

**CONNECTICUT BIOSICENCE  
STRATEGIC PLAN  
EXECUTIVE SUMMARY  
(H.B. NO 5275)  
VERSION 1.0**

**Prepared by Connecticut Innovations  
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## Connecticut Bioscience Executive Summary

Connecticut (CT) has a history of success in the bioscience and healthcare-related industries with its leading pharmaceutical, medical device, healthcare, insurance and genomics companies. In addition, the state has the advantage of top-tier academic institutions conducting ground-breaking research and fostering technology commercialization. From developing UConn Health and the Connecticut Biosciences Innovation Fund (CBIF), to the recruitment of Jackson Laboratory and Yale University's development of the \$25M Blavatnik Fund, the state now has many of the innovation layers needed to ensure it is well-positioned for future growth.

- CT's bioscience sector currently employs nearly 39,000 workers in over 2,500 companies.
- Every new job in the industry results in an additional 3.9 jobs created
- CT ranks 4th in the nation for bioscience patents per 1,000 people.
- 54% of all venture capital invested in state is in bioscience
- 80% of all CT academic R&D investments are in bioscience
- CT ranks as the nation's 5th most innovative state.
- CT has a highly educated workforce, ranking 3rd in adult population with advanced degrees.
- CT ranks 6<sup>th</sup> in the US for the number of scientists and engineers in the workforce per capita

While we start from a position of some strength, there is much work to be done to develop the bioscience sector and compete effectively with our neighboring states. New York (NY) and Massachusetts (MA) have grown their biosciences ecosystem far faster than CT over the last decade. For CT to capitalize on this high growth/high paying sector we encourage the State to think differently and enact more pro-business policies, tax regimes and investments. We need to recruit more companies, support the startups, develop the infrastructure, change tax regimes and create more jobs.

### Connecticut Bioscience Ecosystem

There are various stakeholders from both the public and private sectors that are a key component of the bioscience ecosystem driving the bioscience economy. BioCT is the dedicated advocacy and engagement group that facilitates many of the sector initiatives. Academic institutions and non-profit institutions such as Yale University, UConn and The Jackson Laboratory for Genomic Medicine are leading cutting-edge research.

While CT lost Bristol Myers Squibb (BMS) and Bayer over the last decade, large pharma companies continue to have a significant footprint contributing to the local economy. These companies reduced the size of their workforce over the last decade as they went through their industry cycles of growth and shrinkage. Boehringer Ingelheim and Pfizer are committed to staying in CT and are supportive to the industry and workforce.



The state also has a strong small-to midsize businesses in the industry with both private and public companies.



In the last decade, several initiatives were undertaken to build upon the state’s capabilities and attract entrepreneurs and capital. Funding included state support to enhance the UConn Health Center, The Jackson Laboratory’s expansion into CT, and the establishment of CBIF — all focused on closing the gap created by the loss of jobs in the large pharma sector (e.g. Bayer, Pfizer and BMS) and by the 2008 recession. More recently, many of those initiatives seeded successes including:

- A growing UConn **Technology Incubation Program** with quality lab space for over 40 startups
- The **Jackson Laboratory** for Genomic Medicine facility’s multiple collaborations with UConn and Connecticut Children’s Medical Center
- Addition of **BioCT’s CURE Innovation Commons**, a bioscience incubator utilizing ex-Pfizer space
- The **Blavatnik Fund** which provides \$25M in private dollars to Yale University for grants to foster more technology commercialization activities for licensing and startup opportunities
- **CBIF** provides \$204M allocated by the state to invest in startups and key academic/state initiatives
- A **growing small to midsize biopharma** sector with 2 major NASDAQ IPOs in last 18 months with Arvinas and Biohaven Pharmaceuticals
- **Sema4**, a Mount Sinai predictive health diagnostics company, moved its headquarters to Stamford with 400+ employees in Branford and Stamford

### Economic Development Support

In addition, various organizations have provided additional critical business and economic development support, such as:

- Financial: Equity, loan, grant, and advisory support programs through various entities
- Tax Incentives: R&D tax credits and Angel investor tax credit program

### Opportunities to Further Leverage CT’s Bioscience Ecosystem

#### Key Strengths to Leverage

- Top-tier academic institutions with technology commercialization potential
- Strong bioscience and healthcare talent pool from pharma, insurance and serial entrepreneurs
- High quality of life and attractive location near NY, Boston, MA, New Jersey and Philadelphia
- High risk very early stage capital from CBIF
- Healthcare insurance companies such as Aetna, Anthem, United Healthcare and Cigna as part of the bioscience ecosystem. Presence of biotech, healthcare and insurance creates unique innovation ecosystem.

#### Opportunities to become more competitive:

- Infrastructure
  - Quality, affordable lab space for small to medium size cos.
  - Create spaces where people want to work
  - Offer 100% personal income tax remittance to new employees from the 5th to 75<sup>th</sup> FTE
  - Remove the capital base tax
- Transportation – Easy access, commutable
  - Light rail/more commuter rail options
  - Need to connect Philadelphia, New Jersey, New York City, New Haven and Boston
- People – attract and retain the current and the next generation of talent and high paying jobs.
- Funding – attract new private capital for early stage venture opportunities

## Formulating a CT Bioscience 10-Year Strategic Plan (2019-2028)

While much has been accomplished to stimulate CT's bioscience ecosystem, it is imperative we support a strategic plan for the next decade to leverage our successes, learn from our setbacks, and drive CT forward as a leading bioscience and healthcare hub. Objectives will require both short and long-term planning goals focused on infrastructure, investment, workforce talent, business climate and education. Key themes are highlighted below:

### Marketing & Branding

- Launch marketing campaign to combat negative CT perceptions and focus on CT strengths
- CI and BioCT to co-manage the hiring of an agency to create a marketing plan, social media campaign, PR and a dedicated website to promote CT as a bioscience hub. Funding provided by CBIF
- Identify core competencies (genomics, microbiome, pharma development, diagnostics, med devices, insure tech, AI)

### Attracting Investment Capital

- Continue CBIF's seeding early stage companies to attract talent and capital; attract additional venture funds to invest in CT via CI's Fund of Funds program; promote angel tax and VC life sciences tax credit
- Cultivate partnerships with local, regional VCs/angels/family offices/biotech/Pharma for capital, networking, recruitment
- Leverage more private capital and public/private partnerships for infrastructure, seed funding, and a more independent, self-sustaining ecosystem

### Workforce Development

- Continue/expand funding for internships, work-study programs for pre-grads, postdocs to train and retain talent; develop curriculums for all levels of workforce
- Continue/expand future talent development by partnering with K12 schools for STEM/company collaborations
- Increase the number of employees by 25%

### Business Development/Recruitment

- Expand outreach to emerging foreign biopharma companies with market caps > \$1B who would benefit from a US presence
- Develop a plan and a budget for a "Roosevelt Island" RFP to attract another major academic research institution to CT, or to build on the strengths of the leaders we have
- Promote University-Industry Collaborations with existing stakeholders in innovation places to attract new companies, partnerships, talent
- Offer personal and business tax incentives, student loan forgiveness
- Increase by 25% the number of companies

### Infrastructure Improvements

- Identify and develop space for lab and offices for companies' expansion; co-existence of established companies with start-ups facilitates success by scale (similar to Boston which is attractive for talent, as it offers multiple job opportunities)
- Continue adding infrastructure improvements including modern transportation
- Investing in vibrant cities (parking, streetscapes, arts to build & attract community)

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Key contributors providing input for this summary included representatives from: Department of Economic and Community Development; Connecticut Innovations; BioCT; Biohaven; Rallybio; Aetna; Pfizer; Boehringer Ingelheim; Sema4; The Jackson Laboratory; University of Connecticut; University of Connecticut Health Center; Yale University; Elm Street Ventures; Achillion Pharmaceuticals; Diameter Health; Trevi Pharmaceuticals; Medtronic; Canaan Partners; Southern Connecticut State University; and the Connecticut Technology Council.

## **Appendix**

### **1. SWOT Survey and Analysis – Bioscience subgroup of Key Contributors above**

## State of CT Bioscience SWOT Analysis, August 2018

<p style="text-align: center;"><b><u>Strengths</u></b></p> <ul style="list-style-type: none"> <li>• Quality of life, smaller, more livable state, greater access</li> <li>• Academic excellence (Yale, UConn), supply of talent</li> <li>• Research excellence (Jackson Laboratory), supply of talent</li> <li>• Workforce, talent</li> <li>• Insurance/Payor expertise</li> <li>• Strong schools K -12</li> <li>• Bioscience Investment Fund (\$200M)</li> <li>• Location</li> <li>• Lower cost relative to big urban areas/ CA, NY, MA</li> <li>• Tax credits/incentives</li> <li>• Support for startups</li> <li>• Strong state investments in education/incentives</li> </ul>	<p style="text-align: center;"><b><u>Weaknesses</u></b></p> <ul style="list-style-type: none"> <li>• State does not have a great reputation (perception of no talent, fiscal issues, no ecosystem)</li> <li>• Do not market ourselves effectively/lack of brand</li> <li>• Do not keep all college students (% lower than peers)</li> <li>• Transportation infrastructure</li> <li>• More support for startups/lab space</li> <li>• Lack of c-suite talent</li> <li>• Aging workforce</li> <li>• No 'critical mass in bioscience'/ecosystem</li> <li>• Lack of engagement with large players (future leader companies)</li> <li>• Lack of VC firms (lack of high quality deal flow, discount due to location)</li> <li>• Lack large urban center(s)</li> <li>• Lack alignment w/ key players around the state</li> <li>• Cost of living/taxes</li> </ul>
<p style="text-align: center;"><b><u>Opportunities</u></b></p> <ul style="list-style-type: none"> <li>• Leverage federal delegation/representation</li> <li>• Improve supply chain</li> <li>• Collaboration w/ payors</li> <li>• Collaboration w/ manufacturers</li> <li>• Collaboration among academic institutions</li> <li>• Keep state support \$\$ strong</li> <li>• Make our urban areas 'cool'</li> <li>• Market ourselves better</li> <li>• Create an ecosystem that's perceived to have 'scale'</li> <li>• Keep investing in workforce/broaden tech talent</li> <li>• Leverage tech to grow ecosystem</li> <li>• Recruit new, fast growing companies (global, thru academic research)</li> <li>• Create a new brand</li> <li>• Clarify our strengths (precision medicine, genomics, microbiome)</li> </ul>	<p style="text-align: center;"><b><u>Threats</u></b></p> <ul style="list-style-type: none"> <li>• Technology skills needed for future (bioinformatics, etc.)</li> <li>• Aging out of key people (experienced management)</li> <li>• Governing uncertainty (lack of patience/legislators/new governor)</li> <li>• Rhode Island</li> <li>• Do nothing strategy</li> <li>• Transportation</li> <li>• Shrinking biopharma (ongoing)</li> <li>• Business uncertainty</li> </ul>

## I. Strategic Plan

As a result of the analysis of the survey, the committee developed (5) key imperatives that the state’s bioscience strategic plan should focus upon:

- A. **WORKFORCE AND TALENT:** Identify and secure resources for internships and partnering with academic institutions to create programs that produce targeted workforce and retaining talent.
- B. **LOCATION:** Identify and develop plan to build a cluster, hub or corridor in the state
- C. **BRAND:** Create strategy and marketing plan that aligns with the final strategic plan.
- D. **RECRUITMENT:** Create global strategy to attract medium/large companies and talent
- E. **STARTUP SUPPORT:** Establish resources/programs that will provide assistance to startups from idea to incubator to graduation to commercialization.

Subcommittees were formed to identify the key issues in each focus area and develop recommendations to be incorporated into the strategic plan. Each section below provides the output of each subcommittee that define the current situation and provide proposed recommendation(s) for each imperative.

### A. Workforce and Talent

#### i. Background

While, the state has been a positive trends in the output of degree-level talent in the STEM fields and a strong talent pool from the various entities in the state as highlighted previously, there is much more work to be done to build the workforce of the future to continue developing the skillsets required and attracting talent to participate in the CT workforce in the bioscience sector. It is anticipated that by enacting the plan below along with business development activities in recruiting companies to the state, the sector will increase the number of employees by 75%. Key elements of the action plan are highlighted in the table below.

#### ii. Proposed Action Steps

Problem	What must be achieved	Idea	Action Steps	Resources and costs	Accountable/ Next Committee Steps
1. Ensuring that CT colleges and universities graduate enough students with the skills needed in industry	Produce more STEM graduates with the relevant applied STEM skills needed for the BioScience Workforce:  a. Increase % of STEM graduates with bioscience relevant skills by 10% in 5 years.	<b>1.1:</b> Implement internship and experiential learning programs (at all levels associates, bachelors, masters, doctorate and post-doc; for all CT academic institutions; public and private).	<b>1.1a:</b> Leverage existing programs to develop pilot program for CT state colleges & univ. (CI Talent Bridge, BioPath, UCONN PIE)  <b>1.1b:</b> Program implementation across CT institutions. Use results from 1.1a to motivate broader adoption across all CT colleges and universities (public and private).  <b>1.1c:</b> Facilitate cohesion among programs via	<b>1.1a:</b> Student stipends (amount TBD depending on target for pilot)  Program costs (e.g., for associated professional/skills development; transportation, supplies.)  <b>1.1b:</b> Funding to establish	Outline collaborative pilot program that leverages BioPath/PIE/Talent Bridge. Develop longer term plan for Statewide adoption.  Consult with Massachusetts Life Sciences initiative to determine learn

	<p>b. Increase number of industry relevant programs (credit and non-credit by 10% in 5 years).</p> <p>c. Increase the availability of industry relevant instrumentation and facilities by 10% in 5 years.</p>	<p>Break down into skill level (&lt;BA, BA, &gt;BA, etc).</p> <p>Target population CT natives with focus on groups traditionally underrepresented in STEM.</p> <p>Include business component to prepare students for non-academic workforce.</p> <p>Develop and foster networking among program participants to reinforce community and increase retention.</p> <p><b><u>Metrics for success:</u></b>  <b>Short-term:</b>  Raw numbers of participants in the programs (including demographics)  Skill development-pre/post testing to assess if learning objectives are met, intended outcomes of skill development achieved</p> <p><b>Long-term:</b></p>	<p>required (for continued funding) participation of program directors and staff at regional biyearly and state-wide annual program conferences</p> <p><b>1.1d:</b> Develop a digital matrix or website accessible to all – heavily promoted as a single resource – and supported by phone-accessible staff – to enable coordination of programs, linked to internship-student – employer match matrix. Matrix should include tracking.</p>	<p>infrastructure (e.g., program manager/coordinators for Statewide implementation)</p> <p><b>1.1c:</b> Funding to establish a leadership group comprised of major regional program coordinators – with at least one staff member each.</p> <p><b>1.1d:</b> Funding to develop, promote and implement the matrix or website. (partner with BioCT – see 2.3)</p>	<p>about State funded internship programs and infrastructure.</p> <p><b><u>Committee members</u></b>  Christine Broadbridge (BioPath)  Caroline Dealy (UConn Health/UConnTIP/CTNext PIE)  Sarah Wojiski (JAX)  Lesley Mara (CT State Colleges and Universities (CSCU))  Amy Walsh (CI Talent Bridge)  Jennifer Widness (CT Conference Independent Colleges)</p>
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		Tracking of learner outcomes Where do students/trainees who participate in these programs end up? Are needs of employers met.			
		<p><b>1.2:</b> Non-credit programs</p> <p>Create non-credit, competency-based programs that can be completed in a modular fashion leading to a certificate.</p> <p>Disseminate learning in innovation, entrepreneurship and industry careers in CT broadly – not just to students / trainees enrolled in the programs but to other students also</p> <p><b>Metrics for Success:</b> <b>Short-term:</b> Raw numbers of participants in the programs (including demographics). Skill development-pre/post testing to assess if learning objectives are</p>	<p><b>1.2a:</b> Implement an educational clearinghouse (location for easy access) of existing programs (similar to that offered for the advanced manufacturing sector*).</p> <p><b>1.2b:</b> Conduct industry needs assessment survey to help prioritize content areas</p> <p>Conduct surveys of students at various levels (high school to post-doc) to determine areas where deficiencies</p> <p><b>1.2c:</b> Develop customized modules for different learner groups based upon their developmental stage.</p> <p>Identify student/trainee populations to pilot the program with and industry/academic partners to assist in content development</p> <p>Open as many aspects of programs that are developed to non-program attendees and participants to leverage effort towards broader dissemination</p> <p><b>1.2d:</b> Marketing, regular statewide and regional press coverage, visibility of the programs to the CT public</p>	<p><b>1.2a:</b> Grants to incent development</p> <p>Infrastructure needed to implement clearinghouse approach to advertising existing offerings</p> <p><b>1.2b:</b> Personnel for industry needs assessment and trainee/student surveys</p> <p><b>1.2c:</b> Will require instructional designer(s) and subject matter experts to develop content and online modules. Some topics may be best facilitated by in-person (ie. communication skills) so support for hosting and conducting live training programs will be needed.</p> <p>Beta testers for any modules</p>	<p>Conduct a survey of existing CE offerings.</p> <p>Review existing industry needs assessments (consider additional data collection)</p> <p><b>Committee members</b> Christine Broadbridge (BioPath) Caroline Dealy (UConn Health TIP/PIE) Sarah Wojiski (JAX) Lesley Mara (CSCU) Jennifer Widness (CT Conference Independent Colleges)</p>

		<p>met, intended outcomes of skill development achieved</p> <p><b>Long-term:</b> Tracking of learner outcomes Where do students/trainees who participate in these programs end up? Are needs of employers met</p>	(voters/taxpayers) – link to branding subcommittee	<p>that get developed.</p> <p>Foster private and industry philanthropy to help support programs</p>	
		<p><b>1.3:</b> Implement instrumentation and facility access programs that will provide access to industry relevant instrumentation for students at CT’s primarily undergraduate universities, colleges (public and private) and high schools.</p> <p><b>Metrics for Success:</b> <b>Short-term:</b> Raw numbers of students and faculty provided access. Skill development-pre/post testing to assess if learning</p>	<p><b>1.3a:</b> Leverage existing programs in other states (MA) to develop pilot program for CT colleges &amp; univ., comprehensive and technical high schools.</p> <p><b>1.3b:</b> Survey local and regional companies to determine whether instruments are available for repurpose</p> <p><b>1.3c:</b> Explore adoption of successful shared use facility models (e.g., CT State Colleges and Universities Center for Nanotechnology; UCONN IMS). Membership and fee for use components are integrated.</p> <p><b>1.3d:</b> Program implementation across CT institutions. Use results from 1.1a to motivate broader adoption.</p>	<p>Grants to CT colleges &amp; universities/high schools.</p> <p>Leverage State funding to obtain Federal grants.</p> <p>Consider instrument purchase costs as well as maintenance and support (e.g., service contracts and technical support).</p>	<p>Outline collaborative pilot program that leverages existing State infrastructure and grants programs.</p> <p>Develop longer term plan for Statewide adoption. Consult with Massachusetts Life Sciences initiative to learn about State funded internship programs and infrastructure.</p> <p><b>Committee members</b> Christine Broadbridge (BioPath) Caroline Dealy (UCONN TIP) Sarah Wojiski (JAX)</p>

		<p>objectives are met, intended outcomes of skill development achieved</p> <p><b>Long-term:</b> Tracking of learner outcomes Where do students/trainees who participate in these programs end up? Are needs of employers met.</p>			<p>Lesley Mara (CSCU) Jennifer Widness (CT Conference Independent Colleges)</p>
<p><b>2.</b> Improve the retention of college graduates (and recruit potential employees from other states)</p>	<p>Increase 32% retention rate of college grads to 45% (equivalent to MA) (will be hard to hit within a 5-year time frame)</p>	<p><b>2.1:</b> Create loan forgiveness program for new hires in STEM fields. Competitive application process open to new employees who graduated in the last five years.</p>	<p>Identify best practices in existing loan forgiveness programs for teachers, health professionals, and public service careers. Also examine Rhode Island's Wavemaker Fellowships and new program in Maine. Benefit must be large enough to induce decisions about location. Conduct as a three-year experiment, collecting baseline data and measuring outcomes. However, guarantee three years' of the benefit for every participant. Determine most efficient mechanism – refundable tax credit, direct cash payment; tax subsidy to employer.</p>	<p>Develop cost estimate/revenue estimate. Determine which agency will administer the program; develop plan to manage complexity of loan repayment policies of lenders.</p>	<p>Ask the President's Council, which is comprised of the presidents of all of the colleges and universities in Connecticut, to make a specific recommendation for a program and the agency which will have the lead. DECD or DRS is the most natural home; DECD should have the lead in advertising and marketing the benefit.</p>
		<p><b>2.2:</b> Programs to retain young entrepreneurs</p>	<p>Expand CI early stage fund and college business plan competitions that fund start-ups in CT</p>		<p>CT Innovations</p>

		<b>2.3:</b> Expanded recruiting network	<p>Leverage in-progress programs and programs in development via BioCT</p> <p>Link Statewide internship program with BioCT.</p> <p>Leverage resources and program development implemented for 1.1</p>		BioCT
		<b>2.4:</b> Tax incentives to companies and employees to pay relocation costs	<p>Refundable credit for relocation costs (similar to R&amp;D credit)</p> <p>Allow employees to deduct relocation costs (no longer deductible under new federal tax law)</p>	<p>Need estimated impact on tax revenue</p> <p>No loss from prior years as CT tracked federal code; will forgo tax revenue in future years. DRS should be able to tell the amount of this deduction in prior years.</p>	DECD to propose legislation
<b>3.</b> Support aspiring entrepreneurs and cultivate experienced C-level management.	Increased number and success rate of start-ups	<b>3.1:</b> Training programs for new CEOs	Continue ABCT program for new CEO's	Funded through grants and corporate sponsors	Assess program effectiveness CT Next, other potential entities.
		<b>3.2:</b> Internships and mentors for aspiring entrepreneurs and junior executives	<p>Implement clearinghouse approach to advertising existing offerings</p> <p>Implement innovation education and experiential commercialization/industry internships for bioscience and bioengineering PhDs, Masters, &amp; post-docs, and for undergraduate and</p>	Leverage programs in 1.1 to include MS, PhD, MD, DMD and RN trainees, postdocs and residents	Models underway include the PIE fellows program (CTNext) but more depth and focus on these

			<p>graduate clinical trainees MD, DMD, RN and residents</p> <p>Develop specific programs in Digital Health Innovation – as this is prime area for entrepreneurship by clinicians Programs proposed should include networking component Develop mentor hierarchy within programs such that program alumni / “seniors” help mentor new program trainees</p> <p>Develop standardized and accessible (web-based) mentor training so that mentors have basic skills and understanding, and mentees have realistic expectations</p>	See 1.1 and 1.2	specific groups is needed
		<b>3.3</b> Attract experienced CEO’s	<p>See 2.3 and 2.4 above</p> <p>Coordinate EIR programs currently at CI, university tech transfer offices and VC firms</p>		

## **B. Location**

### **i. Background**

Connecticut has a shortage of incubator and graduation space for startups. The strategy for growing the bioscience industry will require a combination of: a) growing locally created new ventures, b) strengthening established companies, c) encouraging private investment and c) recruiting companies to relocate to Connecticut, possibly from New York or overseas. Nearly all new ventures are located in close proximity to the State’s bioscience assets, including research universities and nonprofit research organizations; Connecticut’s research base is concentrated in New Haven and Greater Hartford.

In New Haven, Yale ranks 10th nationally in NIH funding and New Haven ranks 4th nationally in NIH funding per capita. Resources include Center for Genome Analysis, Center for Molecular Discovery, Comprehensive Cancer Center, Data Sciences initiative, high performance computing, large clinical resources (1,400 physicians in Yale Medicine, five hospitals in Yale New Haven Health). In the past decade, 130 companies based on Yale discoveries launched; in 2017, 11 new companies were created. Companies launched since 2003 raised \$1.4 billion.

In the Greater Hartford area, the University of Connecticut has a significant presence through its School of Medicine, Dental Medicine, Business and Law. The area also includes The Jackson Laboratory for Genomic Medicine, five community colleges, six private colleges, five teaching hospitals, and connectivity to the state's international airport. In addition, the region offers the UConn Technology Incubation Program (TIP) that provides 30,000 square feet of state of the art wet labs and office spaces. In 2017, the 37 companies at TIP raised \$60 million.

Today, established bioscience companies are more geographically dispersed. And while the State's bioscience strategic plan should leverage the "location" of the assets that are in place, the recommendations should ultimately be guided by the goal of maximizing (private sector) job creation over the long term.

With respect to recruiting new companies to the State, Connecticut does not have enough incubator space to support new companies based on inventions from colleges and universities. The incubator space at UConn's TIP, BioCT's Innovation Commons, Science Park, and 300 George Street in New Haven are all effectively full. The DISTRICT intends to construct 13,000 s.f. of incubator space but has not secured all of the financing for the project.

In November 2018, UConn surveyed 175 small and medium-sized bioscience companies in Connecticut encompassing medical devices, therapeutics, vaccines, digital health, research tools and contract services. Among the 56 companies that replied, 60% currently have wet lab space; half of the companies currently occupy less than 500 s.f. of space; 25% have over 2,500 s.f. of space. Sixty-two percent of companies anticipate a need for additional space; the majority of companies would prefer to expand in the Greater New Haven or Greater Hartford area. Eighty percent of companies responded that it is "likely" or "very likely" that they will be in Connecticut in five years. However, the top factor for those companies considering a move from Connecticut is workforce recruitment challenges.

While private capital will be the principal driver of industry growth, the state plays an important enabling role. State investment in translational research through the Bioscience Innovation Fund bridges the gap between National Institutes of Health and institutional funding and early stage, private investments. Similarly, public funding for incubator construction and operating costs is critical, because incubators do not typically generate a profit. In several states, a number of new incubators have been strategically positioned to exploit research advances from universities & nonprofit research organizations. Wexford Innovation Center in Providence, the Princeton Innovation Center Biolabs in Princeton, and the Pennovation Center in Philadelphia, were all subsidized by their respective states.

With limited resources for capital investment, the State will be required to allocate resources where they will have the greatest impact on private sector job creation. Investments that help leverage a robust talent pool and a creative, productive workforce, will help build critical mass. The bioscience sector can achieve "virtual" density through collaborations and information technology; the state can promote density by improving transportation networks; encouraging public/private collaborations and locating incubators, accelerators, and graduation space in close proximity to research institutions. Future state investment in incubator and graduation space should be organized to create maximum local tax benefits – all new space created with state subsidies to house for-profit companies should be taxable.

Finally, the Department of Economic and Community Development and Connecticut Innovations should continue to monitor the regulatory and business factors that influence whether small and established companies choose to remain in Connecticut. Colleges, universities, teaching hospitals, and non-profit research organizations should consider opportunities for collaboration with established pharmaceutical and device companies; such collaborations serve, among other purposes, to demonstrate the value of maintaining a substantial corporate presence in Connecticut.

**ii. Proposed Action Steps**

<u>Idea</u>	<u>What must be achieved</u>	<u>Proposed Action Steps</u>	<u>Who is responsible</u>
<b>1) Invest in Incubator and Graduation Space</b>	Ensure that there is enough incubator space to accommodate and retain startup companies launched around inventions and business ideas of faculty and students. Ensure that there is sufficient accelerator space (and programs) and graduation space for maturing companies.	Use the Manufacturing Assistance Act model to provide competitively allocated funding to facilitate public-private funding of incubators, accelerators, and graduation space near research institutions to accommodate the volume of new business opportunities being created in the cluster.	The Governor and General Assembly should ensure that funds are available. The Jackson Laboratory, UCONN, Yale University, and other colleges and universities, should define the pipeline of new ventures and the space needed to house and support the companies. Local coalitions of universities, research organizations, entrepreneurs, investors, and mayors should demonstrate the expected return on public investment as well as explain how any projects will help to establish the critical mass and innovative-intensive communities that will be competitive with Boston and New York.
<b>2) Promote University-Industry Collaboration</b>	Scientific collaboration to maximize impact on innovation and add to the value proposition for drug and device companies to remain in Connecticut.	The Jackson Laboratory, UCONN, and Yale University, together with the large pharmaceutical and device companies, should explore opportunities for scientific collaboration.	The Jackson Laboratory, UCONN, and Yale University, and other research-intensive institutions together with large pharmaceutical and device companies should consider additional opportunities for collaboration. The Governor and General Assembly should refrain from seeing

			collaboration as a trigger for taxation.
<b>3) Basic Infrastructure Investments</b>	30 minutes rail travel from Hartford to New Haven and 60 minutes from New Haven to New York.	The next Governor and General Assembly should move with a sense of urgency to find creative operational and engineering solutions, along with fresh approaches to financing, to make dramatic improvements to Metro-North in the next decade. The state should also maintain support for the New Haven-Hartford-Springfield line and ensure that it lives up to its promise as a high-speed rail line.	Governor and General Assembly, with active engagement and support of civic and business leaders.
<b>4) Immediate Workforce Needs of Small and Medium Sized Companies</b>	As workforce recruitment challenges were noted as the top factor among those companies indicating a potential move from Connecticut, it is imperative that any effort to provide a pipeline of STEM workers have employer input for development of near and long-term strategies.	Support the Workforce Committee to address near term needs companies through unique programs aimed at the immediate need to retain growing firms	Governor and General Assembly, with active engagement and support of industry leaders and Connecticut's the higher education community.

**C. Brand**

**i. Background**

There is too much negative press in CT in regard to the business climate. The bioscience sector does not have a unified message across the state. There is no centralized communication system so that all key elements in our ecosystem have a way to deliver commentary and information in a streamlined process.

**ii. Proposed Action Steps**



A creation of a marketing program that addresses above will require the hiring of a marketing team (a senior thought leader, and tactical person) who will be responsible for execution. CI and BioCT to co-manage the hiring of an agency and/or marketing team, through a Request for Proposal (RFP), to create a marketing and branding plan that includes a social media campaign, and a dedicated website to promote CT as a bioscience hub. Funding will be requested to CBIF to cover the costs. It is anticipated that the plan be reviewed on the progress on a quarterly basis with staggering 2-year terms. Key elements are highlighted below.

<u>Idea</u>	<u>What must be achieved</u>	<u>Proposed Action Steps</u>	<u>Who is responsible</u>
<b>Creation of a Marketing and Branding Plan</b>	1) Elevate CT visibility both inside and outside CT, especially to investors	1) Create a site that all press releases/news communications, company achievements, industry news can be sent to and disseminated; must include social media connections for relay of information such as, “what’s app” 2) Create an overarching branding theme on who, what and why CT? *Example: CT...The convergence of digital and precision/genomic healthcare	1) The governor needs to create an advisory board to manage the strategic plan and oversight of the marketing team 2) Hire of a marketing team or agency (a senior thought leader, and tactical person(s)) through an RFP who will be responsible for execution of the program

	<p>2) Establish best practices to disseminate information and educating the media on our industry</p>	<p>1) Establish positive friendly press relationships  - Identify key national journalists &amp; reporters to build a coverage pipeline  - Establish third party endorsers for press interviews  2) Build communication channels both within and outside of CT  3) Manage perception and be a spokesperson for the industry  - Main source for press and can help set up interviews with govt/academia/industry/BioCT= ONE VOICE  4) Creation of a bioscience sourcebook for the press</p>	<p>Strategic advisory board and/or CI/CTNext to oversee marketing agency or team</p>
	<p>3) Establishing a CT delegation to attend key investor conferences, regional bioscience summits &amp; conventions in a business development capacity.</p>	<p>1) Development of a 'CT bioscience road show' that can be used tactically with industry influencers, executives, innovators, etc.</p>	<p>Selected advisory board and/or CI/CTNext with input from marketing agency or team</p>
	<p>4) Explore affinities and programmatic relationships (i.e. <a href="https://masschallenge.org/programs-rhode-island">https://masschallenge.org/programs-rhode-island</a>) to align CT with industry-leading bioscience brands and resources in other locations.</p>	<p>1) Participate in global events, expand Venture Clash by adding a bioscience component to attract some growing small to midsize bioscience companies into CT.</p>	<p>1) Selected advisory board to review options with input from ecosystem entities and marketing agency or team  2) Utilize BioCT to be an aggregator of information for the state and industry</p>

D. Recruitment

**i. Background**

Large, established companies are the largest employers in the larger biotechnology hubs, not startups (80-90% of jobs in greater Boston are in big biopharma, not start-ups). The co-existence of established companies with startups have facilitated success by scale given their proximity, relationships, collaborations/deals, talent pools. In order for CT to compete and to be a destination place for bioscience, CT needs to re-establish the presence of big brand biopharmaceuticals in the area. It will be difficult albeit impossible to get there recruiting startups and new companies alone as a strategy. However, it may be difficult to recruit large pharmaceuticals back into the fold. Alternative strategies must be identified to be able to leverage current assets such as the Yale University's brand, college town and environment, young talented scientific work forces from CT universities, historical talent from larger pharmaceuticals that still reside in CT, history and re-strengthening of startup community, proximity to major US and European cities, easy access to China, access to largest financial center in the world, and a high quality of life for families.

**ii. Proposed Action Steps**

<u>Idea</u>	<u>What must be achieved</u>	<u>Proposed Action Steps</u>	<u>Who is responsible</u>

<p><b>1) Build and extend existing relationships around smaller deals that can increase trust and familiarity between communities</b></p>	<p>Partner with China - examples include:</p> <ul style="list-style-type: none"> <li>- Chinese scientists working at Yale also working in China and active in the evolving ecosystem there</li> <li>- Financial firms with a presence in US and China</li> <li>- Companies – both established and growing Chinese companies, who may be looking for an initial or expanded U.S. presence</li> </ul>	<p>1) Establishment of fund that would be exclusively or in part Chinese (investors or investor arms of Chinese companies) with preferred access to Yale based IP for company creation or license – there are at least 2 active (proprietary) discussions around this concept</p> <p>2) Looking for opportunities for include Chinese investors (financial or strategic) in any ongoing financing activities in New haven based companies</p> <p>3) Holding a China/Yale/New Haven Day to build and extend relationships</p> <p>4) Beginning a discussion of companies beginning to get involved with a physical presence in New haven (examples for range from preclinical services – e.g. vivarium to support in vivo work – or a Phase 1 unit at Yale) – there are proprietary discussion also going on in this regard now</p>	<p>Identify leadership for this activity with interest and capacity in conjunction with university scientists with strong ties to China and U.S. investors with strong ties to China (or other regions of interest)</p>
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<p><b>2) Attract 1 or 2 of the strongest relationships from #1 and #2 to expand their presence in New Haven with a focus on R&amp;D or commercial activities. Target would be 100-500 employees</b></p>	<p>Focus on companies that would invest in/develop a US R&amp;D headquarters, a US clinical development and regulatory headquarters, a commercial headquarters – or all of the above</p>	<p>Streamlined state effort must include:  1) Buy-in from universities to support and market the activity  2) Buy-in from local investors to support the overall goal (make room)  3) Support from the existing Bioscience CT community  4) State/City support to identify space with likely some State/City financial incentives</p>	
<p><b>3) Marketing and business development efforts focused on emerging ex-US biopharma companies with market caps &gt;&gt; \$10b who are looking for/would benefit from a presence in the US</b></p>	<p>Attracting companies to do business in the US and showcase CT's offering when compared to other locales</p>		

**E. Startup Support**

**i. Background**

Startups in the bioscience sector are facing several challenges including recruiting talent, raising capital, winning federal Small Business Innovation Research (SBIR) grants, finding affordable and attractive lab and office space, including wet lab space, and securing partnerships with major hospitals and companies in CT.

- In terms of talent, currently, various support organizations including CI and CTNext’s Executive-in-Residence (EIR) mentoring programs, CTNext’s Tech Talent Bridge (TTB) Program (internship grants), university technology transfer offices Small Business Development Corp (SBDC), Women’s Business Development Council (WBDC) all offer some form of support to founders, but finding key hires are still a challenge as the companies grow.

- The primary source for capital in the state to early stage bioscience startups come from CBIF and CBIF’s Fund of Funds Program (funding VC firms in CT) and SBIR grants with consulting support for grant submissions through CTNext. The Accelerating Biosciences in CT (ABCT) program, Yale University’s Blavatnik and Innovations funds, and the UCONN Innovation Fund also support financially. Local funds including family offices and angel groups also participate in the earlier rounds. More funds and groups are needed to help spur development
- Currently, many companies in the ecosystem leverage the UCONN TIP facility, CURE Innovation Commons, and sublease of university lab spaces. Many of these areas are full or are near capacity. Conversations underway in New Haven, as well as in Stamford and Danbury, but a concerted effort would accelerate these efforts.
- While there is existing medium to large businesses partnering with local startups and incubators, more can be done to leverage the state’s assets to foster more collaboration to foster more interactions in the ecosystem.

**ii. Proposed Action Steps**

<b><u>Idea</u></b>	<b><u>What must be achieved</u></b>	<b><u>Proposed Action Steps</u></b>	<b><u>Who is responsible</u></b>
<b>1) Talent</b>	Close the talent gap for C-Level executives to build startup companies	CI/CBIF to hire experienced executives, on durational basis via 6 to 12-month consulting assignments, to launch companies from Yale, UCONN and JAX. CI or CTNext could hire a part/full time recruiter to assist companies.	Statewide Bioscience Advisory Board to ensure the plan performs as designed, the Advisory board will regularly schedule formal reviews of the progress against actions in the plan; success metrics by board should include the launch of 2-5 new funds in CT and 50-75 new CT biosciences companies over the next 4 years.

<p><b>2) Capital</b></p>	<p>Attract new investment and investors to fund startup companies</p>	<p>CI/CBIF, alongside the Treasurer's office, to launch a global recruitment campaign to attract additional life sciences VC firms to CT. Coupled with Zero VC carried interest taxes and Yale's track record, this would be highly attractive. Focus remaining bioscience funds in CBIF on companies creating jobs and moving therapies and technologies forward to improve healthcare and therapeutic treatments. Fund technologies that already emerged from University labs, instead of technologies still in the labs through CI/CBIF leveraging other capital.</p>	
<p><b>3) Tax incentives</b></p>	<p>Provide greater definition of the tax credits for VCs, and a new set of tax credits to attract key talent (i.e. no state income taxes if they move here for 3-5 years) would be incremental and extremely helpful</p>	<p>1) Institute a tax credit or student loan forgiveness methodology program for students who stay in CT in STEM fields through the Executive Branch 2) Develop other creative incentives for investors and talent</p>	

<b>4) Space</b>	Identify new areas to build lab space co-located with exiting companies and/or university resources	1) Sema4 interested in building wet-lab accelerator space in Stamford - secure state investment and/or other dollars to fund program management 2) The District is interested in building wet lab space - secure state investment and/or other dollars to fund program management. 3) Leverage new Federal Opportunity Zones Capital Gains tax abatement program to attract real estate investors to CT	
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