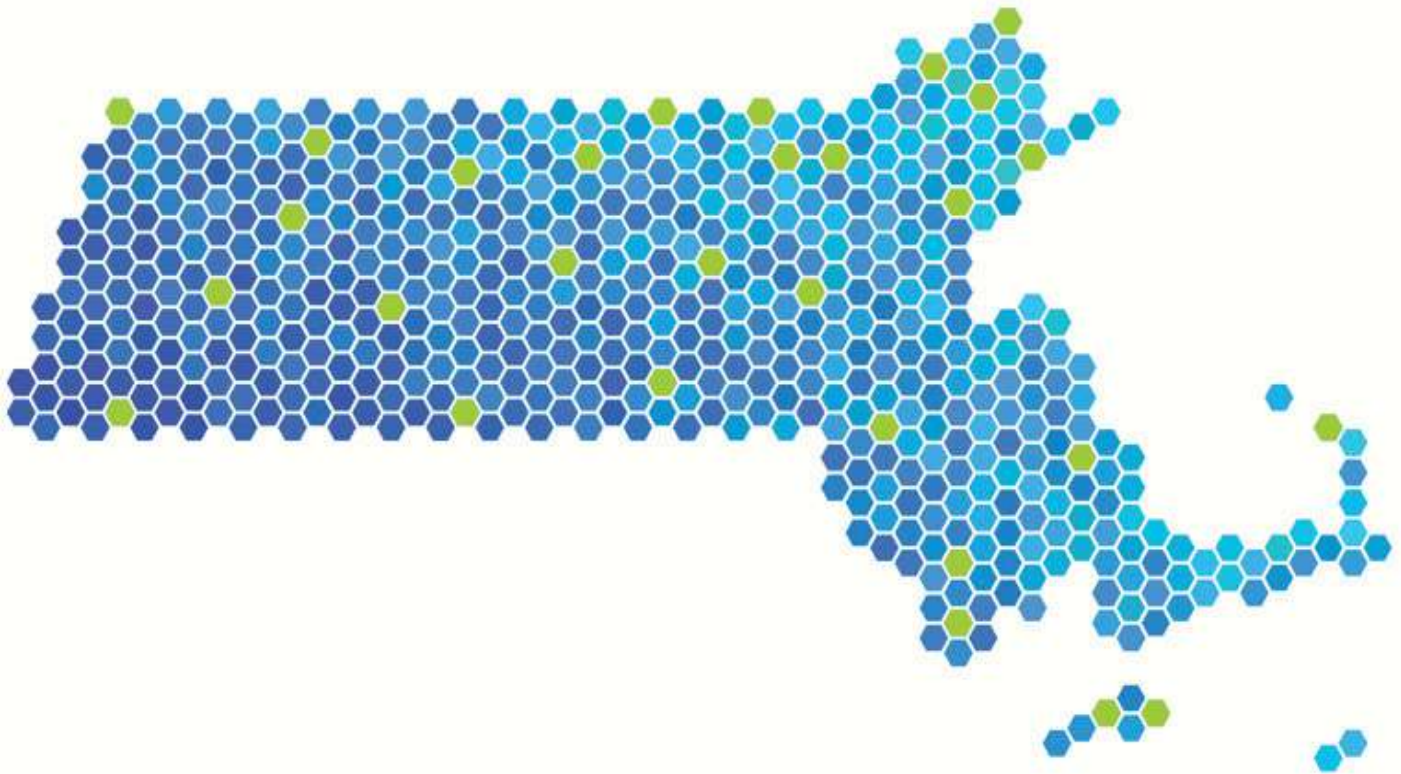
Mission	Elements of the Mission Strategy
<p>A vibrant and sustainable biopharma cluster will need to build and maintain a positive relationship with key constituents in Massachusetts. This will require a forum for open dialogue across healthcare stakeholders to address critical societal issues, such as pricing, access, and reimbursement challenges, and reframing of public narrative.</p>	<ul style="list-style-type: none"> <li>■ Increased understanding of the value of the industry to the citizens and the state of Massachusetts</li> <li>■ Enable the continuous growth and expansion of R&amp;D into more curative therapies and commercialization pathways</li> <li>■ Grow relationships with providers and payers in the state, or near the state, focused on the Massachusetts innovation story, patient access, and reimbursement</li> </ul>
Role for MassBio: Policy & Community Leader	Example of MassBio Tactics:
<p>MassBio serves as a strong policy advocate for the life sciences industry by speaking up on issues such as value and access. The organization leads the community by bringing stakeholders together to discuss how to modernize R&amp;D and ensure patient access to new therapies.</p>	<ul style="list-style-type: none"> <li>■ <b>Own the Narrative:</b> Create narrative to convey the value of biopharma innovation to Massachusetts and beyond</li> <li>■ <b>Stakeholder Collaboration on Value and Access:</b> Continue to drive cross-industry dialogue around access to innovative therapies and create a framework for valuation and cost sharing</li> <li>■ <b>Accelerate the growth of R&amp;D:</b> Advocate with state government to further incentives related to the development of the bio-economy</li> </ul>





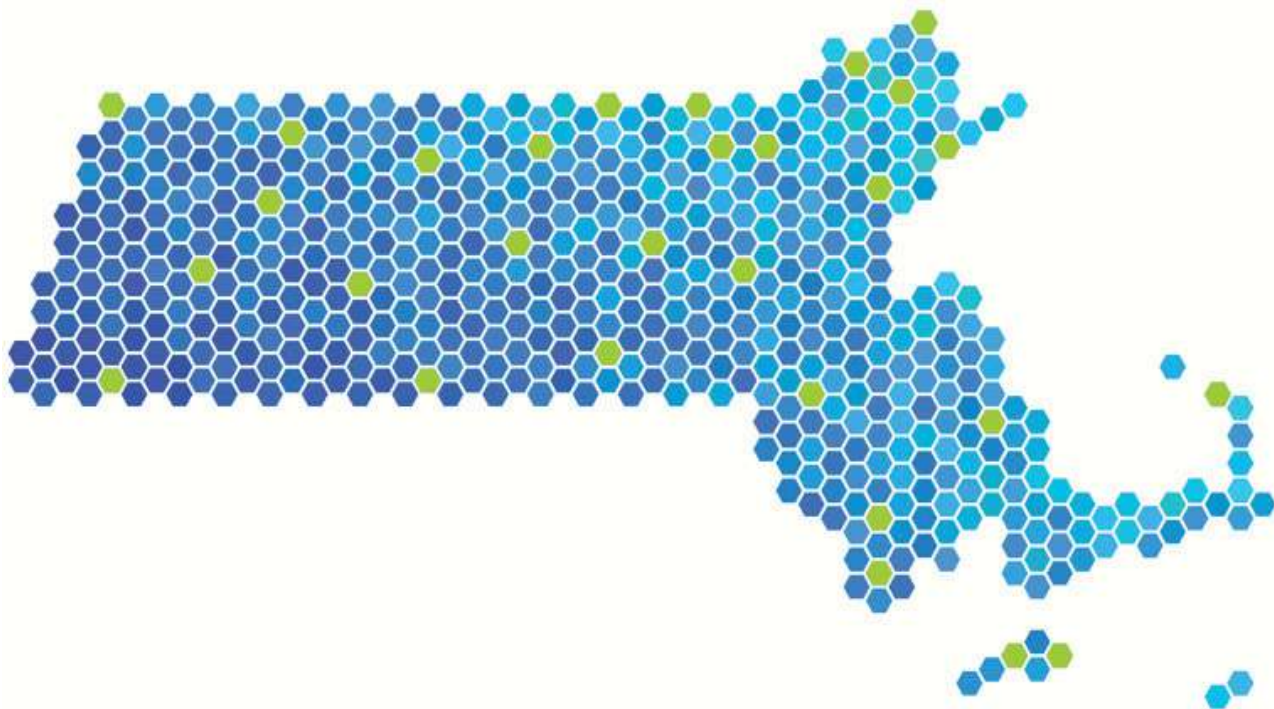
## Strategy 2

Funding	Elements of the Funding Strategy
<p>The vision for the cluster is to have entrepreneurs with transformative ideas that have societal benefits able to secure funding at critical stages to scale their company.</p>	<ul style="list-style-type: none"> <li>■ Support a broad range of early stage R&amp;D and innovative companies</li> <li>■ Reinforce the narrative of innovation and how it benefits society</li> <li>■ Increase funding opportunities and support for companies that are crossing the boundaries of life sciences and technology to achieve convergence</li> </ul>
Key Role for Massbio: Innovation Catalyst	Example of MassBio Tactics:
<p>MassBio will continue to convene, connect, and catalyze a variety of funding avenues and services to support talented entrepreneurs and small businesses to start and scale their companies, such as the MassBio <i>Edge</i> purchasing consortium.</p>	<ul style="list-style-type: none"> <li>■ <b>Alternative Investment Networking:</b> Early stage companies to network and pitch alternative investors</li> <li>■ <b>Consider MassCONNECT Fund:</b> Create a fund, separate from MassBio, to support early stage capital raising for MassCONNECT graduate companies</li> </ul>



### Strategy 3

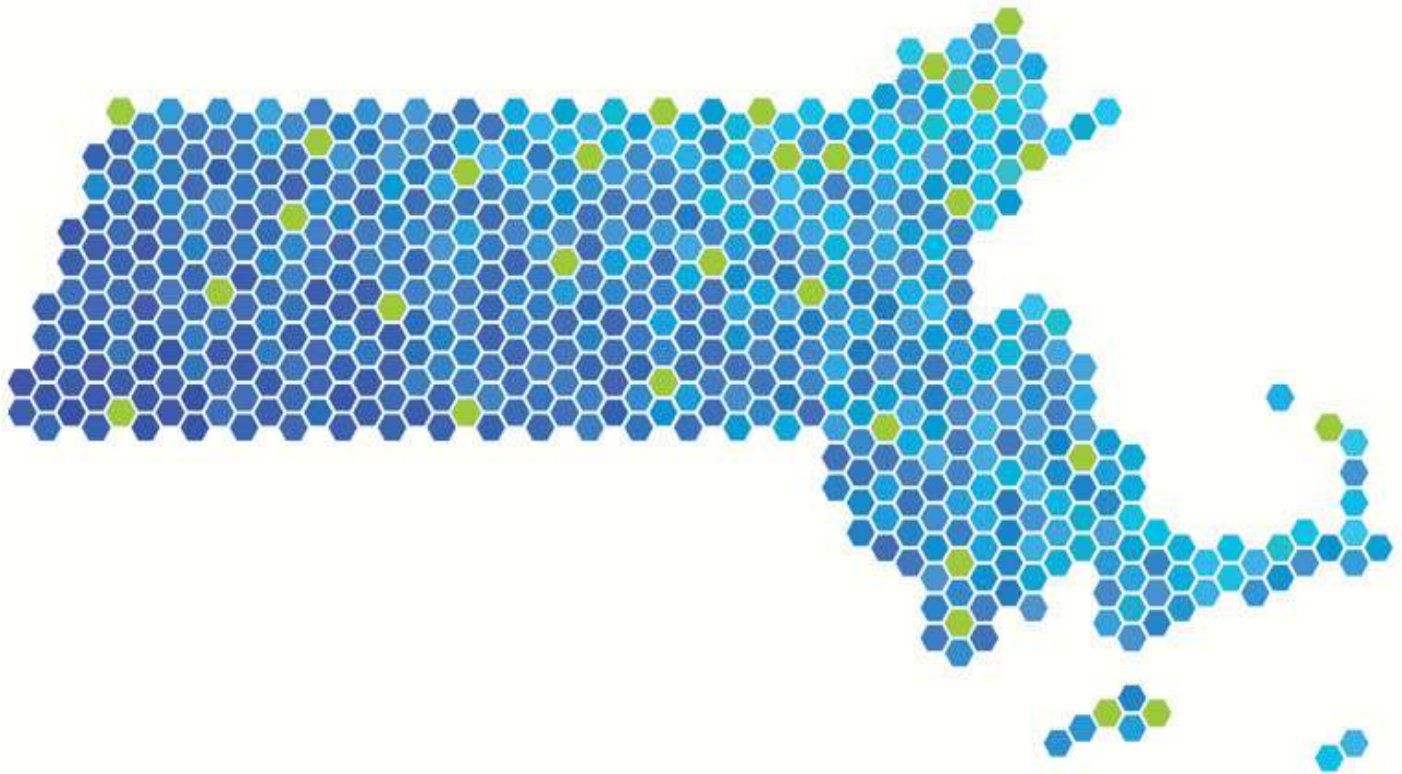
Community	Elements of the Innovation Strategy
<p>At the heart of the ecosystem is a commitment to supporting innovation and ensuring that the environment allows for the creation and development of innovative companies. This includes investing in the development of programs to support early stage innovation, supporting the industry in participating in the state’s data commons, and building community of talent beyond biology.</p>	<ul style="list-style-type: none"> <li>■ Maintenance of a rich life sciences ecosystem to include R&amp;D, commercialization, and manufacturing capabilities</li> <li>■ Development of a technology-oriented community to enable the convergence of biotech, medtech, and digital companies</li> </ul>
Key Role for Massbio: Industry Connector	Example of MassBio Tactics:
<p>MassBio will organize ecosystem stakeholders to facilitate dialogue and exchanges and provide opportunities to leverage MassBio resources and network to spur innovation and grow businesses.</p>	<ul style="list-style-type: none"> <li>■ <b>Partnering/Provider Days:</b> Continue to expand Pharma Days<sup>®</sup> to providers and other stakeholders in the ecosystem</li> <li>■ <b>Data Commons:</b> Create a “sandbox” for a distributed healthcare data framework</li> </ul>



## Strategy 4

Infrastructure	Elements of the Infrastructure Strategy
<p>The vision for the cluster is to have an efficient and resilient infrastructure foundation for the life sciences industry and its people.</p>	<ul style="list-style-type: none"> <li>■ Support the western expansion and development of mini-clusters, especially around precision manufacturing capabilities and facilities</li> <li>■ Advocate for increased resiliency of the transportation system and connect the core Cambridge/Boston R&amp;D hub with commercial and manufacturing hubs across the state</li> <li>■ Retain mid-career professionals with families in the cluster</li> <li>■ Improve retention of talent by supporting the development of a modern and sustainable city</li> </ul>
Key Role for Massbio: Economic Development Advocate	Example of MassBio Tactics:
<p>MassBio will continue its role as a positive voice in the economic development of the state by ensuring the voice of the industry is represented on key efforts to improve manufacturing, transportation, and housing issues in the state.</p>	<ul style="list-style-type: none"> <li>■ <b>Transportation:</b> Continue to work with other industry associations and stakeholders to advocate for effective/future-proof transportation policies</li> <li>■ <b>Affordable Workforce Housing:</b> Advocate for state-wide housing policy that promotes high density and affordable workforce housing near public transportation</li> <li>■ <b>Advanced Manufacturing:</b> Advocate for the development of advanced manufacturing footprint in the state of Massachusetts</li> </ul>





## Strategy 5

Talent	Elements of the Talent Strategy
<p>The vision for the cluster is to have a high-quality, diverse, and versatile talent pool that will provide Massachusetts with the necessary resources to advance the next generation of therapeutic R&amp;D.</p>	<ul style="list-style-type: none"> <li>■ Ensure the supply for in-demand scientific and digital talent to grow R&amp;D capabilities and the convergence of biology, algorithm, and digital technologies</li> <li>■ Increase the supply of talent from non-traditional talent pools to increase commercial, marketing, and manufacturing know-how and capacity within the State</li> <li>■ Drive life sciences career awareness</li> </ul>
Key Role for Massbio: Workforce Development and Education Champion	Example of MassBio and MassBioEd Tactics:
<p>MassBio together with MassBioEd will continue to champion education and workforce development and diversity to drive the supply of quality talent for the industry.</p>	<ul style="list-style-type: none"> <li>■ <b>Professional Development:</b> Ensure the supply of required scientific talent through partnership with academia and MassBioEd</li> <li>■ <b>Diversity of Life Sciences Workforce:</b> Promote diversity of talent across the industry by helping life sciences companies implement pro-active, goals driven equity, diversity, and inclusion policies</li> </ul>





# Conclusion

**T**he State of Possible 2025 Report is the culmination of eight months of research, stakeholder engagement through interviews, group discussions, and virtual panels, and hypotheses testing with a wide range of executives from the life sciences and healthcare industry including CEOs, scientists, venture capitalists, academics, clinicians, and government officials.

Based on the findings, the life sciences industry in Massachusetts is the most successful in the nation and worldwide; however, several disruptions and dynamics of the ecosystem may impact its ability to continue the impressive growth trajectory. This is not fearmongering—the expanding challenges that the industry faces pose very real questions about the future of the industry and suggest that Massachusetts is at a crossroads. The competition from other clusters, the changes in R&D, and other industry disruptions will fundamentally influence the shape of the cluster. Beyond that, constrained infrastructure and the shortage of supply of key talent and funding are some of the issues that are pushing

many startups to consider alternate locations outside of Massachusetts.

Addressing these challenges will provide the state with a balanced growth platform for the industry—Massachusetts will build on the ecosystems core strength in R&D and further develop capabilities across the value chain, convergence, and in geographies beyond the cluster’s core. The industry is at the forefront of the response to the COVID-19 pandemic and has an opportunity to demonstrate its value to health, the economy, and its commitment to serve the public. In responding to opportunities for change, MassBio will continue to be the industry’s first and greatest advocate, but it can’t be the only one. None of the solutions to the challenges identified can be solved by this organization alone. Rather, this report is a call to action to catalyze changes needed to drive the prosperity of the Commonwealth to new heights. This report is therefore the start of a set of strategic economic development, policy, public, and industry dialogues from which solutions will be developed and implemented.

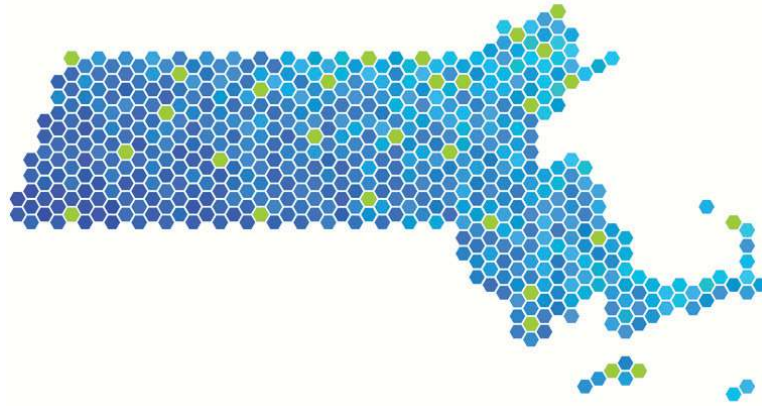
# MassBio 2025 Strategy Effort

**A**s we set out on the journey to develop this report, the MassBio Board of Directors asked the following question: What is the future direction of the Massachusetts life sciences ecosystem and how can MassBio catalyze the transformation to ensure Massachusetts stays ahead of the curve on scientific innovation that improve patient lives?

In order to address this overarching question, we've engaged with a wide range of executives and experts from the life sciences industry including CEOs, scientists, venture capitalists, academics, clinicians, consultants, and government stakeholders. We want to use this opportunity to thank everyone who contributed and supported this effort.

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