



ILLINOIS
MEDICAL
DISTRICT

Restoring Chicago's Life Science Leadership

A STATE AND CITY PARTNERSHIP



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ILLINOIS MEDICAL DISTRICT
2100 West Harrison Street | Chicago, IL 60612



ABOUT THE IMD

The Illinois Medical District

is a special-use zoning district situated in the heart of Chicago's Near West Side. Home to more than 40 healthcare organizations, including four world class hospitals, two highly respected health sciences universities, educational facilities, research labs and a biotech business incubator, the IMD offers a rich ecosystem for medical and life sciences innovation. Together, IMD partners accelerate discovery and commercialization that is reshaping the practice of medicine, generating prosperity for everyone.

About Suzet McKinney DrPH, MPH



Dr. Suzet McKinney has been CEO and Executive Director of the Illinois Medical District (IMD) since 2015. The IMD is the second largest urban medical district in the United States, and Dr. McKinney is the only African-American female CEO of any major medical district in the country.

Before joining the IMD, Dr. McKinney spent 14 years at the Chicago Department of Public Health, rising to the position of Deputy Commissioner of Public Health Preparedness and Emergency Response. She also serves as Adjunct Assistant Professor in the School of Public Health of the University of Illinois at Chicago, as well as an instructor in Harvard's T.H. Chan School of Public Health.

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INTRODUCTION

Illinois' life sciences sector is one of the largest in the country.

The industry employs more than 85,000 people and contributes more than \$98 billion (12% of GDP) in annual economic output statewide, according to the Illinois Biotechnology Innovation Organization (iBIO).¹

For decades, life sciences thrived in Illinois, and especially in the Chicago industry cluster, thanks to two interlocking factors. The first is the major industry presence. Chicago and its suburbs host some of the world's leading pharmaceutical and biotechnology companies, such as Astellas, Abbvie, Takeda, Horizon Pharma, Lundbeck and Fresenius Kabi. It is also home to top medical device and diagnostics companies, including Abbott, Baxter and Siemens.²

These various businesses set up shop in Chicago thanks in large part to the second factor: the city's large number of life sciences-oriented research and educational facilities.³ Chicago's educational pipeline and institutional research infrastructure contributed to a positive feedback loop that fed the industry for decades, while industry research funding fed back into those research and educational organizations.

However, despite these signs of apparent strength, Chicago's life sciences industry has actually been ailing for some time, both in terms of industry growth and tangible patient and community outcomes. While overall industry employment fell 13.6%, R&D employment was cut virtually in half, as many of Chicago's leading pharmaceutical and biotechnology companies, including Shire and Takeda, have moved large parts of their R&D operations out of state.⁴

Chicago can recover its place as one of the foremost centers for the life sciences in the United States, but only if it embraces a new strategy. To really make the life sciences industry thrive, as well as improve social and healthcare outcomes across the city, Chicago's various stakeholders, from government to industry to academia, must work together with the shared goal of fostering a leading innovation district.



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SECTION I

The U.S. Life Sciences Industry

Innovation-Driven Growth Nationwide

Over the past several years, the U.S. life sciences sector has seen rapid growth, with the nearly 86,000 businesses employing more than 1.73 million people nationwide.⁵ Job growth has been extremely healthy; in the 15 years through 2016, life science employment rose by 19%, about double the growth in overall employment.⁶ New business formation in life sciences has also been strong, up 40% between 2001 and 2016, compared to 19% in the private sector overall.⁷

As the industry has grown in recent years, it has done so unevenly. R&D and lab testing jobs rose sharply between 2001 and 2016, by 34.6% and 38.8%, respectively.⁸ During this period, R&D supplanted pharmaceutical and medical manufacturing as the biggest industry sub-segment by employment. Manufacturing employment grew by an anemic 6.5%, well below the national growth rate.⁹ The industry is clearly undergoing a serious transformation, with R&D, as well as diagnostic and testing labs, taking an increasingly important position, even as the manufacturing businesses that used to define the industry fall into relative decline.

R&D Multiplier Effect

Strong growth within the life sciences, especially in R&D, has done more than add jobs to the economy. In fact, numerous studies have demonstrated that life sciences employment and research spending generate significant economic multiplier effects.¹⁰ In other words, the benefits of a flourishing life sciences industry extend into the surrounding local economy in the form of job creation and economic output:

- For every life science job created, an additional 3.57 jobs are supported throughout the broader economy.¹¹
- \$1 in life science industry output generates an additional \$1.27 in output in the broader economy.¹²
- \$1 of biomedical research increases local business activity by \$2.43.¹³

Growing industries have a tendency to attract investment, and life sciences is no exception. Venture capital investment in the life sciences industry reached \$23.3 billion in 2018, shattering the previous record of \$16.6 billion, which had been set just the previous year.¹⁴ Life science constituted 14.6% of all venture capital investment in 2018, up from 13.4% in 2017.¹⁵

Clustering Drives Innovation

With R&D employment in particularly hot fields such as biotechnology expected to grow by as much as 19% by 2026, and venture capital flows expected to continue their rapid growth for the foreseeable future, there is a large amount of potential economic benefits still to come from the industry.¹⁶ Which cities and regions reap the rewards of the life sciences explosion will depend on their ability to adapt to the evolving industry.

The Brookings Institution defines industry clusters as "geographic concentrations of interconnected businesses, suppliers, and associated institutions."¹⁷ In essence, clusters are localized economic ecosystems dedicated to specific industries or sectors.

Connectivity Drives Collaboration

Economists have studied the impact and importance of clusters for decades and their findings have been consistent: Clusters foster and maintain economic ecosystems that produce heightened levels of innovation.¹⁸ Clusters have consistently been demonstrated to support higher rates of startup formation and survival, allowing for the cultivation and development of new industry leaders.¹⁹ While a multitude of factors contribute to the success of an industry cluster, there are two prerequisites: proximity and connectivity.²⁰

Connectivity is vitally important as it is the underpinning for inter-organizational collaboration. Removing frictions from, and active encouragement of, such collaborations has been shown to boost productivity. This is especially true of industries in the knowledge-based economy, where collaboration between younger, smaller firms and research universities is critical.²³ Opportunities for inter-institutional research collaboration can also reap great scientific and economic rewards. The venerable Research Triangle Park, one of the first real innovation clusters to emerge, has consistently pulled in a disproportionate amount of federal research funding thanks to the collaborative research efforts between members of its three anchor universities (Duke, UNC and NC State).²⁴

A healthy life science and biotech ecosystem is reliant on strong R&D capabilities and access to lab facilities. Shared spaces and active efforts to foster connections between firms and other related institutions strengthens the ecosystem as a whole.²⁵



The Power of Proximity

Proximity is both powerful and ephemeral. When startups, industry leaders and university researchers work in close geographic proximity, there are high levels of knowledge spillover. Indeed, according to a 2012 study by the Federal Reserve Bank of Philadelphia, geographic density is a key determinant of successful knowledge sharing and its resultant boost to innovation and economic activity.²¹

This is especially true of industries dependent on high levels of R&D and laboratory science, such as the life sciences. Manufacturing, by comparison, experiences far more limited clustering effects. When distances exceed as little as a quarter of a mile, beneficial clustering effects rapidly dissipate.²²

Industry Pressure to Relocate

As the life sciences industry has become increasingly driven by R&D, the pressure on companies to congregate within major clusters has grown significantly:

- Big Pharma companies are heavily dependent on startups and other developmental biotech and pharma companies to replenish their product pipelines.
- Small and mid-sized firms have been responsible for a whopping 63% of pharmaceutical products brought to market since 2013.²⁶
- 47% of new product and process innovations come about through external partnerships.²⁷

Thus, it is little wonder that nearly 80% percent of industry location decisions were based on proximity to major research universities and R&D ecosystems, according to a 2018 survey of JLL life science clients.²⁸

The clusters with the best R&D ecosystems will be the biggest winners of the life sciences boom - and will be the source of Big Pharma's future blockbuster products. Increasingly, the life science industry is gravitating to the dominant clusters on the Pacific and Atlantic coasts. The Greater Boston, San Francisco Bay Area and San Diego clusters have become especially influential, attracting firms and research talent at increasing rates. Their lead in investment inflow is especially great, receiving venture capital funding far in excess of other regional clusters, including top-tier clusters such as the Research Triangle Park.. In 2016, California and Massachusetts received a staggering 82% of all life science venture capital funding; no other state cracked 5%.²⁹

Tech and R&D Working Together

The success of the life sciences clusters in California and Boston makes even more sense in light of their proximity to - and overlapping with - major technology clusters. There is ever more overlap between life sciences, especially healthcare, and tech. Innovation clusters thrive when there is cross-pollination of ideas and the opportunities for collaboration between life sciences firms and tech firms is rapidly expanding.



SECTION II

Life Sciences in Illinois

State of the Industry

While the life sciences industry as a whole has experienced rapid growth, the story is more complicated in Illinois. Between 2002 and 2016, total life science employment in Chicago actually fell sharply. The principal causes: the disappearance of R&D and failure to cultivate a leading industry cluster.

Chicago remains an important life sciences manufacturing hub, but the industry is changing in fundamental ways. Manufacturing has been supplanted by R&D, which is now the key driver of the life sciences sector, yet Chicago and Illinois have failed to keep up with the times. As R&D-oriented clusters grow in importance, Illinois has proven to be an underperformer.³⁹

- Despite being home to world-class hospitals, universities and research institutions, Illinois saw academic spending on life sciences R&D worth just \$1.43 billion in 2016, putting it in ninth place nationwide in terms of total spend. On a per capita basis, Illinois fares far worse.
- Illinois lags on critical NIH funding, ranking ninth nationwide in 2017 with \$805.5 million.
- The state has fared little better when it comes to private investment, attracting \$1.59 billion between 2014 and 2017, the seventh-highest recipient nationwide.

Despite these setbacks, Chicago is still recognized as an important mid-tier cluster.³¹ However, it has failed to do anything more than hold its ground, even as other mid-tier clusters, such as Denver and Seattle, have made steady gains. In JLL's 2012 ranking of life sciences clusters, Chicago, Denver and Seattle were ranked 12th, 13th and 10th, respectively.³² In 2018, Chicago was still in 12th place, while Denver had leap-frogged to 11th and Seattle had risen to 7th.³³

KEY PLAYERS IN ILLINOIS UNCOORDINATED STRATEGY



* Sampling of top companies. Not representative of all Biotech & Medical Device companies in Illinois.

Losing Out to Bigger Clusters

The top-tier clusters have made some of their gains at Chicago's expense. Shire and Takeda, for example, relocated much of their R&D staff to Boston and Cambridge in recent years. And the bleeding has not stopped: In September 2018, Takeda announced it would be moving its headquarters to Boston, affecting nearly 1000 jobs.³⁴

Yet, while Chicago has suffered in recent years, other mid-tier and emerging clusters have prospered. For example, between 2014 and 2017, Colorado (Denver Metro Area cluster) ranked 9th in terms of total life science venture capital investment, and 5th on a per capita basis.³⁵ Denver has focused heavily on early-stage companies, supporting numerous incubators and accelerators, which have formed the backbone of its burgeoning life sciences industry.

Known clusters are not the only ones to see success in recent years. Other regions have emerged from relative obscurity to stake claims as significant life sciences clusters in their own right. Houston, for example, placed 15th in JLL's rankings; it did not place at all in 2012.³⁶

While a number of factors have contributed to the Chicago life science cluster's diverging fortunes, a key issue cited by industry participants is the geographic separation of Chicago's life sciences research institutions, startup facilities and leading industry players.³⁷ Chicago has all the pieces necessary to be a top-tier life science cluster, yet it has failed consistently to put them together. The result has been a whole that is less than the sum of its parts.

What Chicago Needs: An Innovation District

The key to turning Illinois' fortunes around and establishing Chicago as a top-tier life sciences cluster is to commit to a radical new strategy: establishing an innovation district that can bring startups, research institutions, industry stalwarts and investors together into close proximity in order to foster a collaborative environment favorable to innovation in the life sciences. Because of the economic generation power of Innovation Districts, they have received increased attention since the Great Recession. The Brookings Institution defines innovation districts as "geographic areas where leading-edge anchor institutions and companies cluster and connect with startups, business incubators and accelerators."³⁸ At first glance, this might appear to be little different from the definition of an industry cluster. However, innovation districts differ in an number of key respects.

The principal difference between innovation districts and other clusters is the method of their formation. While clusters often form organically as industry players coalesce both around one another, and around leading research institutions, innovation districts are formed by deliberate and coordinated action. Coordination through a shared agenda among all key stakeholders is critical to success.³⁹ It allows districts to focus resources on achieving the specific goal by enhancing connectivity and collaboration, while weeding out inefficiencies.

Establishing an Innovation District Gateway

Frequently, a "gateway" organization that can be synonymous with, and the key promoter of, the district is chosen to coordinate the district formation.⁴⁰ This need not be the dominant stakeholder in the local industry or the proposed district, but rather an organization that has the respect and trust of all parties and is both willing to take a strong leadership stance as well as be able to mediate between the large number of disparate stakeholders. Such an identifiable institution is often crucial to raising awareness within the community and across the industry. Without that awareness, startups do not set up shop, large anchor firms steer clear and investment does not flow.

Engaging Government at All Levels

Federal, state and local governments have played key roles in the formation of innovation districts across the country, with public-private partnerships usually front-and-center.⁴¹ These government stakeholders play different roles in every district, but common functions include providing startup and investment capital, as well as providing the organizing drive in the absence of another coordinating institution.⁴² In every case, government buy-in is crucial, however, because its support brings participants to the table, fostering a collaborative spirit and sense of mission. Fundamentally, innovation districts are mission-driven efforts to foster new, rejuvenate flagging, or expand successful industry clusters.

Focus on Community Impact

While the focus of discussion about innovation districts tends to revolve, unsurprisingly, around economic innovation and development, it is far from the only consideration. For a life sciences and healthcare-oriented innovation district, especially, there must also be a focus on community impact. A successful innovation district must be a living, breathing ecosystem nested in a vibrant community. That means engaging the surrounding community along a number of metrics:

- **Jobs and Training:** Labs and facilities will require blue-collar workers of various skill levels, from maintenance staff to lab technicians. Community programs to teach business, science and technology skills can also foster upskilling and entrepreneurship.
- **Community Spaces:** Parks, recreation, public meeting spaces and public forums can provide real amenities for residents living around the district.⁴³
- **Improved Infrastructure:** Upgrades to internet, improved public transportation, electricity and other utility improvement.
- **Public Health Improvement:** Focus research on diverse local community, engage community public health needs and identify targeted, patient-centric therapies.

Keys to a Successful Innovation District

According to Brookings, there are eight factors that are the essential prerequisites to the development of any successful innovation district:⁴⁴

1. **Core Competency** (already good at the discipline in question)
2. **People** (leadership, researchers, skilled workforce)
3. **Culture** (collaborative, attractive to outside talent)
4. **Business Capabilities** (supporting startups, teaching entrepreneurs business skills)
5. **Sophisticated Demand** (ready market; should ideally come from within the cluster)
6. **Access to Funding** (startup investment, funding for offices and labs)
7. **Infrastructure Provision** (airports, roads, housing, building stock, etc.)
8. **Regulatory Environment** (easy permitting, zoning control, ease of doing business)

We can see all eight of these factors at work in virtually all established and successful innovation districts. Chicago has all the pieces necessary in place as well. Currently, Chicago plays host to a multitude of organizations, companies, and stakeholders involved in the life sciences industry. Several, such as iBIO and MATTER Health, are focused in part on fostering life sciences innovation and bringing more industry players to Chicago, and to Illinois more broadly. While these groups have made tangible contributions to supporting the life sciences in Illinois, the lack of a coherent mission and holistic plan of action across institutions have hampered their success. It will require one or more organizations committing to making an innovation district a reality before real progress can occur. Then the real work of winning buy-in from all the stakeholders begins.

Chicago is falling behind. We have no time to lose.

SECTION III

Public Health Impacts

Public Health Disparities Nationwide

When it comes to healthcare outcomes, there are intense disparities across geographies and ethnic groups. Among adults, 8.5% of Whites, 14.1% of Blacks and 27.2% of Hispanics lacked health insurance coverage, according to the National Center for Health Statistics.⁴⁵ But that is just the tip of the iceberg. Across a majority of the hundreds of healthcare outcome metrics tracked by the Department of Health and Human Services (HHS), minorities receive inferior levels of care and experience inferior outcomes compared to white patients.⁴⁶

Chicago, with its strong life sciences industry, would seem at first glance to be an ideal ecosystem for high quality public health. The city is home to a high concentration of life science and healthcare companies and professionals, as well as world-class research and teaching organizations, including:

- 6 of the world's finest medical schools.
- 30+ teaching hospitals.
- 3 leading federal research centers.

The sheer quantity of leading hospitals has contributed to Chicago having the nation's highest concentration of physicians.⁴⁷ Meanwhile, the city's world-class universities graduate the sixth highest number of doctors in science and engineering subjects, and the seventh highest numbers of doctors in life sciences.⁴⁸

However, all of these advantages have failed to translate into tangible healthcare outcomes for Chicago's residents.

Diverging Patient Outcomes in Chicago

HHS has ranked Illinois 45th out of the 50 states for overall healthcare quality, with Chicago's health quality a particular drag on the state's average.⁴⁹ The state's performance in dealing with chronic disease management and support for patients post-discharge from hospitals is particularly bad.⁵⁰

Poorer, ethnically diverse areas of Chicago suffer especially badly. HHS ranked Illinois in the 4th quartile (worst) in terms of the average differences in quality of care for blacks, Hispanics, and Asians compared with whites.⁵¹ Black women are 3.5 times more likely to die in childbirth than white women, and their newborns suffer triple the mortality rate.⁵² Appalling maternal and infant mortality amongst black women was a chief contributor to Illinois' ranking 18th in the nation overall in maternal mortality.

Aligning Community and Hospital Priorities

Poor healthcare provision to economically troubled, racially diverse regions has impacts across the lives of residents. Infrequent checkups, poor public health education, and insufficient patient support infrastructure have all contributed to a health crisis in the most vulnerable neighborhoods, especially on Chicago's South and West Sides. Residents of these communities live shorter, less healthy lives. In fact, the average life expectancy of residents of the West Side is a staggering 16 years shorter than that of residents of the affluent Loop.⁵³ They may be three miles away in terms of distance, but they are worlds apart in terms of health outcomes.

Ironically, the areas of Chicago worst served by healthcare professionals and facilities are home to some of the nation's top research universities and hospitals. The University of Chicago and its medical center are on the South Side, while the Near West Side hosts the Illinois Medical District, an area containing two top medical universities and two renowned teaching hospitals. Clearly, better aligning the priorities of these institutions and the communities that surround them must become a bigger priority.

Vulnerable Populations Can Reap Tangible Benefits

In an effort to address healthcare disparities between various populations, as well as the ballooning cost of care for everyone, focus has shifted within the industry in fundamental ways. The most meaningful of these shifts are a transition to outcome-based healthcare and a focus on prevention.⁵⁴ The full patient journey, from diagnosis and pre-treatment all the way through post-treatment and follow-up, must be taken into consideration and addressed. Public health disparities in underserved communities have arisen in part thanks to low levels of entry at the start of the patient journey funnel, as well as from disproportionately poor post-treatment care. Thus, while everyone benefits from healthcare and life science innovation, it is vulnerable groups, specifically, that stand to reap the greatest benefit.

Leveraging World-Class Facilities and Technology

Healthcare providers can work together by sharing data, collaborating in research and with industry, and offering low-friction digital health platforms that can easily onboard, track and follow-up with patients.⁵⁵ Digital technology and telemedicine are aiding in a rapid fundamental transformation of the patient experience for the better.⁵⁶

At the same time, advanced data collection and analysis are aiding in improving diagnostics, treatment and outcomes for all patients, including vulnerable populations.⁵⁷ Chicago's world-leading hospitals and vast population of medical and life sciences professionals must embrace these new methodologies and tools if they expect to improve care and enhance patient outcomes.

Improving Outcomes Through an Innovation District

In Chicago, mortality can drop as much as 20% when going from one zip code to another. This is largely driven by the social determinants of health. A life science innovation district co-located in neighborhoods with diverse populations may have true healthcare benefits. First, translational research and clinical data pooling from immediate diverse populations can provide statistical data that can transform patient outcomes.

Second, co-location of a Life Science innovation district in these diverse neighborhoods could realign the priorities of renowned health institutions with the communities that surround them. The University of Chicago and its medical center are on the South Side, while the Near West Side hosts the Illinois Medical District, an area containing three top medical universities and two renowned teaching hospitals.

SECTION IV

Recommendations

To date, many players from across the city are discussing biotech and life sciences and many are working on, or about to work on, initiatives that touch it—far too many to mention in this report. A successful life science innovation district has to be intentional and carefully planned. It is a state and citywide initiative requiring a multidisciplinary approach to accelerate business development within the life science category. It involves public and private partnerships anchored by education, research and new and established healthcare businesses.

First and foremost, it is an INNOVATION LIFE SCIENCE DISTRICT—an ecosystem intentionally designed to fuel innovation, jobs and economic growth. The ecosystem includes capital, talent, incubators, research facilities, technology commercialization services and public-private partnerships to advance the development of new life science discoveries, businesses and technologies. And it is best done starting with existing infrastructure, instead of ignoring present-day assets to “start from scratch”.

To accelerate development, we recommend the following:

1. State Appointed Board Chair and committee to oversee development

- This requires the state to take the initiative given many key entities sit outside the city of Chicago, but the city of Chicago given its rich talent pool, entrepreneurial spirit, infrastructure, academic and research footprint would be home to the Life Science Innovation District and represent the centralization of the effort.
- The life science innovation district is key. Many innovative programs have been launched at a state level. In 2012, Maryland raised \$84 million through an insurance tax credit auction to invest in life sciences and other technology growth areas. New York entered into a state and city partnership to create a \$500 million program to fund Life Science.
- The board chair and the committee would set up a working process and committees that would ultimately develop a plan. Recommended committees follow: capital, infrastructure, public-private partnerships, academic-research partnerships, talent and community.



2. Enlist Key Stakeholders and utilize this list to formulate your board and committees

- **The Governor's, Cook County Board's and Mayor's Offices:** Local government participation is absolutely critical to success. The mayor is the power center in Chicago and is the key decision-maker on issues concerning innovation districts and city-wide strategy.
- **Illinois Medical District.** IMD is a special zoning district of Illinois. It has a unique legal position as a semi-state body gives it full zoning authority and the ability to accelerate construction and development plans, bypassing the bonds of red-tape that afflict the city and the county. With more than 40 healthcare organizations, including four teaching hospitals, two highly respected health sciences universities, educational facilities, research labs and a biotech business incubator, the IMD is already a rich ecosystem for medical and life sciences innovation. It is already improving transportation infrastructure, as well as digital connectivity through 5G network upgrades. In addition to its existing facilities, the IMD has 31 acres of land available for development. The IMD is working to transform this land into usable facilities that will facilitate further growth of its life sciences ecosystem.
- **MATTER Health.** MATTER has become Chicago's preeminent medical startup incubator. Based downtown in the Merchandise Mart, MATTER has succeeded in developing extensive investors networks, leveraging its support from the city and government and the non-profit ChicagoNEXT.
- **Chicago Biomedical Consortium.** A research collaboration between between the University of Chicago, Northwestern and the University of Illinois at Chicago, the CBC has combined the resources and expertise of the three universities to produce significant research and draw significant research funding. 2048 peer-reviewed publications attributed to CBC-funded research, helped establish six national research centers at CBC universities, facilitated Open Access Initiative (allowing CBC-affiliated researchers to use all core facilities at 'in-house' rate) and pulling in \$616 million in follow-on funding from CBC-initiated research. Expanding open access to other institutions would further multiply the impact and scope of research and funding.
- **iBIO.** iBIO is the chief industry lobbying and advocacy group in Illinois for both medical devices and biotechnology companies. It is the state affiliate of two national advocacy organizations, the Biotechnology Innovation Organization and the Advanced Medical Technology Association. The organization has deep connections throughout the industry: AbbVie, Astellas US, Horizon Pharma, Shire and Takeda Pharmaceuticals North America all serve as leadership sponsors of iBIO's public affairs and industry lobbying efforts.
- **The Discovery Partners Institute (DPI).** DPI is a new purpose-driven interdisciplinary research institute led by the University of Illinois System that is focused on building prosperity and growing the state's workforce by creating solutions to grand challenges. DPI's mission is to revitalize the Illinois economy by reinventing the role of the research university through interdisciplinary public-private partnerships that aggressively drive technology-based economic growth with global impact.
- **P33.** P33 is a new initiative spearheaded by former Commerce Secretary Penny Prtizker and tech entrepreneur Chris Gladwin that aims to transform Chicago into a leading tech ecosystem by 2033. P33 will promote the initiatives and policies that make Chicago the most dynamic technology ecosystem where residents, and companies both new and established, will grow and thrive.
- **Private Companies:** There are a vast array of private institutions that are involved in life science.

3. Establish a plan and timeline

- Articulate a 5-year timeline for development
- Establish leadership team that will act on behalf of all participants
- Articulate roles and responsibilities of participating organizations
- Designate the lead/anchor institution and “gateway” identity

4. Select location

- Geography is critical. A serious issue facing Chicago is the geographic dispersal of industry players, research institutions, and innovation-fostering groups and companies. Establish who can move and who cannot. Incubators such as MATTER are more mobile than research hospitals.
- Site selection is key. It must be able to be built upon quickly, with room to expand. It must also be in a neighborhood/community that can benefit from, as well as support, a burgeoning ecosystem.

5. Engage the community

- Life Science is fundamentally a healthcare initiative. The leaders of this initiative have the power to make it stand for something greater than economics. This initiative has the power to change outcomes in health, particularly for vulnerable populations; and in neighborhoods.
- The community is not a passive beneficiary, however. Everyone is a stakeholder as well. Community participation and buy-in will be crucial to the success of an innovation district whose benefits will radiate out to the wider community, city, county and state.

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INNOVATION DISTRICT

Case Studies

PITTSBURGH

TEXAS MEDICAL CENTER



ILLINOIS
MEDICAL
DISTRICT

ILLINOIS MEDICAL DISTRICT
2100 West Harrison Street | Chicago, IL 60612

22



PITTSBURGH

The Brookings Institution has published case studies on a number of innovation districts in an effort to demonstrate how they formed and why they succeeded. Brookings highlights the success of Pittsburgh as an urban healthcare innovation district.⁵⁸

Reviewing Pittsburgh through the lens of Brookings' eight success factors, we can see that the innovation district covered all the critical bases: ⁵⁹

Core Competency	University of Pittsburgh Medical Center (top-tier hospital and research institution) Carnegie Mellon University (AI and computer science)
People	Leadership: Governor Dick Thornburgh spearheaded the project, introducing grants and developing a comprehensive plan for the district Researchers: Many already working in research universities and hospitals Skilled Workers: Plan included development of education facilities to train (and retrain) workers for healthcare and computer science jobs
Culture	Strong, established cultural identity across community Low cost of living Affinity organizations and pastimes, including national sports teams
Business Capabilities	State government helped facilitate by funding regional tech centers to provide training, startup funding and incubation, and research funding
Sophisticated Demand	U. of Pittsburgh Medical Center is direct customer for biotech and pharma University has facilities and researchers to meet increasing demand for medical research Sourcing demand and grant funding from HHS
Infrastructure Provision	Downtown revitalization and modernization in collaboration between local government and key institutional stakeholders New state-of-the-art airport



Access to Funding

Medical research centers have received NIH and other federal research funding

Federal funding has also flowed to CMU's computer science, robotics, and AI research.

District plan included public funding and foundation grants to provide venture capital financing to promising startups and emerging companies within the cluster

Rich research ecosystem and strong funding profile from local, state, and federal sources attracted many leading tech companies to locate operations in or near the district

Regulatory Environment

District technology centers have developed expertise in navigating local and national regulations, providing support to institutions and startups within the district

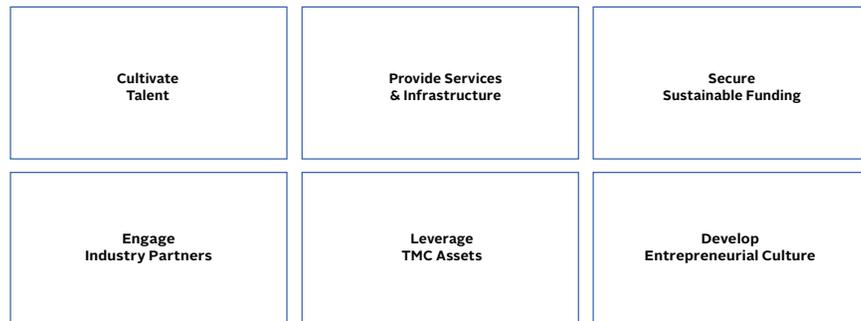
Pittsburgh continues to struggle with fairly exacting regulatory environment, but the district stakeholders have been pushing for relaxation

Started in 1982 by the efforts of Pennsylvania's governor, Pittsburgh's innovation district is going strong today. Strong leadership, core industry knowledge, and extensive research funding all played a role in making the district work. The importance of stakeholder coordination and buy-in were absolutely crucial to the success story. In 1985, building on the governor's plan, the city of Pittsburgh, the county of Allegheny, University of Pittsburgh, and Carnegie Mellon University all came together to commit to a joint economic development strategy that has helped shape the area ever since.

TEXAS MEDICAL CENTER

For a more contemporary case study, we turn to Houston, where the development of a new innovation district has only recently gotten underway. The district began as the brainchild of the Texas Medical Center.

Described as a “medical mini-city” by Forbes, TMC is the largest healthcare facility in the world.⁶⁰ In 2014, TMC unveiled its Strategic Plan, which included a call to develop an innovation district to bring startups and investment capital to Texas (and to Houston, especially).⁶¹ The plan to develop an innovation ecosystem was built on six strategies that cover all eight of the dimensions of success outlined by Brookings:



TMC spent a long time building stakeholder interest, cultivating relationships with other institutions, industry partners, and the local government. TMC developed firm commitments from a multitude of key partners, including the Mayor of Houston and Rice University. The collaboration has also won the buy-in of Station Houston, the region’s hub for innovation and digital entrepreneurship, the Greater Houston Partnership, and Houston Exponential.

In April 2018, the innovation district was finally unveiled. Houston’s Midtown neighborhood was selected to be the home of Houston’s innovation district. The 9.4-acre site will be centered around a massive Art Deco building owned by Rice University that had once been a Sears.⁶² The anchor facility will take two years to complete, but Houston is well on its way.

Houston has made great strides in turning its dream in 2014 into a reality today. For Chicago to achieve similar success in fostering its own life sciences innovation district, a deep rethink is essential. Bringing all the stakeholders in the state’s life sciences industry together, and building a campus that can play host to them all, is the way to achieve that goal.



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APPENDIX

For your convenience, we have included existing white papers from MATTER Health and iBio for educational purposes.

MATTER

Putting the Life Sciences to Work for a Healthy Illinois Economy

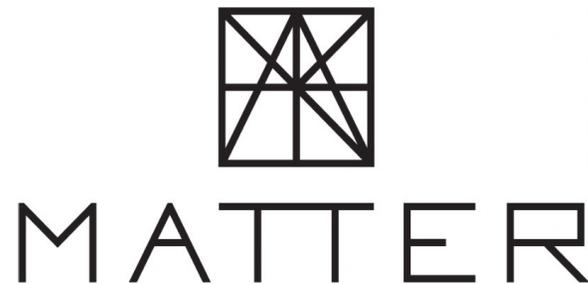
Published: Oct. 2017

iBIO

Illinois Life Sciences Economic Blueprint

Published: Dec. 2018

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Putting the Life Sciences to Work for a Healthy Illinois Economy

Economic development white paper

Executive Summary

The life sciences industry is an \$80 billion contributor to Illinois' economy that generates 600,000 jobs while delivering solutions to some of the nation's largest health challenges. **Illinois' life sciences industry is at an inflection point, however, with the State's leadership position at risk.** On the one hand, an increasing number of local biotech startups are launching, growing and receiving investment. On the other hand, Baxalta moved to Boston; Takeda announced the relocation from Deerfield to Boston of its North American headquarters; and Astellas moved its R&D to Boston. This migration is, in part, due to corporations wanting to locate alongside the innovative startups and strong talent pipelines that will drive their future success.

Many states and regions are aggressively developing their life sciences innovation ecosystems to mirror Boston's success – pulling technologies, companies and jobs their direction. Without an articulated vision, Illinois is at risk of becoming an also-ran life sciences hub, as companies big and small seek supportive environments driven by more proactive business and political leadership. With the right investments, however, Illinois can not only retain existing industry, but capitalize on tremendous strengths to cultivate a world-class innovation ecosystem.

This white paper proposes a branded umbrella initiative with two aims that will drive startup growth and success and feed Illinois' established biotechnology firms and jobs: (1) deliver focused support for high-potential life science ventures; and (2) leverage, connect and brand Illinois' unique life sciences elements and existing initiatives. We believe that by doubling down on Illinois' historic strengths in life sciences, these programs can **deliver \$25 billion in new life sciences startup value over 10 years**, while catalyzing further growth and investment for a revitalized global biotech destination. Key life sciences economic development initiative elements are as follows.

- **Create a biotech fellows program** that attracts life science startup talent.
- **Initiate a life sciences technology accelerator** that offers executive talent, shared services, training and affordable laboratory space.
- **Seed development of a downtown biotechnology district** by catalyzing needed wet lab space that supports the needs of high-growth biotechnology companies.
- **Launch seed investment instruments** to address the unmet need for early stage funding and increase the pool of investable startups in Illinois.
- **Establish a public-private life sciences commercialization organization** that facilitates access to, and collaboration across, the Illinois life sciences community.

By executing these elements, the State can shore up and expand this vital industry and secure Illinois' life sciences leadership for generations to come.

Illinois Life Sciences Background

Life sciences: The intersection of prosperity and quality of life

Few industries offer a stronger opportunity to do well by doing good than the life sciences. Healthcare innovation through new drugs, diagnostics, devices and data analytics represents an important economic driver, while also tackling large, intractable problems related to access, quality and the cost of healthcare.

- **Strong and inclusive economic engine.** Illinois' biotechnology cluster supports almost **600,000 total jobs (direct and indirect) distributed across Illinois**, with an additional 157,000 jobs projected by 2025^{1,2}. The biosciences industry enjoys a 4.57 employment multiplier nationally³. In Illinois, the biopharmaceutical industry alone enables more than **\$80 billion in economic impact** (including direct, indirect and induced effects), **ranked third in the U.S.** behind California and New Jersey.⁴
- **Outsized need, outsized benefit.** The time, capital and infrastructure required to create economic value from life sciences innovation is higher than other technology sectors. Government action is often required to advance new drugs and medical diagnostics to the point where free-market forces can take over to get these products over the commercialization finish line. Yet, **the potential for return on public investment in the life sciences exceeds more traditional tech industries** with the median exit valuation for healthcare startups consistently exceeding digital and technology ventures (\$212 million vs. \$133 million average from 2012–16)⁵.
- **Tackling evolving healthcare priorities.** The shift to outcome-based healthcare reimbursement and a focus on preventive care can dramatically reduce healthcare costs if and when new drugs and diagnostics tailored to these priorities are developed. Illinois, like many states, struggles with the cost and accessibility of healthcare, **with up to 20 percent of general revenue (\$7.9 billion projected in 2019) supporting healthcare costs** while the State's poorest neighborhoods suffer with the shortest life expectancies⁶. The State's life sciences innovation excellence positions Illinois to lead the shift to more efficient and effective care with stronger outcomes for all residents.

Building on existing strengths: All the ingredients for success

Illinois is a global life sciences hub and has the potential to extend its leadership to the cultivation of game-changing medical innovations. All the individual components – from unique research strengths, to a top-three density of biotechnology companies, to more than 95 healthcare systems in Chicagoland alone – exist to deliver on this vision.

¹ *Illinois Innovation Ecosystem*. Illinois Science & Technology Coalition (ISTC) (2018)

² *The Illinois Economic Development Plan*. DCEO (2014)

³ *Investment, Innovation and Job Creation in a Growing U.S. Bioscience Industry*. TEconomy (2018)

⁴ *The Economic Impact of the U.S. Biopharmaceutical Industry*. The Pharmaceutical Research and Manufacturers of America (2016)

⁵ *Cashing Out: Tech vs Healthcare Exit Valuations*. CB Insights (2017)

⁶ *2017-18 State of the Chicago Health Care Industry*. Health Care Council of Chicago (2017)

- **Leading the way in life sciences research.** More than \$1 billion in federal medical and biological research funding primes the State's life sciences innovation pipeline⁷. Illinois' universities and research centers produce globally leading scientific discoveries with the potential to improve health in important areas such as neuroscience, nanomedicine and oncology⁸.
- **Focus on commercializing academic research.** Illinois' universities are increasingly developing the capabilities to commercialize life sciences innovation. Chicago-area universities, in particular, have invested in recent years in attracting commercialization-minded faculty, building facilities that foster startup development, and deploying funds to help early stage biotech ventures. **Biomedical, biotechnology and healthcare ventures are the largest percentage today of Illinois university startups (27 percent)**, ahead of the number-two startup area, information technology (15 percent)⁹. 2018 has been a banner year for local life sciences startups with three recent IPOs totaling \$1.6 billion¹⁰.
- **Significant industry base brings market pull to life sciences innovation.** Chicago and Illinois are at the center of the Midwest biotech cluster, **the second largest in the nation**¹¹. These prospective startup partners and customers include local leaders like Abbott, AbbVie and Baxter, along with the North American headquarters of global life sciences corporations such as Astellas, Fresenius-Kabi and, for now, Takeda.

Key challenges in Illinois

Given the wealth of assets the State has in the life sciences arena, why does Illinois lag other biotech clusters in nurturing life sciences startup companies? We see four key reasons for the growing distance between Illinois and innovation hubs such as Boston and San Francisco.

- **Lack of seasoned biotech executives.** While Illinois has great strengths in both academic research and established industry leaders, the State lags other markets in executive teams with experience commercializing early stage life sciences assets. In Boston, for example, an investor can be confident of putting together a team of executives who have relevant experience.

Executive Talent in Illinois: AveXis Case Study

When investors tapped Sean Nolan to take over struggling AveXis, he said he'd build the company in Chicago. Over the next two years, he hired 250 people in the northern suburbs and developed the company to the point where Novartis acquired it for \$8.7 billion. He attracted world-class talent both locally and nationally, proving that with good leadership, the right technology and funding, it is possible to build biotech businesses in Illinois that are second-to-none.

Given the volume and caliber of research in Illinois and the State's concentration of established firms, Illinois can have dozens of companies like AveXis. One of the key ingredients is attracting and developing more people like Sean Nolan to start and grow businesses in the State.

⁷ *Illinois' R&D Landscape and Path Forward, 2018 R&D Innovation Index*. ISTC (2018)

⁸ *Illinois Science and Technology Roadmap*. ISTC (2014)

⁹ *2018 University Entrepreneurship Index*. ISTC (2018)

¹⁰ *Chicago is Building a Deep Biotech Bench*. Crain's Chicago Business (September 7, 2018)

¹¹ *The Economic Engine of Biotechnology in Illinois*. Illinois Biotechnology Industry Organization (2013)

- **Limited infrastructure.** Illinois has the lowest life sciences wet lab vacancy rate nationally, hovering around 1 percent¹² for its 12.5 million square feet of space spread across locations like the Illinois Institute of Technology's University Technology Park and the Illinois Science + Technology Park in Skokie. What lab space there is lacks the immediate proximity to the corporations, core research facilities, clinical trial partners and funders that hubs like Kendall Square in Cambridge and the Texas Medical Center in Houston provide.
- **Dearth of early stage capital.** While local capital for early stage tech deals has grown significantly over the last decade, local capital for early stage biotech deals has not. In fact, Illinois has almost no capital available locally to support life sciences ventures. Successful biotech states such as Massachusetts and California have a commercialization efficiency ratio (measuring VC dollars against NIH funding) of around 1. Illinois' ratio is only 0.14. The lack of capital means that technologies born in Illinois frequently get stuck in the so-called "valley of death," hurting local researchers and pushing both IP and talent to the coasts.
- **Inaccessible technologies and community.** While the ingredients for success exist, they remain opaque and disjointed to national biotech players. Many local life sciences leaders have expressed that they have an easier time accessing university-developed innovations in other parts of the world than they do in their own backyard.

Recommendations to accelerate Illinois' life sciences economic engine

We propose a new, branded initiative, managed by the State and implemented in partnership with a public-private life sciences "integrator" organization, aimed at maximizing the impact of Illinois' significant talent and technology. A Life Sciences Advisory Council, appointed by the Governor, can provide stakeholder input and strategic oversight. Key initiative elements should address the identified issues around collaboration and targeted startup support and include the following.

- **Create an executive talent fellows program.** The State should support a program of fellows who can take assets out of labs and through the commercialization funnel. Through a public-private partnership, the State should facilitate collaboration with local and regional universities to identify promising technologies and potential talent and support efforts to bring the right leadership forward to nurture and develop new products.
- **Launch a life sciences accelerator.** The State should capitalize a life sciences technology accelerator that shortens startup time-to-market and increases venture success rates. The accelerator should expand on current healthcare technology incubation efforts, such as MATTER, that have been most successful to date, but lack the necessary resources to intensively drive commercialization of emerging life sciences technologies. One highly successful model to consider exists in Israel, where the government leverages its dollars to attract private

¹² *How Brick and Mortar is Stifling Chicago's Biotech Biz*. Crain's Chicago Business (July 20, 2018)

capital to commercialize early stage technologies. Regionally, models such as BioGenerator (St. Louis), BioEnterprise (Cleveland) and BioCrossroads (Indianapolis) each offer pieces that could be emulated. Key elements include entrepreneurs-in-residence to help build companies, shared services support, and a structure that can help pull the most promising life sciences technologies and connect them to the right talent and capital.

- **Seed a Chicago biotechnology district via funding and incentives.** New, centralized life sciences laboratory space is needed to meet the growing demand for commercial lab space while establishing a community identity through a new downtown biotechnology district. The nation's lowest laboratory vacancy rate contributes to Illinois' startup retention challenge, which increasingly affects retention of larger companies that employ thousands and seek to locate near technology and talent pipelines. While there are signs that real estate developers may be beginning to invest in lab space¹³, it is important from an economic development perspective to develop a cluster of facilities. We propose an initial effort to create at least 500,000-square-feet of laboratory development clustered in one area of Chicago. Additional surrounding space can be developed over time to create a multi-million square foot life sciences zone – similar to Kendall Square in Boston – that positions high-growth startups near required research, clinical and manufacturing partners. Recent federal "Opportunity Zone" legislation that enables capital gains to be invested tax-free into specific under-resourced communities, such as the Illinois Medical District and the former Michael Reese Hospital campus, may have potential to incentivize private funding to drive the downtown biotechnology district concept.
- **Launch early-stage funding instruments.** The State has a history of growing the pool of investable startups through access to early stage capital that enables ventures – particularly R&D-heavy startups like those in the life sciences – to reach key technology and business milestones. The \$74 million Technology Development Account I, for instance, created approximately 6,300 jobs and generated more than \$150 million in private investment¹⁴. Two investment instruments are envisioned.
 - **Small Business Innovation Research (SBIR) matching fund.** Resurrect the dormant SBIR matching grant program. Thirteen states currently offer such matching funds that leverage the existing subject matter expertise and due diligence of federal grant reviewers. Matching dollars support expenses that

**ROI on State Investment:
LifeSciNYC Case Study**

There is no better example today of life sciences-focused economic development than the New York City Economic Development Commission's LifeSciNYC initiative. The \$500 million program includes a well-developed 10-point plan to establish New York City as the global leader in life sciences research and innovation, aiming to deliver 16,000 jobs and more than \$1 billion in new tax revenue. Illinois can do as much right to compete for life sciences talent and companies as New York – but without a State-level commitment to the sector Illinois will continue to experience a talent and technology drain.

federal funding cannot, such as patent filings and business development support. A study of North Carolina's program showed each state dollar returned \$30 in federal and private funding¹⁵. University startups receiving SBIR awards are more likely to remain active over five years (92 percent compared to 74 percent for all university startups)¹⁶, increasing the likelihood of positive ROI by targeting this group.

- **\$50 million public-private seed fund.** Call for Illinois life sciences companies and other investors to support a \$50 million seed fund aimed at helping local startups bridge the "valley of death" gap between federal and institutional funding. These funds could include a match through existing mechanisms such as the \$700 million Treasurer's Illinois Growth and Innovation Fund. The \$50 million in funding will help life sciences startups achieve the technology and market validation milestones needed to receive private venture funding. This effort will foster shared ownership in the Illinois life sciences community's future, while creating leveraged investment opportunities with the potential for a strong return.
- **Establish a public-private, life sciences commercialization-focused organization.** Many states with growing life sciences ecosystems have public-private entities that provide resources to both established companies and startups. These organizations are the "front door" that help startups, investors and Fortune 500 companies gain visibility into local opportunities.

¹³ *Growing Demand, Lack of New Spaces Makes Chicago Life Sciences Real Estate An Asset Class to Watch*. BISNOW (March 1, 2018)
¹⁴ State of Illinois data

¹⁵ *NC finds success with SBIR/STTR matching grants*. SSTI webinar series (October 11, 2017)
¹⁶ 2018 *University Entrepreneurship Index*. ISTR (2018)

Illinois Life Sciences Economic Blueprint

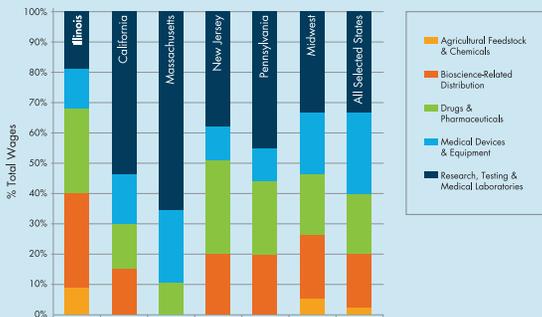


ABOUT iBIO

iBIO is a life sciences industry association representing the 85,000 life sciences jobs in Illinois. Our member companies, universities, service providers and venture capital firms conduct groundbreaking research and make investment to bring life-changing new treatments to patients around the world. As the main convener for the life sciences community in Illinois, iBIO advocates for the industry and promotes the industry's value and its benefits to the public and policymakers; connects innovators to investment, talent and collaboration; and engages industry members to foster the next generation of innovators and entrepreneurs to transform patient lives and the Illinois economy.

ABOUT THE COMMUNITY

With more than **85,000 direct jobs**, Illinois is one of the top states for the life sciences industry. Illinois is also one of the most balanced states between industry subsectors and hosts the second largest concentration of biopharma companies in the country.



The life sciences industry is a huge contributor to the overall Illinois economy. In 2011, the overall economic output of the industry was **\$98.6 billion**. This figure represents \$52.4 billion of direct output, plus an additional \$46.2 billion in indirect and induced output.

OUR MISSION AND VISION

iBIO promotes, connects and engages the life sciences community to drive discovery, transform patient lives and grow the Illinois economy.

Our vision is to make Chicago and Illinois one of the world's top life sciences industry centers.

WHAT IS THE LIFE SCIENCES INDUSTRY?

We define "Life Sciences Industry" to encompass companies in the fields of biotechnology, pharmaceuticals, biomedical technologies, medical devices and diagnostics, nutraceuticals, cosmeceuticals, food processing, environmental, biomedical devices, and organizations and institutions that devote the majority of their efforts in the various stages of research, development, technology transfer and commercialization.

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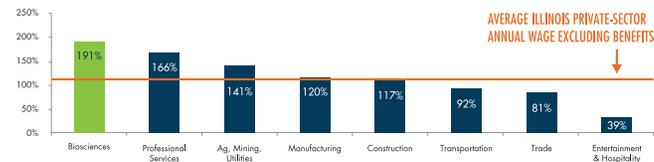
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Illinois Life Sciences Economic Blueprint



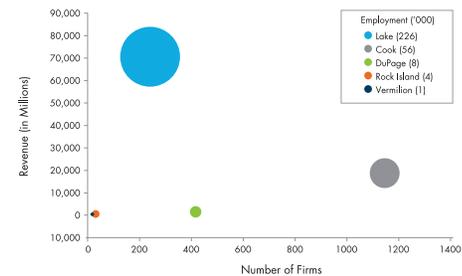
WAGES

Regarding wages, the life sciences industry is also one of the highest paying industries. Illinois residents employed by life sciences companies earn 91% more than the average Illinois resident. Illinois state and local taxes paid by the life sciences industry equal approximately 4.7% of all state and local taxes collected in Illinois.



GEOGRAPHY

The geographical distribution of the life sciences industry is also diverse, with companies located in counties throughout Illinois. Of the top five counties in Illinois, Lake County hosts the greatest number of biopharma companies, and Cook County is primarily distinguished by its high concentration of startup companies in the biopharma, device and food and nutrition fields. DuPage County, Rock Island County and Vermilion County round out the top five in Illinois with a significant presence of agricultural and industrial firms.





Illinois Life Sciences Economic Blueprint

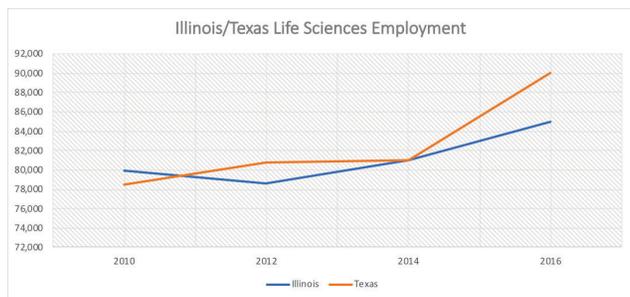
GROWTH

With more than 85,000 life sciences jobs, Illinois is among the top tier of states in terms of industry employment. As the chart below indicates, the Illinois life sciences industry grew by 3.8% since 2014, slightly behind the national average of 4.4% and well behind the growth of the other states with established communities.

State	Employment Growth (2014-2016)	Total Direct Employment 2016
Georgia	10.60%	32,000
Arizona	9%	25,686
Massachusetts	8.90%	94,000
Texas	8.60%	89,746
California	7%	268,000
Illinois	3.80%	85,210

The Value of Bioscience Innovation in Growing Jobs and Improving Quality of Life 2018

Historically the size of the Illinois and Texas life sciences industries have been virtually the same. The graph below highlights the difference in recent growth rates between the states since 2010.



There are a few reasons why Illinois is falling behind the other leading life science industry states, and why Illinois is in effect exporting research and development (R&D), talent and jobs.



Illinois Life Sciences Economic Blueprint

ACCESS TO CAPITAL

Illinois life sciences companies have received \$1.6 billion in venture capital investments from 2014 through 2017. But the state still receives a fraction of the funding available in California and Massachusetts.

Total Bioscience Venture Capital Investment, 2014-17		Bioscience Venture Capital Distributions	
Leading States	Total (\$ Millions)	Leading States	\$ Per 1M Population
California	\$28,582	Massachusetts	\$2,226
Massachusetts	\$16,270	California	\$723
New York	\$2,158	Washington	\$269
Washington	\$1,993	Connecticut	\$250
Pennsylvania	\$1,778	Colorado	\$210
Texas	\$1,591	Minnesota	\$203
Illinois	\$1,586	Utah	\$200
North Carolina	\$1,368	District of Columbia	\$159
Colorado	\$1,180	Maryland	\$158
Minnesota	\$1,132	Pennsylvania	\$139

Source: TEconomy Partners analysis of data from PitchBook Data, Inc.

The need for funding continues to be a reality confronting all life science industry companies. Locating funds to underwrite innovative research is an on-going challenge for small companies which require significant funding to hire qualified personnel and acquire research facilities and equipment. More established companies require larger infusions of venture capital funding for investments in additional infrastructure and clinical research and to move products into the marketplace.

According to a 2016 study by Tufts Center for the study of Drug Development, it can take anywhere from 10-15 years and more than \$2 billion dollars to successfully bring a biotech product to market.

Other states have passed measures and have implemented policies to encourage venture capital and discovery fund investments that benefit targeted technology sectors. These initiatives tend to specifically target early stage funding typically underserved by existing capital markets. Policymakers in other states are establishing a variety of mechanisms to provide vital "deal flow" funding for companies at various stages of research and development, including the encouragement of pension fund and quasi-public investments administered by privately managed venture funds, to tax credits to angel investors.

Illinois Life Sciences Economic Blueprint



INFRASTRUCTURE

Illinois' life sciences industry is growing rapidly, and it takes a complex web of resources to ensure that new companies can form and succeed while remaining in Illinois. According to the Illinois Science and Technology Coalition's Illinois Innovation Index, 942 startups came out of Illinois universities in the past

For emerging life sciences startups in Illinois, the availability of quality laboratory space is one of the most crucial components for continued life sciences industry growth, innovation and development, and yet it is Illinois' scarcest resource.

Startup companies needing less than 1,000 square-feet and growth-stage companies in need of 5,000 square-feet or more of lab space simply have nowhere to go in Illinois. According to CBRE of the 12.5 million square feet of commercial lab space, there is just 1.2 percent available for new companies or expansion.

These facilities are not physical labs, but these facilities create the ecosystem of public private partnerships. More specifically, it is space for universities to team with big and small companies to innovate and commercialize new ventures.

Larger life sciences companies looking to expand or relocate facilities to Illinois do not have an option to move into pre-existing space, they must build-to-suit. This circumstance results in creating a more expensive option for these companies than other communities where we are seeing accelerated life sciences industry growth.

TALENT

The life sciences industry needs a strong supply of qualified, trained workers. Illinois is home to a tremendous talent pool and with more than 14 Research universities, Illinois is one of the best educated states in the United States.

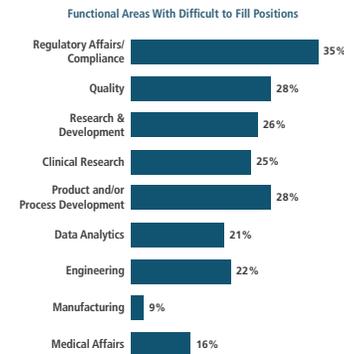
In addition to having world-class researchers, successful life sciences communities need to have an adequate supply of experienced management, sales, marketing, and regulatory in the life sciences industry. Recent announcements of employee reductions and company relocations have diminished the experienced talent pool needed to grow the community and attract relocations.

In 2017 Illinois companies participated in a nationwide life sciences workforce trends survey and report. When surveyed about how difficult it has been to hire certain positions, 78% of respondents reported that they were able to fill positions within 4 months; 42% of them within 9 weeks or less.

Illinois Life Sciences Economic Blueprint



Based on the survey the graph below identifies functional areas that are difficult for life sciences companies to fill. Regulatory Affairs/ Compliance positions continue to stand out as the most challenging to fill. 35% of respondents described those positions as "more difficult" or "much more difficult" than average to fill.



Multiple companies cited significant individual challenges in finding the right candidates for C-suite positions or for positions in Analytical R&D, Bioinformatics, Clinical Development, Clinical Operations, IT & Data Analytics, Project/Program Management, Quality, Regulatory, Research, Sales, Software Engineering.

While Illinois universities are excellent sources for entry-level positions, companies of all sizes are increasingly utilizing recruiters and staffing firms to place candidates into job openings for experienced employees.

Illinois Life Sciences Economic Blueprint



POLICY BLUEPRINT FOR GROWTH

For members of the Illinois life sciences industry now is a critical time to get actively involved in planning for the future of the industry. The Life Sciences industry in Illinois directly employs over 85,000 workers. It is the highest paying industry in Illinois and provides the state with \$98.5B in economic output.

To support the growth of the life sciences industry in Illinois iBIO has developed three overarching goals:

1. Strengthening our ecosystem;
2. Life sciences workforce development and talent retention; and
3. Open Illinois to relocations and expansion

STRENGTHENING OUR ECOSYSTEM

Life Sciences companies are fueled by their R&D, and a robust startup community is critical to a success-ful life sciences ecosystem. Because of the lengthy commercialization timeline for the life sciences industry, there are three distinct phases of company creation and expansion. The chart below highlights the different stages of life sciences companies and the related policy best practices from other states necessary to support that stage of company.

<p>Emerging / startup companies: Typically, these companies have no products on the market and have fewer than 100 employees. Funding is often provided by Angel and Venture Capital sources. Funding provides the company with the ability to begin to verify the viability of a new compound, device or diagnostic tool.</p>	<p>State Best Practices:</p> <ul style="list-style-type: none"> - SBIR/STTR Small Business Technology Match Funding - Seed Capital Tax Credit - Incubator/Accelerator Funding
<p>Testing Companies: This group of companies is made up of mid-stage product development and later stage regulatory review and approval. These companies require significant investment in personnel, equipment and facilities. Mid-stage companies typically have fewer than 200 employees and their products are usually in Phase I FDA trials. The later stage companies must show that their products are both safe and effective. Often pilot-scale manufacturing must be built or contract manufacturing capacity must be secured along with the require personnel.</p>	<p>State Best Practices:</p> <ul style="list-style-type: none"> - Net Operation Losses (Carry-Over, Transferability) (Massachusetts has a 15 year NOL) - Innovation Investment Tax Incentives (Massachusetts has a 10% refundable life sciences investment tax credit in addition to the states R&D tax credit as well as a refundable FDA User Fee Credit.)
<p>Manufacturing Companies: Larger companies with product on the market. These companies are manufacturing commercial quantities of product and have a sales force or license product to another company. Traditional sources of financing are commercial loans and public stock offerings.</p>	<p>State Best Practices:</p> <ul style="list-style-type: none"> - Site and Infrastructure Grant Funds - Renewable Energy Tax Credits - Sales and Use Tax Discounts - Utility rebates

Illinois Life Sciences Economic Blueprint



WORKFORCE DEVELOPMENT

For the life sciences industry, which stands as the most research and development intensive sector of our economy, the importance of talent is well recognized—and the challenges are particularly acute. Industry, State Government and academia need to work in collaboration to identify skill training and education needs to support the growth of the community.

Ensuring a strong foundation of Science, Technology, Engineering and Mathematics (STEM) skills to prepare for postsecondary education and the lifelong learning required for careers in life sciences occupations.

Fostering postsecondary talent generation that promotes strong connections to career opportunities in life sciences.

Upgrading the skills of the incumbent workforce to meet the changing skill demands of the fast-paced innovations and changing business models transforming the life sciences industry.

Raising Illinois' ability to attract and to retain top health and life sciences talent across the highly competitive national labor markets for scientific, engineering, and medical talent.

MARKETING ILLINOIS FOR RELOCATIONS AND EXPANSIONS

Illinois historically has been successful in attracting the establishment of life sciences headquarters and relocations for foreign and domestic companies. Transportation infrastructure, quality of life and geographic location have been constant benefits to attract companies but increasingly Illinois has lost out on some possible relocations because the state is not viewed as business friendly. The policy recommendations provided in the first goal section: Strengthening our Ecosystem will provide some basic economic incentives. In addition to incentives, state government and the industry should collaborate on marketing the industry.

Raise Illinois profile by attracting life sciences international trade conventions like the Annual International BIO Convention

Leverage domestic and foreign conventions to market and showcase the Illinois life sciences industry

Deputize corporate leadership as brand ambassadors for the Illinois life sciences industry

Target marketing efforts at overpriced and overcrowded markets.

iBIO believes a strong and consistent commitment by our government partners is critical to maintaining an ecosystem for industry growth in Illinois. **When government, industry, and academia work together, our community thrives.**



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