

ILLINOIS INNOVATION INDEX

2020 UNIVERSITY ENTREPRENEURSHIP INDEX

STARTUP CREATION REACHES RECORD HEIGHTS

Rosalind Franklin University of Medicine and Science

The *Index* is a
publication of:



INTRODUCTION

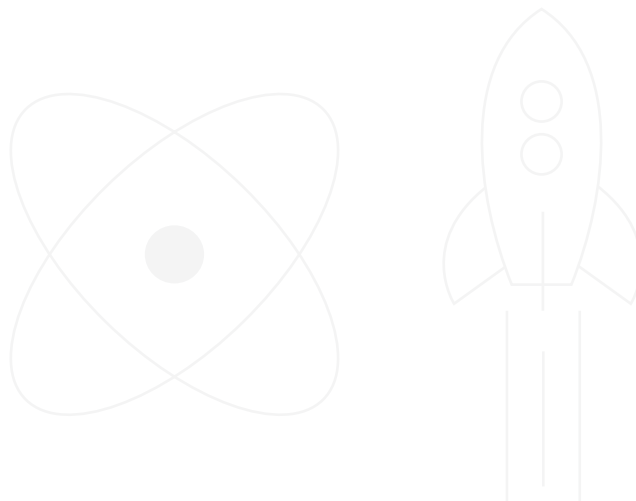
Illinois' universities are engines of talent production and groundbreaking research that propel the state's economy forward. Each year, our universities produce nearly [25,000 new STEM graduates](#) and conduct [\\$2.5 billion in research activity](#)—injecting high-skilled talent into the workforce and creating innovations that become the backbone of new deep tech businesses. Over the past two decades, universities across the state have also embraced the role of supporting entrepreneurial faculty and students by providing additional resources and guiding the creation and growth of new ventures. This work has led Illinois' universities to further increase their economic value to the state through direct support of new business creation and job growth.

The *Illinois Innovation Index* has tracked entrepreneurship and commercialization emanating from the state's universities for more than a decade. In that time, increased support for faculty and students has led to incredible growth in startup activity. This trend continues in 2020, with new records for startup creation, capital raised, and job creation.

KEY FINDINGS

- Over the past five academic years—2014-15 through 2018-19—**1,064 startups were founded by students and faculty of Illinois' universities**. This volume of startup activity is the largest ever tracked by this *Index*, and the first time five-year volume has surpassed 1,000 startups.
- **Nearly three out of five startups founded over the past five years remain active** (59.4 percent), while 39.3 percent are inactive, and 1.3 percent have been acquired.
- Despite the narrative that Illinois' startups leave the state, **more than two-thirds of active startups founded over the past five years remain located in Illinois** (68.5 percent).
- **More than one in five startups founded on Illinois' campuses are in the biotech industry** (21 percent). Healthcare-related startups (those in biotech and healthcare & social services) make up more than one-third of all startups spun out of Illinois' universities.
- Two out of five startups founded over the past five years have received funding through venture or angel investment, competition prizes, SBIR/STTR awards, direct university funding, or other sources. **Startups founded over the past five years have raised \$1.42 billion in funding, the highest amount ever recorded for a five-year period.**
- **More than two-thirds of startups (68.5 percent) that have raised funding remain in Illinois.** However, a majority of startups that have raised more than \$5 million are located outside the state.

- **Startup funding is led by companies in the biotech industry**, which have raised more than those in all other industries combined (\$749 million vs. \$646 million). Startups in real estate and retail & wholesale industries have also collectively raised more than \$100 million in funding.
- Nearly a quarter of startups (23.2 percent) founded over the past five years received direct funding support from their university, totaling \$14.1 million. Startups receiving direct funding from universities have gone on to **raise \$204 million in follow-on funding, representing a staggering 14:1 ratio of follow-on funding.**
- Among startups founded over the past five years, **141 have participated in the NSF I-Corps program, while 78 have received SBIR or STTR funding.** Startups participating in I-Corps or receiving SBIR or STTR funding are more likely to remain active and be located in Illinois.
- Startups founded on Illinois' university campuses provide direct economic benefit to the state through new job creation. **Startups founded over the past five years have created around 3,300 jobs.** Of these jobs, around 2,700 remain active and 1,500 are located in Illinois.
- Over the past several years, universities have stepped up efforts to improve representation in entrepreneurship. These efforts are paying off. Among startups founded over the past five years, **around one-third (33 percent) have a female founder or co-founder, roughly twice the national average.**
- Foreign-born students and faculty are critical to Illinois' startup pipeline. Among startups founded over the past five years, **an estimated 39 percent are founded or co-founded by foreign-born students or faculty.**
- Beyond startup creation, Illinois universities **disclosed 707 inventions**, were **issued 255 patents**, and **created 166 license and options agreements** to commercialize new technologies in 2018. Licensing activity by Illinois universities **brought in \$1.37 billion between 2014 and 2018**, 4th most nationally.



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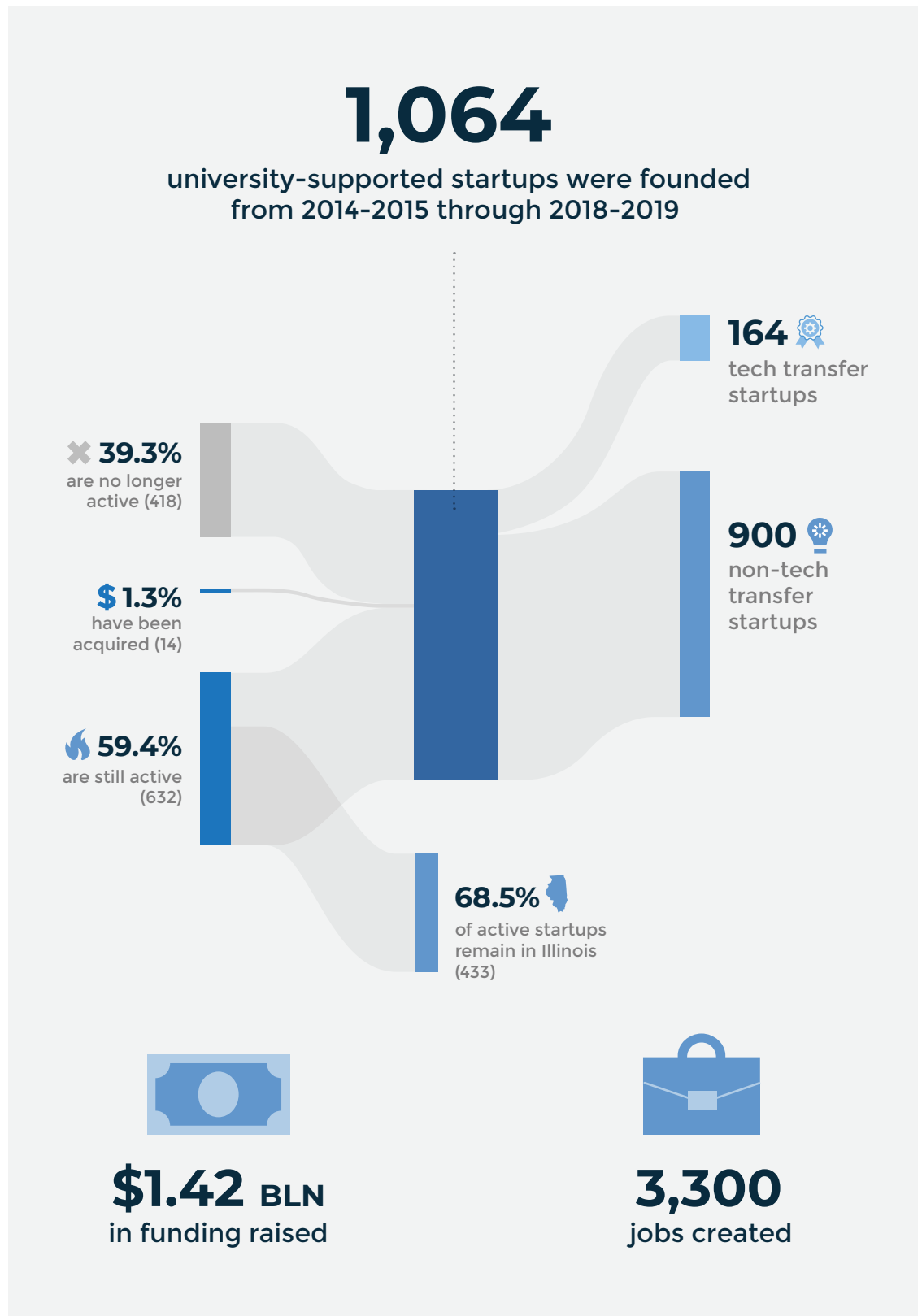
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Startup
Overview
2015-2019



Source: ISTC University
Entrepreneurship Survey

STARTUP CREATION

STARTUP ACTIVITY REACHES NEW RECORD HIGH

Thanks to increased support for entrepreneurship on campuses across the state, startup creation has risen consistently for more than a decade. Over the past five academic years—2014-15 through 2018-19¹—1,064 startups were founded by students and faculty of Illinois' universities.² This volume of startup activity is the largest ever tracked by this Index, and the first time five-year volume has surpassed 1,000 startups. The number of startups founded on Illinois campuses over the past five years is nearly double that of the previous five year period, when 576 startups were founded.

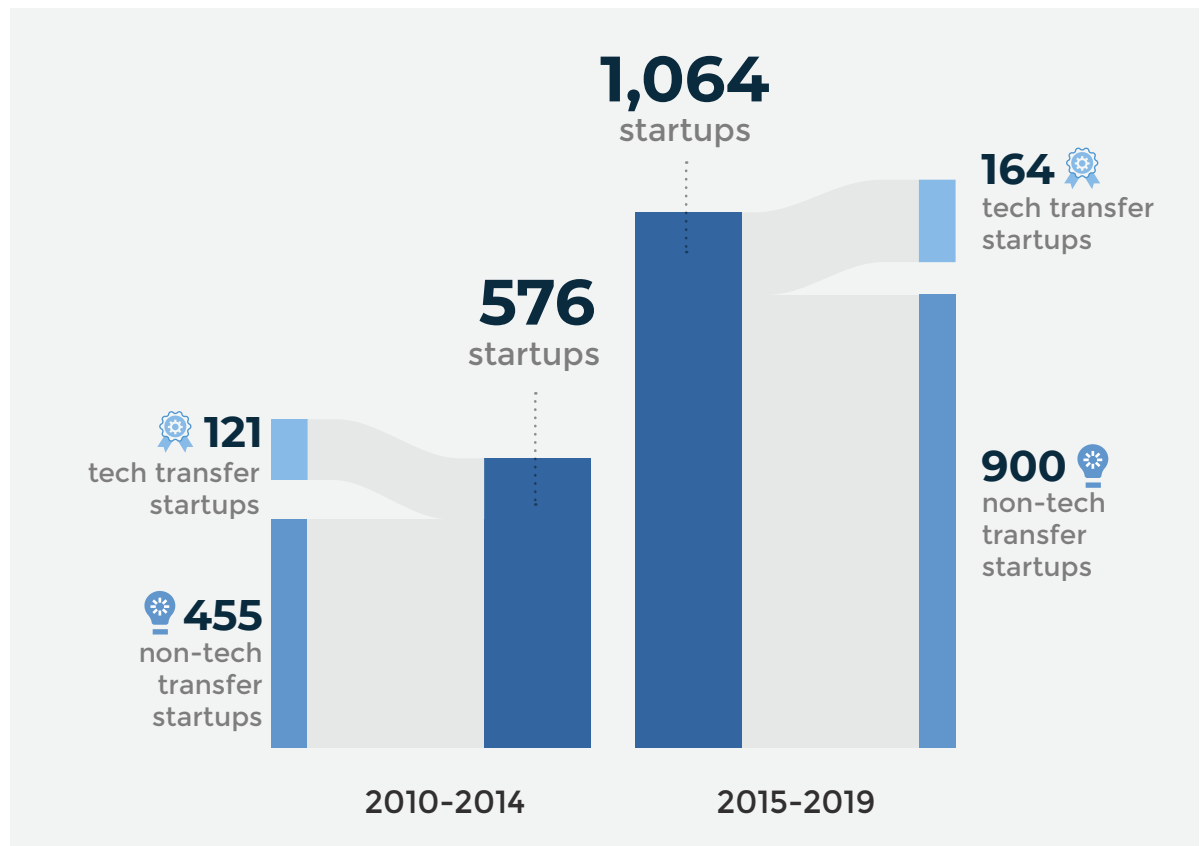
Of the 1,064 startups founded from 2015-2019, 164 startups (15.4 percent) were created through the commercialization of university intellectual property. These “tech transfer” startups are more likely to be founded by research faculty advancing deep tech innovations.³ The remaining 900 startups (84.6 percent) founded over this period are “non-tech transfer” startups. Non-tech transfer startups are those not licensing a technology from their supporting university. These non-tech transfer startups are more likely to be founded by students.

¹ For brevity, this period is referred to as 2015-2019 in the remainder of this *Index*.

² Startups founded by students and faculty are referred to as university-supported startups in the remainder of the *Index*. The full [Index Methodology](#) includes a detailed definition of these startups and ISTC's data collection and analysis process.

³ Deep tech refers to technologies based on substantial scientific advancements or engineering innovations.

Startup Activity by Period



Source: ISTC University Entrepreneurship Survey

Though both tech transfer and non-tech transfer startup activity has grown over the past decade, much of the overall increase in startup activity is due to the growth of non-tech transfer startups. Compared to the previous five-year period, non-tech transfer startup creation has grown by 97.8 percent, compared with 35.5 percent growth among tech transfer startups.

The growth of non-tech transfer startups—especially those led by students—is thanks in large part to an increase in resources provided by university entrepreneurship centers. These centers often provide student entrepreneurs with workspace, incubation programming, mentorship, technical assistance, equipment, access to capital, and more.

Nearly three out of five startups founded over the past five years remain active (59.4 percent), while 39.3 percent are inactive, and 1.3 percent have been acquired. The share of startups remaining active has fallen compared with the previous five year period, when 77.6 percent of startups remained active within five years. This decline can largely be attributed to the growing number of non-tech transfer startups, which are less likely to remain active. 76.2 percent of tech transfer startups founded over the past five years remain active or have been acquired, compared with 57.9 percent of non-tech transfer startups.

Despite the common narrative that Illinois' startups leave the state, more than two-thirds of active startups founded over the past five years remain located in Illinois (68.5 percent). The share of startups remaining in Illinois within five years is largely unchanged compared with the previous period, when 67.6 percent of startups remained in the state.

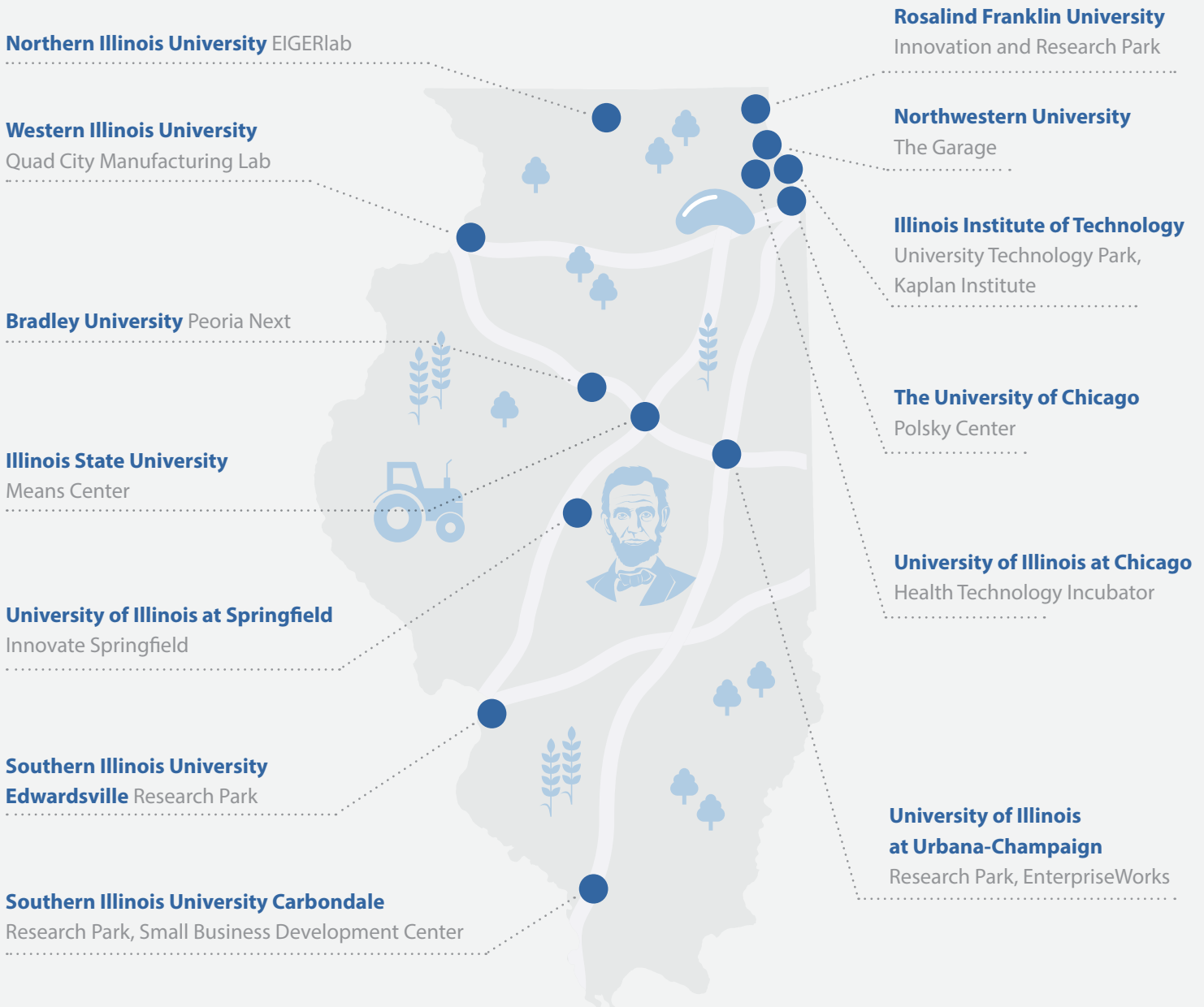
ILLINOIS TECH FOSTERS ENTREPRENEURSHIP THROUGH STUDENT ORGANIZATIONS



The Illinois Institute of Technology (Illinois Tech) has seen student interest in entrepreneurship steadily rise in recent years. This increased interest has led to the growth of student organizations on campus, including those that focus on entrepreneurship, innovation, and product design. New and growing organizations include [Intinium](#), [Collegiate Entrepreneurs Organization \(CEO\)](#), and [Sigma Nu Tau \(SNT\)](#), which each boast close to 100 members. These organizations have been able to leverage the platform of Illinois Tech's new [Kaplan Institute for Innovation and Tech Entrepreneurship](#)—the university's hub for student collaboration and entrepreneurial initiative. Participation in student-organizations focused on entrepreneurship is expected to continue growing at Illinois Tech, injecting new momentum into the university's start-up ecosystem.

UNIVERSITY ENTREPRENEURSHIP CENTERS AND TECH PARKS

Over the past decade, universities in Illinois have created and grown their own vibrant startup ecosystems. These ecosystems are anchored by university-managed incubators and entrepreneurial hubs—including Bradley University’s [Peoria NEXT Innovation Center](#); Illinois State University’s [Means Center](#); Illinois Tech’s [University Technology Park](#) and [Kaplan Institute](#); Northern Illinois University’s [EIGERlab](#); Northwestern’s [The Garage](#); Southern Illinois University Carbondale’s [Research Park](#) and [Small Business Development Center](#); Southern Illinois University Edwardsville’s [University Park](#); The University of Chicago’s [Polsky Center](#); University of Illinois at Chicago’s [Health Technology Incubator](#); University of Illinois Springfield’s [Innovate Springfield](#); University of Illinois at Urbana-Champaign’s [Research Park](#) and [EnterpriseWorks incubator](#); and Western Illinois University’s [Quad City Manufacturing Lab](#).

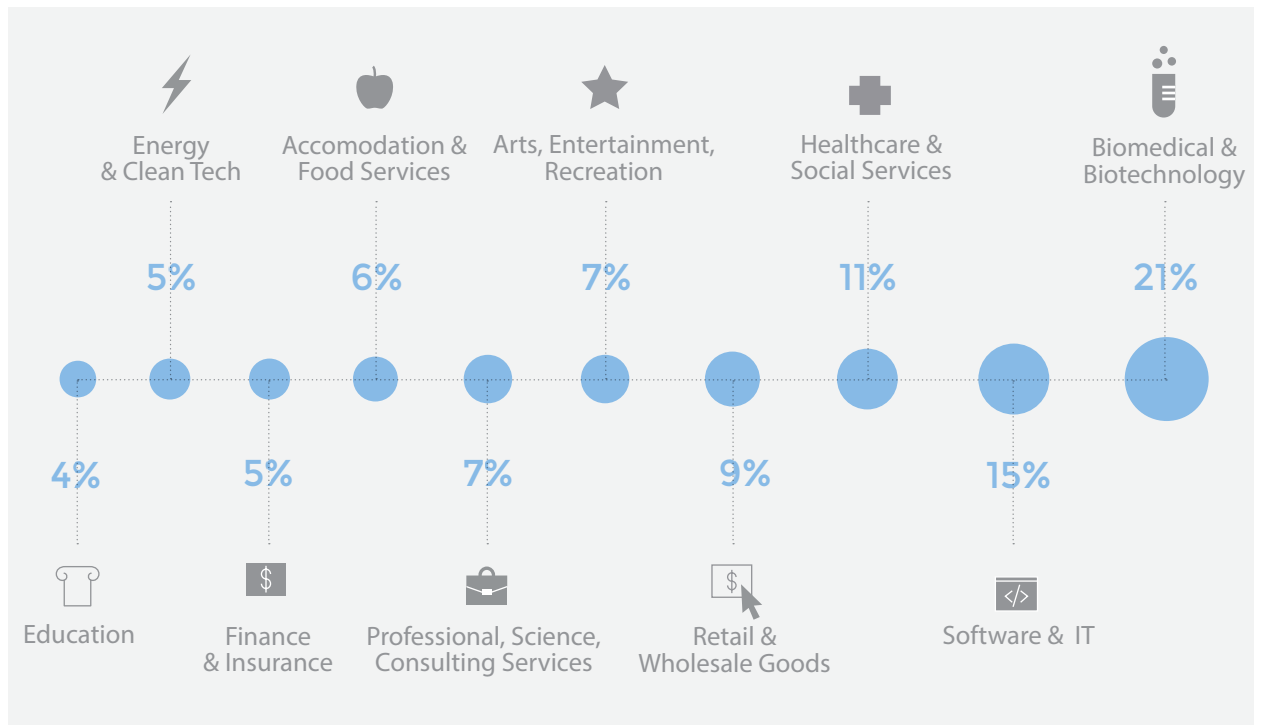


BIOTECH CONTINUES TO LEAD STARTUP CREATION

The strength of Illinois’ academic research in genomics, immunology, diagnostics, and therapeutics (among other disciplines) has led to the growth of startup creation in biotech. More than one out of five startups spun out of Illinois’ universities are in the biotech industry (21 percent). Around 15 percent of university spin-out startups are in information technology, while healthcare & social services startups make up around 11 percent. Together, healthcare-related startups—biotech and healthcare & social services—make up more than one-third of all startups spun out of Illinois’ universities.

Startups by Industry

Top 10 Industries
2015-2019



Source: ISTC University Entrepreneurship Survey

University-supported biotech startups are typically backed by groundbreaking on-campus research. Compared with all startups founded on university campuses, biotech startups are significantly more likely to license a technology from their supporting university. In fact, biotech startups make up more than half (56.7 percent) of all tech transfer startups.



NORTHWESTERN'S VENTURECAT LAUNCHES STUDENT STARTUPS

Northwestern

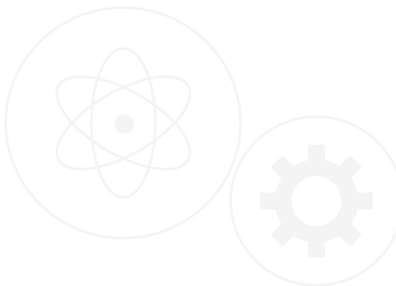
[VentureCat](#) is Northwestern's premier showcase celebrating the University's most promising student-founded startups. The day-long event culminates with a pitch competition in which over \$250,000 in non-dilutive prize money is distributed to the student ventures. Pitches are open to the public and live-streamed to a global audience. The 25 semifinal teams participate in a 4-week Pitch Prep Program which includes: pitch coaching, advice from industry experts, and professional graphic design support. VentureCat is a collaborative event supported by [The Farley Center for Entrepreneurship and Innovation](#), [The Kellogg School of Management](#), the [Donald Pritzker Entrepreneurship Law Center](#), and [The Garage](#) at Northwestern.

STARTUP SPOTLIGHT: RHAEOS



[Rhaeos](#) is a medical device startup that has developed technology to help patients with fluid buildup in the brain, known as hydrocephalus. The company was founded in 2018 by Northwestern University professor John Rogers and Feinberg School of Medicine student Amit Ayer. To treat hydrocephalus, Rhaeos has developed FlowSense, a wearable device that enables monitoring real-time of the brain. Through monitoring, FlowSense can eliminate the need for unnecessary hospital visits and scans. Rhaeos' technology is a result of research conducted in [professor Rogers' lab](#).

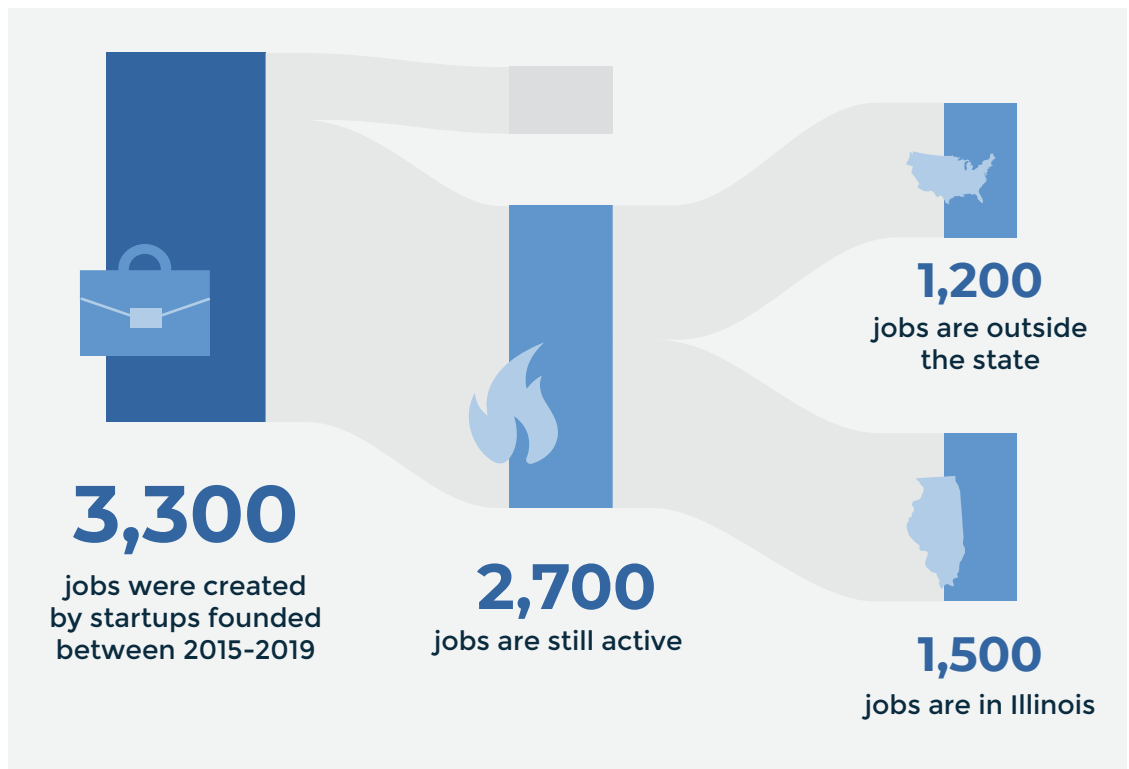
Rhaeos has leveraged Northwestern resources to launch and grow the company. Prof. Rogers connected with his co-founder, Amit Ayer, through the [NUvention](#) program, which helps Northwestern students develop business plans. In 2018, Rhaeos won third-place (and the audience favorite award) at [VentureCat](#), Northwestern's annual student startup competition. Beyond campus, Rhaeos won fourth-place at the national Rice Business Plan Competition in 2019 and was named one of [Built In Chicago's 50 Startups to Watch in 2020](#). For its research, Rhaeos also received an SBIR award of \$225K in December 2019.



UNIVERSITY-SUPPORTED STARTUPS SPUR JOB CREATION

Startup companies spun out of Illinois' universities provide substantive economic benefit by creating new, high-skilled jobs across the state. Over the past five years, university-supported startups have created an estimated 3,300 new jobs. Of those jobs, around 2,700 are still active and 1,500 are in Illinois. By industry, job creation is led by startups in biotechnology (around 700 jobs); retail, wholesale goods, e-commerce (around 450 jobs); and information technology (around 400 jobs).

Job Creation 2015-2019



Source: ISTC University
Entrepreneurship Survey

LAKE FOREST COLLEGE BUILDING ON ENTREPRENEURSHIP PROGRAM SUCCESS



LAKE FOREST
COLLEGE

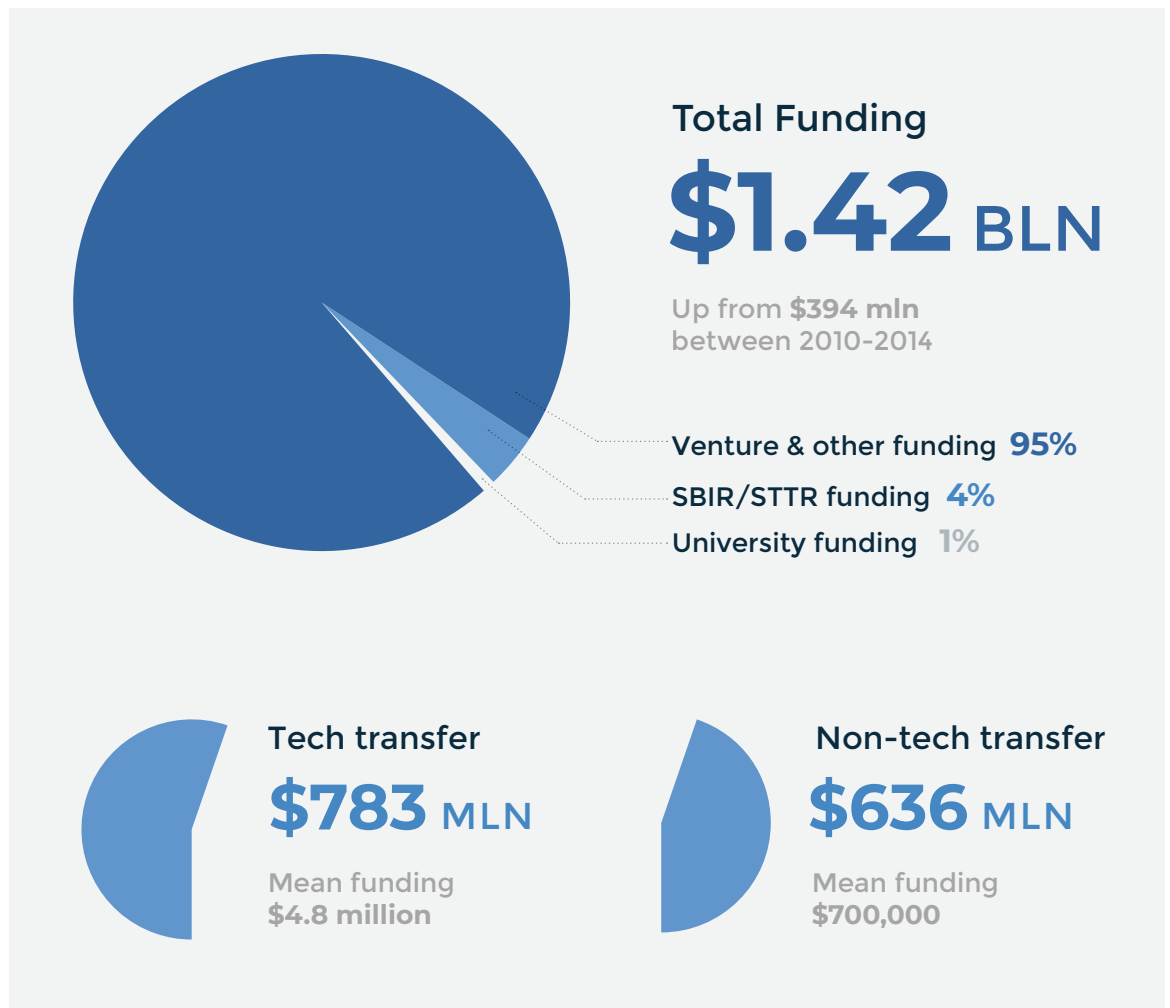
To catalyze a growing student entrepreneurship community, Lake Forest College (LFC) is building a new collaborative innovation space for students. The new [Oppenheimer Center for Innovation and Entrepreneurship](#) will be housed in the Donnelley and Lee Library in the heart of LFC's campus. Creation of the new Oppenheimer Center builds upon the success of LFC's [Entrepreneurship and Innovation Program \(ENTP\)](#), a minor that provides students with guidance and resources to take on entrepreneurial challenges. The ENTP minor is the most popular minor on campus, with more than 20% of Lake Forest College students participating in ENTP programming, courses, and internships.

FUNDING

STARTUP FUNDING SURPASSES \$1.4 BILLION, A NEW RECORD HIGH

As the volume of startups created on Illinois' university campuses has grown, so too has the amount of funding raised by these companies. Among startups founded on Illinois' university campuses over the past five years, 40 percent have received funding through angel or venture investment, competition prizes, direct university funding, or other sources. In total, startups have raised \$1.42 billion in funding, compared with \$394 million over the previous period (2010-2014). Among startups founded over the past five years, the mean funding amounted raised by startups was \$1.3 million, compared with \$680,000 during the previous period.

Startup Funding by Source 2015-2019



Source: ISTC University
Entrepreneurship Survey

Despite making up just 15 percent of all startups, tech transfer startups raised \$783 million in funding—significantly more than non-tech transfer startups, which raised \$636 million. The mean funding amount raised by startups was \$4.8 million for tech transfer startups, compared with \$700,000 for non-tech transfer startups.

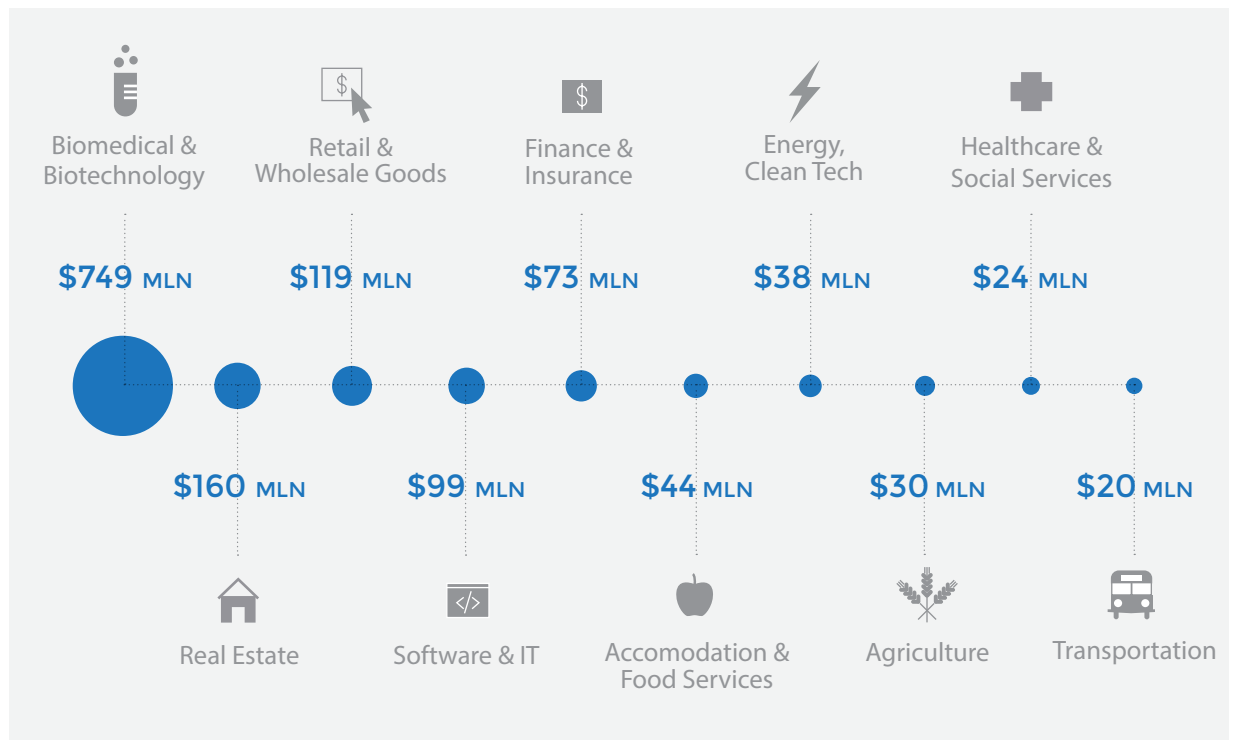
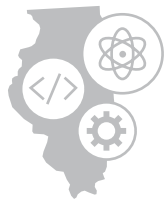
More than two-thirds of startups (68.5 percent) that have raised funding remain in Illinois. However, findings suggest startups leaving the state do so in search of higher levels of funding. More than half of startups that have raised \$5 million or more in funding are located outside Illinois (51.4 percent). Eight of the ten highest raising companies founded on Illinois' campuses over the past five years are now located outside Illinois.

BIOTECH STARTUPS RAISE OVER \$700 MILLION

By industry, university-supported startups in biotechnology founded over the past five years have raised more than those in all other industries combined (\$749 million vs. \$646 million). Startups in real estate; retail, wholesale goods, and e-commerce; information technology; and finance & insurance industries have each collectively raised more than \$50 million.

Funding by Industry

Top 10 Industries
2015-2019 (\$M)



Source: ISTC University Entrepreneurship Survey

UNIVERSITY OF ILLINOIS ASSISTING ENTREPRENEURS STATEWIDE

ILLINOIS UNIVERSITY INCUBATOR NETWORK

With funding support from the U.S. Economic Development Administration (EDA), the University of Illinois at Urbana-Champaign (UIUC) is providing additional resources to boost entrepreneurship across the state. Thanks to EDA funding, UIUC has established the [Illinois University Incubator Network \(IUIN\)](#) and EDA University Center, both led by the university's [EnterpriseWorks incubator](#). The IUIN and EDA University Center provide technical assistance to entrepreneurs, small businesses, and communities throughout Illinois. These services include counseling or workshops that assist with SBIR funding proposals or award management; mentoring guidance for startups; creative and design assistance; incubator feasibility guidance; and resource sharing among Illinois incubators, accelerators, and entrepreneurship programs.

STARTUP SPOTLIGHT: PSYONIC

PSYONIC

[PSYONIC](#) is a startup advancing bionic prosthesis technology for those with limb differences. The company was founded in 2015 by University of Illinois at Urbana-Champaign (UIUC) students Aadeel Akhtar (PhD, neuroscience) and Patrick Slade (BS, mechanical engineering). PSYONIC's mission is to create better and more affordable bionic prosthetics that are guided by machine learning. The company's flagship bionic hand—dubbed the Ability Hand—is a durable and lightweight prosthesis that also provides touch feedback to its wearer. The Ability Hand is also significantly more affordable than many alternatives, and can even be free to users through their healthcare insurance.

To help launch the company Akhtar and Slade participated in UIUC's [Cozad New Venture Challenge](#) in 2015, winning the grand prize. Akhtar also won the [Illinois Innovation Prize](#) in 2016—an award given annually to a student innovation positively impacting society. PSYONIC has also won two SBIR awards to further develop their touch feedback prosthesis technology. The company is based at the University of Illinois Research Park.



DIRECT UNIVERSITY FUNDING HELPS STARTUPS BRIDGE GAPS

One trend that has helped boost the viability of university-supported startups is the growth of direct funding from universities. This funding support now includes everything from pitch competition prizes to equity investments, and helps support startups at multiple stages of growth.

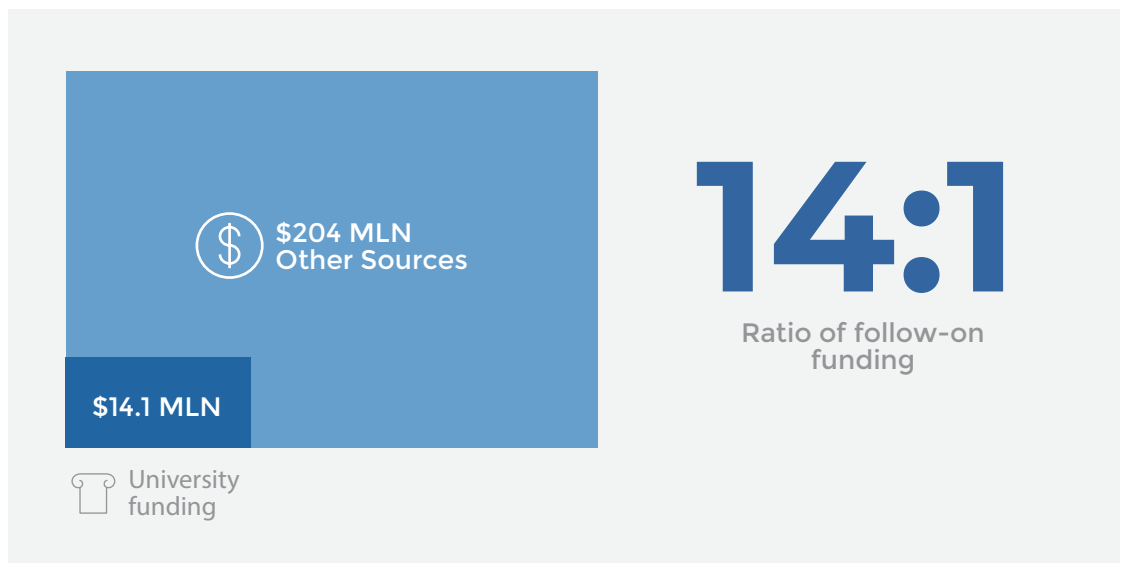
Early stage startups benefit from startup competitions at universities across the state, including Illinois State University's [Means Center Startup Showcase](#); Illinois Tech's [Innovation Challenge](#); Lake Forest College's [Venture Design Competition](#); Northern Illinois University's [EigerLab FastPitch Competition](#); Northwestern University's [VentureCat](#); The University of Chicago's [Edward L. Kaplan, '71, New Venture Challenge \(NVC\)](#); and University of Illinois at Urbana-Champaign's [Cozad New Venture Challenge](#). Active university funds include Illinois State University's [William and Nancy Yarger Entrepreneurial Support Fund](#); Northwestern University's [N.XT Fund](#) and [NUSeeds](#); The University of Chicago's [George Shultz Innovation Fund](#) and [UChicago Startup Investment Program](#); University of Illinois [Illinois Ventures](#); and University of Illinois at Chicago's [Chancellor's Innovation Fund](#).

Nearly a quarter of startups (23.2 percent) founded over the past five years received direct funding support from their university, totaling \$14.1 million in funding. Direct university funding amounts are typically small (median of \$10,000), but allow early stage startups to build prototypes, explore target markets, and refine their business plans, while also positioning the startup for further funding. In fact, startups that received direct university funding have gone on to raise a staggering \$204 million in follow-on funding from the venture capital community and other sources. This amount represents a 14:1 ratio of follow-on funding resulting from direct university funding.

Direct University Funding 2015-2019



Source: ISTC University Entrepreneurship Survey



ROSALIND FRANKLIN UNIVERSITY UNVEILS NEW RESEARCH PARK



This spring, Rosalind Franklin University of Medicine and Science (RFUMS) unveiled its [Innovation and Research Park](#), a new 100,000 square foot laboratory and workspace for life science innovation. The Innovation and Research Park provides space for RFUMS research labs—including much needed wet lab space—as well as workspace for industry and startups designed to foster the sharing of ideas and expertise.

The Innovation and Research Park is also the new home of the [Helix 51 incubator](#) and the [SmartHealth Catalyzer](#). Helix 51—Lake County’s first life science incubator—is a dedicated space for RFUMS faculty and regional startup companies to form and accelerate their growth. SmartHealth Catalyzer accelerates the commercialization of therapeutics, diagnostics, and medical devices being developed at Midwest universities and research hospitals that diagnose, prevent and treat life threatening diseases.



The Innovation and Research Park’s newly completed lab space.

STARTUP SPOTLIGHT: NEUROLUCENT



[NeuroLucent](#) is a biotech startup working on promising new therapeutics to treat patients with Alzheimer’s disease (AD). Founded in 2016 by Rosalind Franklin University of Medicine and Science (RFUMS) professor Beth Stutzmann, NeuroLucent is developing compounds that restore healthy neuronal signaling. Unlike existing treatments that only temporarily slow the progression of memory loss, NeuroLucent’s compounds stop memory loss by keeping synaptic health and memory function intact.

NeuroLucent is advancing its new compound through an exclusive license, including patents, with RFUMS. This includes nine compounds already cleared as effective in AD models. Thanks to the strength of its science, the company has raised significant funding to commercialize a new AD treatment, including a grant from the Alzheimer’s Drug Discovery Foundation and an STTR award.

I-CORPS, SBIR AND STTR PROGRAMS CATALYZE GROWTH, RETENTION

The federal government plays a significant role in supporting deep tech startups through the National Science Foundation’s Innovation Corps (I-Corps) program, the Small Business Innovation Research (SBIR) program, and the Small Business Technology Transfer (STTR) program. I-Corps participants learn to identify valuable product opportunities that can emerge from academic research, and gain skills in entrepreneurship through training in customer discovery and guidance from established entrepreneurs. The SBIR and STTR programs offer funding through federal agencies to encourage small businesses and startups to engage in research and development that has the potential for commercialization.

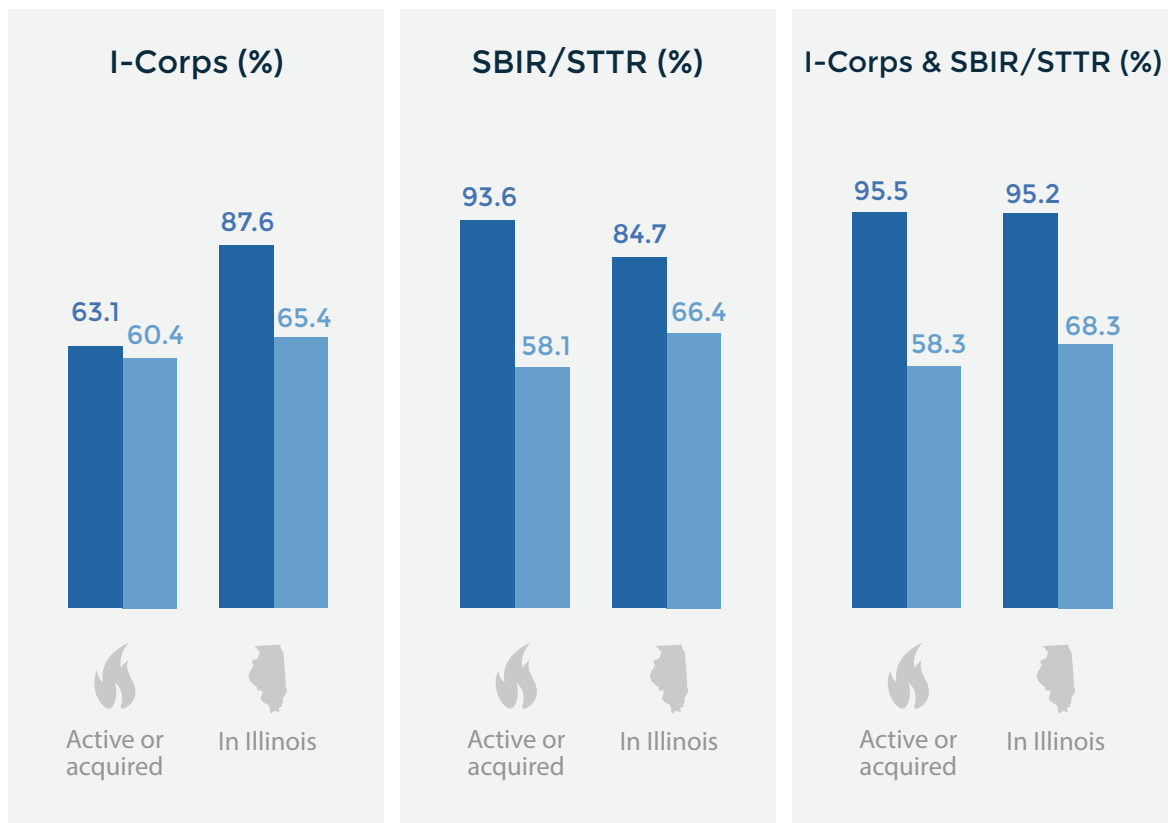
Among university-supported startups founded over the past five years, 141 (13.3 percent) have participated in I-Corps. Compared with non-participant startups, those participating in I-Corps are slightly more likely to remain active within five years (63.1 percent vs. 60.4 percent), and significantly more likely to remain in Illinois (87.6 percent vs. 65.4 percent).

I-Corps & SBIR/STTR 2015-2019



■ Participants
■ Non-Participants

Source: ISTC University Entrepreneurship Survey



Around 7 percent (78 startups) of university-supported startups founded over the past five years have received SBIR or STTR awards, totaling \$52.7 million in funding—both record highs for a five-year period. Being awarded an SBIR or STTR funding is a significant boon for the viability of Illinois' university-supported startups, with 93.6 percent of recipient startups remaining active or being acquired—compared with 58.1 percent for startups that have not received SBIR/STTR funding. Startups receiving SBIR/STTR funding are also significantly more likely to remain in Illinois (84.7 percent), compared with those that have not received this funding (66.4 percent).

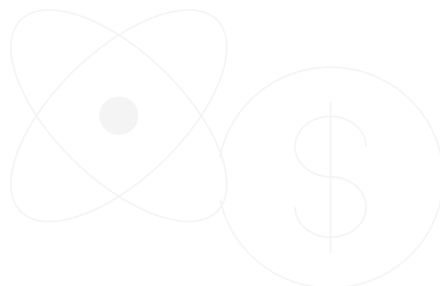
Overall, Illinois punches below its weight in SBIR and STTR funding. Companies in the state received 127 SBIR or STTR awards in 2018, totaling \$69.6 million in funding. Illinois ranks 12th nationally by both the number of companies receiving SBIR or STTR awards, and the amount of funding received. This finding illustrates the need for Illinois to join many of its peer states by offering matching funds for startups receiving SBIR/STTR awards.

STARTUP SPOTLIGHT: HIGH SCHOOL ZOOM



[High School Zoom](#) is a startup streaming platform that allows fans to watch high school sports events live online for free. The startup was founded in 2018 by Blake Whittle, then a senior at Illinois State University. Whittle saw an opportunity in the streaming sports market when The Cube, a similar streaming service, shifted to a pay-per-view model and eliminated its free streams. High School Zoom provides free streams to viewers, instead charging high schools an annual fee to broadcast their events through the platform.

To launch High School Zoom, Whittle leveraged assistance provided by Illinois State University's College of Business and the George R. and Martha Means Center for Entrepreneurship. This included guidance from faculty mentors, and \$5,000 in funding support through the [William and Nancy Yarger Entrepreneurial Support Fund](#). High School Zoom is currently working to expand its platform to include more high schools across the country.



ENTREPRENEURSHIP IN ACTION

UNIVERSITY-SUPPORTED ENTREPRENEURS TAKE ON COVID-19

The COVID-19 pandemic has introduced critical challenges for healthcare systems and frontline medical workers across the globe. Luckily, entrepreneurs on Illinois' campuses are stepping up to take on these challenges. These entrepreneurs, either through startup ventures or by leveraging university R&D expertise, are creating innovative solutions to fight the pandemic and save lives.

Beyond the extraordinary work that Northwestern University medical researchers are doing to study COVID-19 treatments and expand testing, university-supported entrepreneurs are also developing new healthcare solutions. With support from a National Science Foundation (NSF) RAPID grant, Northwestern innovators are creating a new [self-sanitizing medical face mask](#). The new mask deactivates viruses on contact, and would provide an increased level of protection to healthcare workers on the frontlines.

Student entrepreneurs at Northwestern are also shifting their focus to find innovative solutions to COVID-19 challenges. [City Health Tech](#), founded by Northwestern senior Ibraheem Alinur, aims to lessen the spread of disease by encouraging longer hand washing times. The company's first device, coined Opal, is a digital, wireless display that plays engaging and customizable animations that encourage users to wash their hands for 20 seconds. City Health Tech is working with city governments and businesses to help stop the spread of COVID-19 through improved hygiene.



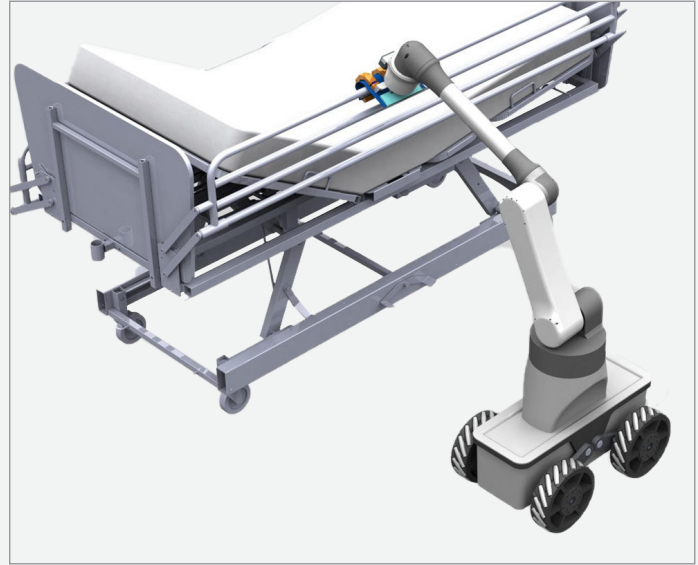
Fabric Medical's KN95 masks (left), and City Health Tech's Opal device (right).

Vishaal Mali, co-founder of [PedalCell](#) and a Northwestern senior, also quickly pivoted from his normal operations to aid in the COVID-19 crisis. Led by Mali, a team of five Northwestern engineering students and Rosalind Franklin University medical students formed [Fabric Medical](#) to supply FDA approved KN95 respirators to hospitals and organizations in need during the COVID-19 outbreak.

At the University of Illinois at Urbana-Champaign, innovators are also working to boost the supply of life-saving medical equipment. A team of innovators, led by the university's Grainger College of Engineering, have created a new prototype ventilator, coined [RapidVent](#), to help address shortages. RapidVent has been shown to perform as well as commercial ventilators. The Grainger-led team has also developed [RapidAlarm](#), a system that monitors respirators, allowing critical staff to care for more patients simultaneously.

To boost the supply of personal protective equipment, The University of Illinois at Chicago's Makerspace lab shifted operations to create [face shields](#) using the lab's 3D printers, laser cutters, and milling and scanning equipment. Using this equipment, the Makerspace is able to produce a face mask every 20 seconds, and is working with the University of Illinois at Chicago Medical Center to distribute face shields to healthcare workers who need them most.

In addition to creating new medical devices and meeting demand for PPE from healthcare providers, University of Illinois at Urbana-Champaign (UIUC) spin out companies are working to create new healthcare solutions. [EarthSense](#)—a robotics startup co-founded by UIUC professor Girish Chowdhary and former UIUC postdoc Chinmay Soman—is working to adapt its autonomous robots for cleaning in hospitals and public spaces. By reducing the need for sanitary workers, EarthSense's robotic cleaning units can help lower the community transmission rates of COVID-19 and other infectious diseases.



EarthSense's prototype cleaning robot

[Serionix](#), an air filtration startup founded by UIUC materials science and engineering alum James Langer (PhD 2012), is applying its technology to face masks. The company is using its [Colorfil technology](#) to create antiviral masks that change color when they expire. The technology is currently being tested against COVID-19, and the company plans to supply up to millions of Colorfil masks at a local and national level.

University of Chicago-supported startups are also leveraging their technology and expertise to create solutions. The FDA recently authorized the continuous monitoring technology developed by UChicago Innovation Fund recipient [physIQ](#) for COVID-19 care. The physIQ monitoring system, named [pinpointIQ](#), can now be used to provide continuous physiologic remote monitoring for any quarantined COVID-19 patients. The monitoring technology can detect even the most subtle changes in a patients' physiology and offer early detection of COVID-19-related complications, all while remaining safely in self-isolation.

Co-founded by Rachel Kohler and UChicago physician Dr. Stacy Lindau, Hyde Park-based [NowPow](#) is working to make it possible for care providers, first responders, and even volunteers to refer people to vital emergency resources during the COVID-19 crisis. Covering all aspects of a person's "whole health" from physical and mental to financial and emotional, NowPow's health services platform is an easy and accurate way for healthcare workers to refer patients to the tools and facilities that they need to improve their health.

These university-supported innovations and ventures represent just a fraction of the ongoing work across Illinois' campuses to address COVID-19. Thanks to these entrepreneurial centers, new solutions are helping the state, and nation, overcome this challenge.

FOUNDERS

ADDITIONAL RESOURCES BOOSTING FEMALE ENTREPRENEURSHIP

Over the past several years, this *Index* has tracked the growth of female founders on Illinois' campuses. Among university-supported startups founded over the past five years, an estimated one-third (33 percent) were founded or co-founded by women.⁴ Though less than representative, this share is significantly higher than the national average, where around 17 percent of startups have a female founder or cofounder.⁵

The growth of female entrepreneurship on Illinois' campuses is no accident. Universities across the state are stepping up efforts to support female founders. Northwestern University's [INVOReach](#) and [Propel Program](#) provide resources for women and other underrepresented entrepreneurs, including additional resources, networking, mentorship, and immersive learning experiences that promote diversity and inclusion in the invention-to-innovation entrepreneurship lifecycle. The University of Illinois at Urbana-Champaign's [AWARE program](#) offers a dedicated entrepreneur-in-residence, mentorship, proof-of-concept grants, and events to underrepresented entrepreneurs. The University of Chicago's Polsky Center hosts frequent events supporting women in entrepreneurship, while monthly meetups help female founders support each other.

⁴ Estimate based on a subset of 573 startups for which data were available.

⁵ [Crunchbase Women in Venture Report, 2017](#)

UIC CONNECTING ENTREPRENEURS WITH INDUSTRY EXPERTS



The University of Illinois at Chicago (UIC) has launched its new [Executives in Residence \(XIR\) program](#). Beginning as a six-month pilot, the XIR program will connect UIC researchers with expert industry executives to help them commercialize their technologies, explore industry partnerships, and launch new startups. To facilitate the new program, UIC's [Office of the Vice Chancellor for Innovation](#) has put together a diverse group of industry leaders, including innovators, investors, and advisors. Researchers that participate in the program will receive business insights, guidance on market trends and strategies, and technology development consultation. During the initial pilot, the XIR program will focus on medical devices, artificial intelligence, and machine learning, with industry partners dedicating 2-4 hours per week to work with UIC Innovators.

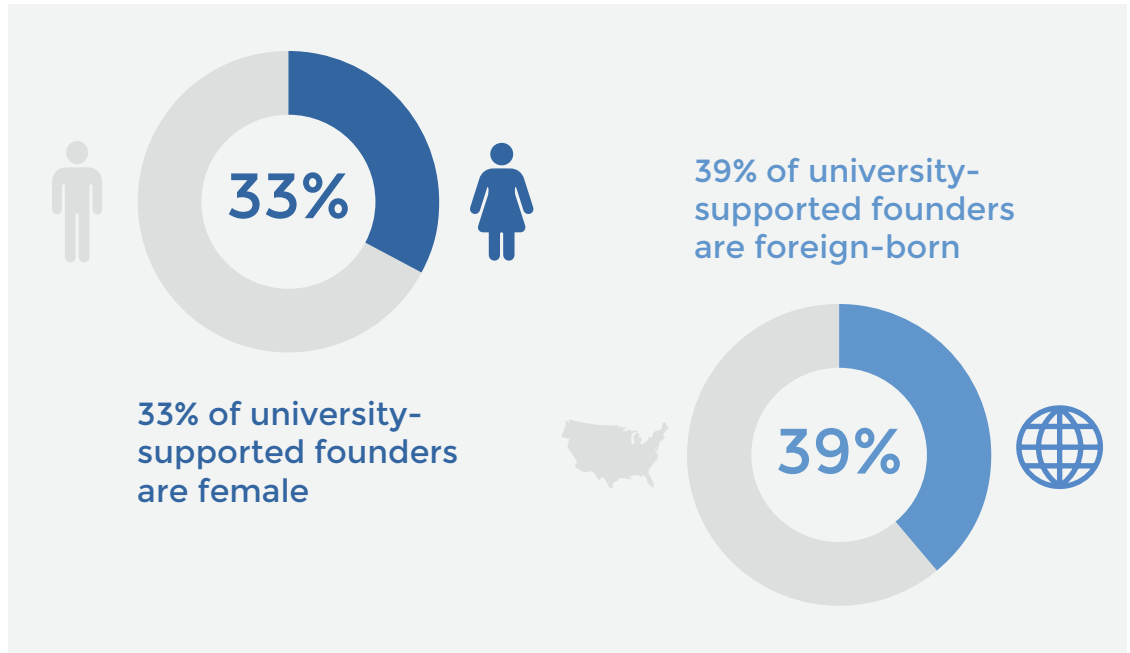
Data show efforts to boost female entrepreneurship are paying off. Compared with all university-supported startups, female founded startups are more likely to remain active within five years (68.5 percent vs. 59.4 percent). Female founded startups on Illinois’ campuses are also more likely to receive funding (52.9 percent vs. 40 percent).

Female & Foreign-born Entrepreneurs 2015-2019

University-supported startup founders



Source: ISTC University Entrepreneurship Survey



FOREIGN-BORN FOUNDERS CRITICAL TO ILLINOIS’ STARTUP PIPELINE

The strength of Illinois’ universities, especially in STEM fields, attracts students and faculty from around the world. This influx of talent is vital to both Illinois’ workforce, and the creation of new businesses. Among university-supported startups founded over the past five years, an estimated 39 percent were founded or co-founded by foreign-born students or faculty.⁶

This finding mirrors similar data on foreign-born and immigrant entrepreneurship. In Illinois, immigrants and foreign-born residents make up nearly a quarter (24.7 percent) of the state’s entrepreneurs, despite making up just 14 percent of the state’s population.⁷ Nationally, immigrants have founded more than half (55 percent) of all startups valued at \$1 billion or more.⁸ The critical role of immigrants in the creation of new ventures—both in Illinois and nationally—illustrates the need to protect current immigration policies that allow founders to stay in the US, and to create new paths to prolonged and permanent residency for foreign-born entrepreneurs.

⁶ Estimate based on a subset of 273 startups for which data were available.

⁷ ACS Public Use Microdata Sample (PUMS). U.S. Census Bureau, 2018

⁸ [National Foundation for American Policy, 2018](#)

TECH TRANSFER

COMMERCIALIZATION AND TECH TRANSFER METRICS SHOW MIXED GROWTH

Beyond supporting the creation of new student and faculty startups, innovations made possible through university research can become commercially available through the technology transfer (tech transfer) process. This process typically involves three key steps: 1) the disclosure of a new technology made possible through university research, 2) the protection of the technology through patents or copyrights, and 3) commercialization of the technology through license or options agreements.

In 2018, Illinois universities disclosed 707 inventions, were issued 255 patents, and created 166 license and options agreements to commercialize new technologies. Though the quantity of licenses and options agreements created by Illinois universities lags behind many peer states (Illinois ranks 19th nationally), Illinois universities brought in \$1.37 billion in license revenue between 2014 and 2018, 4th most nationally.

Tech Transfer Metrics 2018



Invention Disclosures

707

Patents

255

Licenses & Options

166

License Revenue 2014-2018

\$1.37 BLN

State rank

13th

9th

19th

4th

CAGR 2014-2018

1.2% in Illinois
2.2% nationally

2.2% in Illinois
4.7% nationally

4.2% in Illinois
8.2% nationally

Source: Association of University Technology Managers (AUTM)

UCHICAGO'S POLSKY CENTER INNOVATES IN TECH TRANSFER



The University of Chicago's [Polsky Center for Entrepreneurship and Innovation](#) has reimaged its technology transfer function and launched "Polsky Science and Technology." This newly formed group will operate at the forefront of innovation and at the important intersection of science and business. Polsky Science and Technology has moved to a new model of specialized functional groups to enable invention specialists and business experts to provide deep expertise to all innovators and industry partners. The new structure is built to scale and supports the entire commercialization value chain—from IP protection to technology licensing and new venture creation.

The Polsky Center is actively expanding its support for technology commercialization in quantum, microbiome, data analytics, and immunoengineering. The Center works closely with researchers who are making breakthrough discoveries and developing next generation technologies through the [Chicago Quantum Exchange](#), the [Duchossois Family Institute](#), the [Center for Data and Computing](#), and the newly launched [Chicago Immunoengineering and Innovation Center](#).

Developing a strong pipeline of new innovation creates significant economic benefit for the entire Chicago region and state. The Polsky Center is active in the ecosystem and works closely with World Business Chicago's [ChicagoNEXT](#), [P33 Chicago](#), [Argonne](#), [Fermilab](#), and others, to pave the way to transform Chicago into a global city for technology, science, and deep tech innovation.

CHICAGO QUANTUM EXCHANGE: BUILDING THE NATION'S QUANTUM EPICENTER



Quantum information science will enable quantum computers to solve problems that classical computers can't, networks to send unhackable information, and sensors to detect cancer in a single cell. The future impact of quantum science and engineering relies on the discoveries of today. In our region, this effort is led by the [Chicago Quantum Exchange \(CQE\)](#), a collaboration between The University of Chicago, Argonne, Fermilab, the University of Illinois, the University of Wisconsin, and Northwestern University. This rapidly expanding network connects leading talent, top scientific facilities, and prominent industry partners to drive technological advances and innovation. With support from the State of Illinois to build an epicenter for quantum science and economic development, the CQE is developing Chicago and the region into the nation's quantum powerhouse.

LOOKING FORWARD

LEVERAGING UNIVERSITY-DRIVEN ENTREPRENEURSHIP FOR ECONOMIC GROWTH

Illinois' entrepreneurial faculty and students have more resources and support at their disposal than ever before. University entrepreneurship centers across the state provide incubation programming, mentorship, pitch and startup competitions, technical assistance, direct funding, and much more. Thanks to this support, entrepreneurship emanating from Illinois' campuses reached new heights over the past five years. However, more can be done to ensure that our homegrown startups are able to scale in Illinois.

A key factor to growing retention of university-supported startups is ensuring they have access to resources once they leave campus. Over the past decade, Illinois' university entrepreneurship centers have built a strong pipeline to the state's larger ecosystem of entrepreneurship resources. These resources include [1871](#), [BLUE1647](#), [Catapult Chicago](#), [ChicagoNEXT](#), [iBIO](#), [ICNC](#), [ISTC](#), [Illinois Technology Association](#), [mHUB](#), [MxD](#), [TechNexus](#), [Techstars](#), and many more. Industry-specific resources include [2112](#), [CBC Accelerator Network \(CBCAN\)](#), [Clean Energy Trust](#), [Current](#), [Energy Foundry](#), [MATTER](#), [The Hatchery](#), among others.

Though the growth of Illinois' ecosystem of entrepreneurial resources—and the strengthening pipeline to these resources from universities—has helped retain startups, too many are still leaving the state in search of funding and other resources. This is especially the case for deep tech startups, which often require more specialized technical assistance and higher levels of funding to scale.

To help retain and scale more economically critical deep tech startups, Illinois should enact an SBIR and STTR matching program. Such a program would provide matching funds to startups that receive SBIR or STTR funding, putting the state on an even playing field with many of its peers and incentivizing participation in a federal funding program that helps retain startups. The state should also look to incentivize R&D collaboration between scaling, off-campus startups and universities. Such collaborations benefit both parties, with startups leveraging university research assets to develop new products, and universities accessing additional resources.

At the federal-level, immigration issues preventing foreign-born founders from staying in the country to scale their startups must be addressed. Currently, no "startup visa" program exists that would offer a direct path to residency for founders. Instead, many are forced to leave the country to grow their companies, or abandon the venture to seek employer sponsorship for an H-1B visa. The current immigration system must be retooled to allow foreign-born entrepreneurs the ability to stay and grow their startups in the US, creating high-skilled jobs in the process.

Universities across our state are launching and supporting more entrepreneurs than ever before. Now the task is to ensure these ventures—and their founders—have the tools and opportunity to flourish in Illinois. ■

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The Illinois Science & Technology Coalition (ISTC) is a member-driven nonprofit that measures, connects, and advocates for Illinois' innovation economy. Created by the State of Illinois 30 years ago, we create powerful links between the state's universities, industry, startups, and government to strengthen our economy and talent pipeline through data collection, policy advocacy, and programs.

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