

# Illinois Innovation Index

Innovation news and metrics for metropolitan Chicago and the state of Illinois



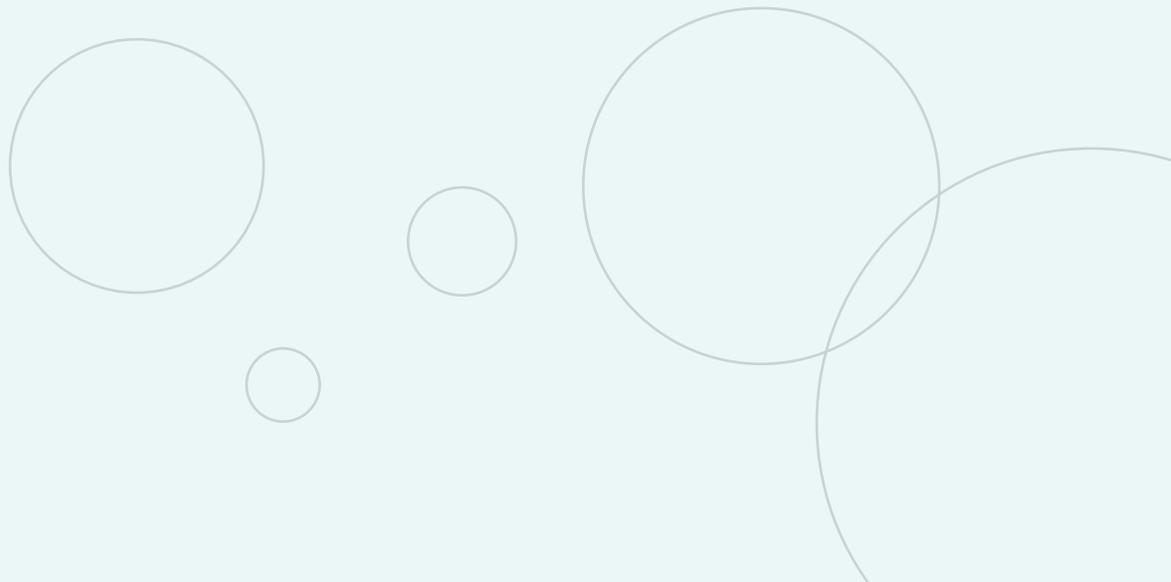
Winter 2016

## University Entrepreneurship Rising: A detailed look at university startup creation, tech transfer, and local funding trends

## Overview

Illinois universities are vital economic engines for the state's economy. Beyond producing tens of thousands of qualified graduates each year, higher-education institutions throughout the state are also at the forefront of innovation and entrepreneurship. They attract the brightest minds, provide the resources and infrastructure for research and exploration across a variety of disciplines, and spawn visionary companies that go on to make a significant social and economic impact.

The past several years have seen a growth in entrepreneurial programs at universities as manifested in the growing number of startup competitions, incubation spaces, mentorship programs, seed funding, and entrepreneurial education and training provided by universities. These initiatives have emerged alongside the traditional technology transfer process, which focuses on commercializing proprietary research and facilitating public-private partnerships. Given the importance of activities at the intersection of academia and business in ensuring that promising ventures have the funding, facilities, and mentorship to reach their full potential, the ISTC has sought to capture data on the full gamut of university entrepreneurship.



This issue of the *Illinois Innovation Index* features research and analysis on the depth of Illinois' university entrepreneurial ecosystem and how it interacts with another critical stakeholder—investors, both public and private. Our comprehensive look provides the latest figures on overall university entrepreneurship as well as an in-depth examination of the technology transfer process, an integral element of university innovation. Our analysis also finds new evidence that local investors play a critical role in supporting innovation and entrepreneurship, providing much-needed funding to Illinois startups.

**Key findings:**

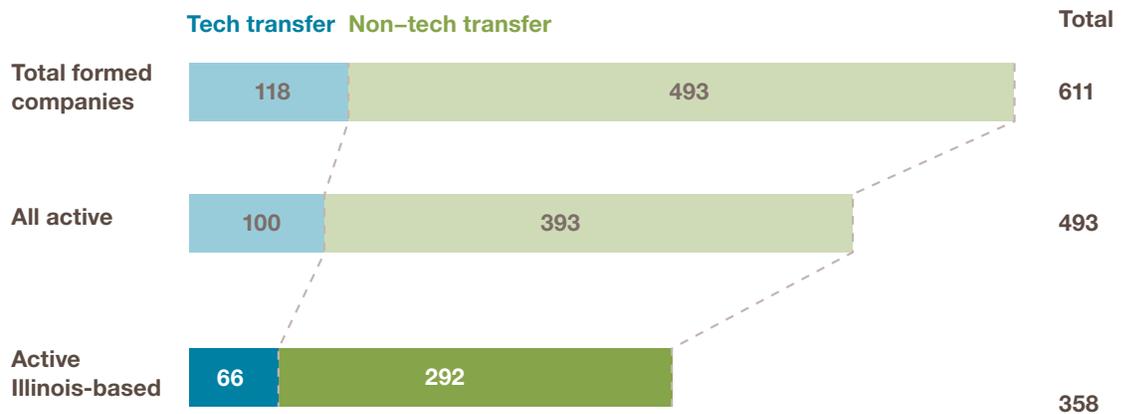
- Over the past five years, students and faculty at Illinois universities have created more than 600 known startups, nearly doubling the annual total from 2011 to 2015.
- Approximately 80 percent of these companies are still active, and of this segment 73 percent, or 358 companies, are still based in Illinois—the highest level recorded since this survey began.
- Companies created since 2010–11 have raised more than \$345 million from public and private sources to date, with Illinois retaining roughly 62 percent of companies that received VC funding.
- Illinois' 10 university-affiliated research and tech parks and on-campus incubator spaces are taking entrepreneurship to new heights, providing programs, funding, and other resources to nurture new ventures—as well as access to space and talent to expand successful tech businesses.

## Continued ascent in university entrepreneurship

Over the past five years, approximately 611 startups were formed through university technology licensing, entrepreneurship programs and competitions, and other university-financed initiatives. This total is the highest number in the three years that the ISTC has conducted this research (Exhibit 1). The total number of startups each year nearly doubled during this period—from 79 in 2011 to 150 in 2015. While annual startups from tech transfer technologies remained fairly flat, companies founded through other entrepreneurial programs and activities accounted for nearly all of the total increase.

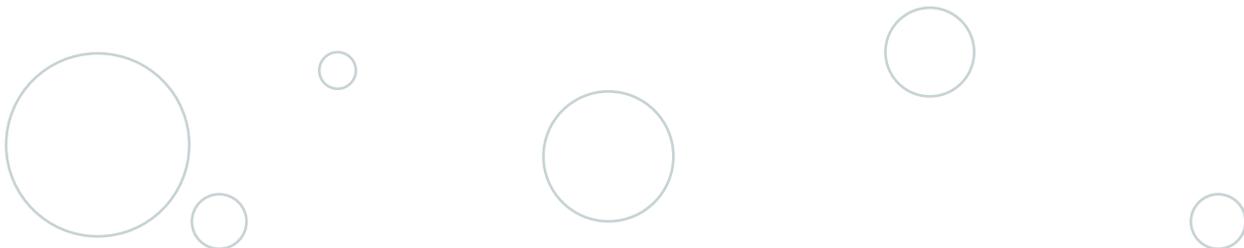
Roughly 80 percent of companies formed during the 2011–15 period remain active (or were acquired during this time), and 73 percent of active startups were based in Illinois at the time of the survey—the highest level recorded since the survey’s inception. Although recent depictions show entrepreneurial and technological talent leaving the state, the above numbers may be indicative of the increasing efforts to strengthen the local innovation ecosystem as well as greater access to investors in Illinois.

### Tech transfer and other startups, Illinois, founded 2011–15<sup>1</sup>



<sup>1</sup>The totals are estimates because the data were submitted by different year classes (financial vs. academic).

Source: ISTC Tech Transfer and University Entrepreneurship surveys, December 2015



Spotlight:  
**Thermaquatica**

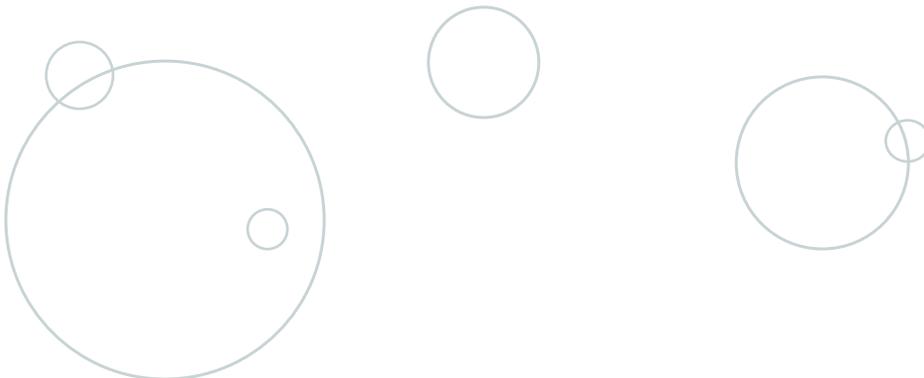
Thermaquatica was founded in 2010 by Dr. Ken Anderson, a professor of geology at Southern Illinois University Carbondale (SIUC). With decades of experience in coal science and other related fields, Dr. Anderson developed a process called Oxidative Hydrothermal Dissolution (OHD), which has formed the foundation of Thermaquatica. Together with John McAlister, Doctor of Biochemistry, Anderson perfected the method of reacting macromolecular organic solids such as coal with small amounts of oxygen in water under high heat and pressure. OHD transforms these solids into liquid products that are useful in making polymers such as plastics and fuels. The process is inherently environmentally benign—it creates no

hazardous pollutants or waste—and Anderson is therefore hopeful that these technologies will become the preferred method for manufacturing commodity chemicals and bio-based liquid fuels.

Thermaquatica, which now has six employees, owes much of its success to SIUC and in particular to Operation Mousetrap, a program that helps research scientists understand how businesses work and how to communicate their ideas in the private sector. Thermaquatica is located in the Southern Illinois Research Park on the Carbondale campus and just steps from the Dunn-Richmond Economic Development Center where the company got its start.

### Funding

University startups created since 2010–11 have raised more than \$345 million, including \$311 million in follow-on private funding. The remaining \$34 million includes financing from crowd funding, university grants, competition awards, and the government in the form of SBIR/STTR grants. While this data presents an insightful look into the funding picture and trends of the state’s university-based startups, it does not capture the totality of funds raised. University startups created prior to 2010–11 are not reflected in the funding data, though many obtained funding during this time (including Naurex, profiled on p. 9). This sampling reflects funds raised by our universities’ most recently created startups, and the analysis reinforces the importance of early-stage funding and the growing role of local funders.



## Total funding raised by startups created between 2011–15, \$ millions



Source: ISTC Tech Transfer and University Entrepreneurship Survey, 2015; NVCA; Pitchbook; CrunchBase

### About the research

This year ISTC worked with university technology transfer offices and entrepreneurship centers across the state as well as a number of additional partners to compile the most comprehensive data for university-based companies. Our analysis includes companies founded by researchers, faculty, or students while they were at Illinois universities, as self-reported by each institution.<sup>1</sup> With data partners such as NVCA, the Startup Directory, and additional research using federal databases and CrunchBase, ISTC has managed to capture most if not all existing funding data. However, our sample doesn't include companies established by alumni or startups at tech parks that weren't founded by students or with university technology. That said, these alumni-founded and non-university-research companies at tech parks represent even more economic impact from our universities.

Our research included two main sources of data:

1. The Association of University Technology Managers (AUTM) provided data on licensing, startup formation, and other tech transfer outputs for the period FY2010–2014.
2. The ISTC Tech Transfer Survey focused on the period FY2011–2015 and accounts for all the data around funding and most of the data around startup formation.

<sup>1</sup> Respondents to the survey included Bradley University, the Illinois Institute of Technology, Northern Illinois University, Northwestern University, Southern Illinois University, the University of Chicago, the University of Illinois at Chicago, and the University of Illinois at Urbana–Champaign. Though not all provided new information.

## An in-depth look at tech transfer

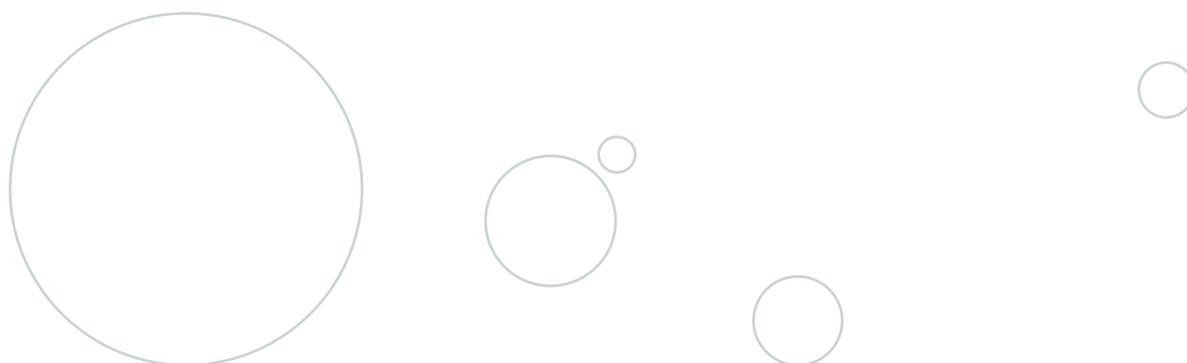
Activity in all four tech transfer categories—disclosures, patents, licenses, and startups—has increased over the past five years both in Illinois and at the national level. Illinois universities have recorded especially robust growth in total number of patents, although the state has been less successful as measured by total licensing of patented technologies.

**Disclosures.** Technology disclosures at Illinois universities have grown 3 percent since 2011, a rate in line with the national growth rate of 4 percent during this period. Activity has remained consistently high: Illinois technology transfer offices received 674 technology disclosures, or 9 disclosures per full-time equivalent (FTE)—nearly equal to the national average of 10 per FTE.

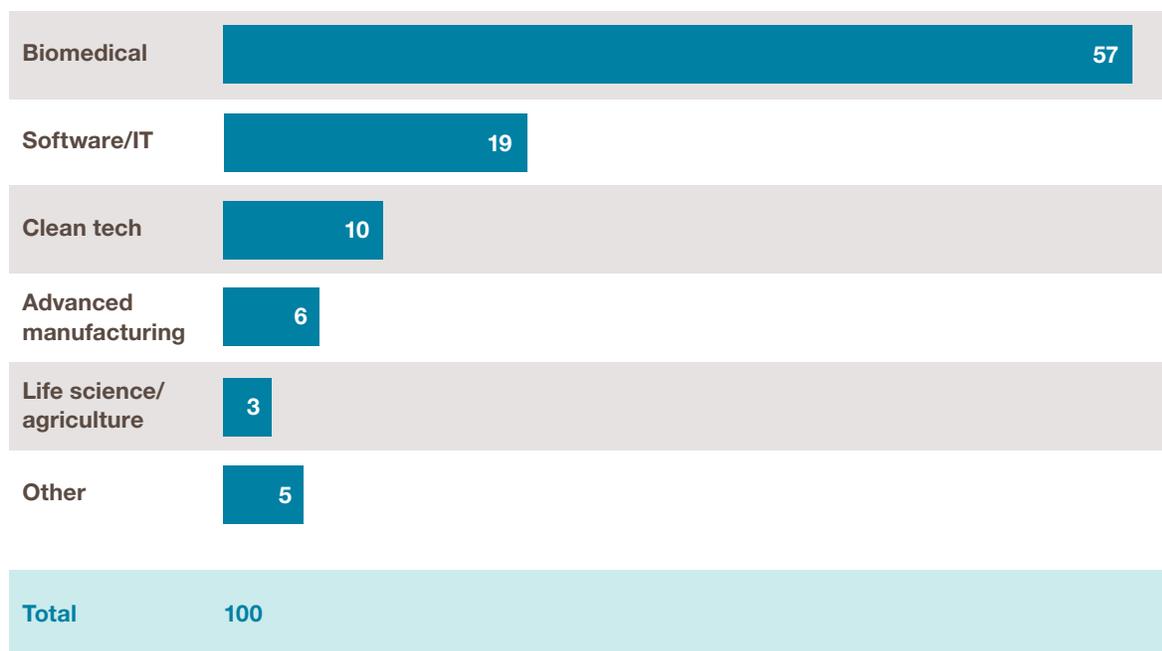
**Patents.** In the past five years, Illinois was fifth in the country by total number of patents issued, with 1,006. Patents issued per tech transfer employee in Illinois was 3.1 during this period compared with 2.8 at the national level. By this measure of efficiency and productivity, Illinois' tech transfer offices have surpassed the national average over the past 10 years.

**Licensing/options.** Illinois universities executed 583 licenses and options from 2010 to 2014, good for 12th in the nation. Forty-three percent of these agreements were exclusive (compared with a national average of 37 percent), and 5 percent brought in more than \$1 million in licensing revenue. The analysis indicates that Illinois' licenses tend to be exclusive and more frequently valuable than the national average, which may influence the overall volume of licensing.

**Startups.** The ISTC Tech Transfer Survey identified 118 companies that were formed from 2011 to 2015, with 28 companies founded in 2015 alone. Of this total, 100 startups, or 85 percent, are still active, and 66 percent are still located in Illinois. More than half are commercializing biomedical technologies, with software and clean tech companies accounting for 19 and 10 percent, respectively, of active startups (Exhibit 3).



## Tech transfer startups, by technology application, 2011-15, percent



Source: ISTC Tech Transfer and University Entrepreneurship surveys, December 2015

### The cost and ROI of technology transfer

Universities make sustained investments in talent and facilities to create new innovations and protect their intellectual property. This year, the Index took a closer look at AUTM data to examine the costs of technology transfer. These costs can be significant for universities, which take on this expense as part of its mission to contribute to the public good. From 2010 to 2014, Illinois universities spent \$49.7 million on legal costs related to technology transfer—creating new IP and negotiating licenses and other arrangements such as material transfer agreements. Of these expenditures, \$20.4 million or 41 percent were reimbursed in the form of licensing payments, a level in line with the national average.

This analysis suggests that Illinois universities, similar to other U.S. universities, shoulder nearly 60 percent of the cost associated with creating the IP that ultimately produces promising startups and returns millions of dollars in licensing revenue over the life of the license. These businesses not only populate Illinois' ecosystem but also attract hundreds of millions of dollars in funding and create new jobs. Without the support of universities, this research would be at risk of languishing or being exploited for little or no return. Further, if the ability to invest in patents is reduced, then future opportunities for licensing and its potential revenue are lost.



## Spotlight: **Naurex**

Depression affects an estimated 19 million U.S. residents each year, and there is no easy cure. Neurotherapeutics startup Naurex, based on research conducted over two decades by research professor of biomedical engineering Professor Joe Moskal, spun out of Northwestern University in 2007. The company developed GLYX-13, a novel therapeutic for difficult-to-treat depression that targets brain receptors responsible for learning and memory. After almost a decade working to commercialize GLYX-13, Naurex successfully

completed Phase IIb clinical trials and was acquired for \$560 million by Allergan in June 2015. Naurex, which raised \$160 million over the course of its existence, exemplifies the critical role that universities and local VC firms play in promoting innovation and business growth. The [successful translation](#) of this therapeutic was catalyzed by grant funding from the Baxter–Northwestern Alliance, a partnership created to research new therapeutics, biomedical and device engineering, biomaterials, and drug delivery technologies.

## Funding for tech transfer startups

Over the past decade, Illinois' tech transfer startups have raised almost \$1 billion in public and private funding, indicating a strong interest in innovations coming out of Illinois' universities. Indeed, this segment represents an outsize portion of all VC funding raised: while just one-fifth of all startups formed in the period came from tech transfer, these companies account for nearly one-third of all funding.

According to data from the Startup.Directory, Illinois was seventh among all states for tech transfer startups that had received funding. While Illinois was in line with the median of the top 15 states for Angel and Series A funding, the state's university-based startups outperformed the national average for later-stage funding: 11 and 6 percent of all active Illinois-based companies receiving Series B and C funding, respectively, compared with a U.S. average of 9 and 3 percent.<sup>2</sup> Overall, Illinois funding outperforms or is equal to the average funding rate for each series of VC funding.

## Other university entrepreneurship

Approximately 80 percent of all startups from Illinois universities are part of a newer breed of companies usually founded by students and not connected to university research. Instead, they are the product of a greater emphasis on startup competitions and entrepreneurial programs at the state's institutions. From 2010–11 to 2014–15, Illinois universities facilitated the formation of 493 companies. Currently, 393 of these companies are active, with 74 percent still calling Illinois home.

<sup>2</sup> Data reflects funding for active Illinois-based companies from 2000-2015.

## Number of non-tech transfer university startups formed per academic year, 2011–15



Source: ISTC Tech Transfer and Entrepreneurship Survey, 2015

### Spotlight: Reliefwatch

Founded in 2013 by former University of Chicago undergrad Daniel Yu, Reliefwatch has achieved remarkable success in just a few years. What once was a small student project now tracks 14 million units of medical supplies in two continents and supports 12 languages—mostly with “dumb” phones and cloud-based systems.

Reliefwatch recently won second place at the Social New Venture Challenge, received \$100,000

from the University of Chicago Innovation Fund, and raised hundreds of thousands of dollars from angel investors. Since the company’s inception, they have also joined with Heart to Heart International to track the spread of Ebola and ensure proper supplies are in place to combat the virus in Liberia. Their home at the Chicago Innovation Exchange (CIE) on the University of Chicago campus has kept them close to their roots and one of their biggest supporters—the university.

### Funding for other university startups

University startups that were created since 2010–11 have raised at least \$182.5 million, which in addition to venture capital, includes funding from angels, business plan competitions and other university support. Relocations can take place either due to the founders moving after graduation or because companies are compelled to move closer to investors. Nevertheless, Illinois retained 62 percent of companies that have received VC funding—an indication of the role universities have played in channeling student talent into ventures that have diversified the state’s economy, anchored talent in Illinois, and provided new opportunities for local investors.

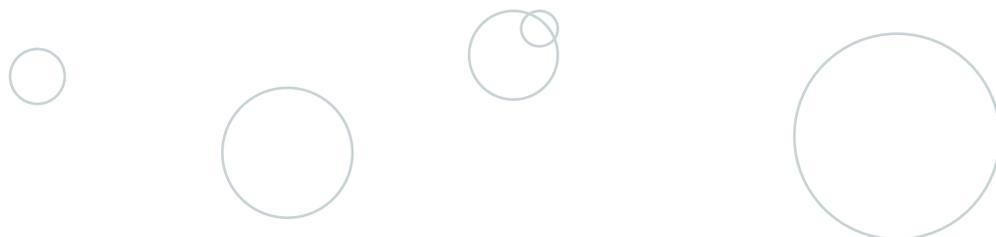
### University Investment, POC and innovation funds

Some Illinois universities also support promising entrepreneurial ventures from across campus through investment such as proof-of-concept (POC) and innovation funds. This critical financing, which is committed in the developmental stage, helps to bridge the gap between basic research and commercial investment by increasing the value of a new venture and attracting the attention of possible investors. These funds include both tech transfer and non-tech transfer companies and have supported a range of highly successful endeavors.

Launched by the University of Illinois, IllinoisVENTURES supports university innovations and aims to lead or collaborate on the funding and development of new scientific and technological ventures by providing POC funding as well as early-stage venture funding. IllinoisVENTURES has managed more than \$70 million in assets since its inception in 2002 and was ranked #1 in gap funding for third-party capital attraction by Innovosource. It has collaborated on the initial funding of more than 85 research-derived startups or projects from the University of Illinois and other Midwest institutions, which have gone on to receive more than \$650 million in outside funding. Its portfolio includes companies such as Chromatin, Diagnostic Photonics, and the social media staple ShareThis.

Other university-supported funds include the Innovation Fund, a \$20 million investment fund focused on commercializing early-stage research and supporting emerging companies at the University of Chicago and its affiliates, including Argonne National Laboratory and Fermi National Accelerator Laboratory. The Innovation Fund is managed by the Chicago Innovation Exchange in partnership with UChicagoTech (the Center for Technology Development & Ventures) and the Polsky Center for Entrepreneurship & Innovation. Similarly, Northwestern University has established two funds to accelerate the growth of early stage innovations on campus. The \$10 million N.XT fund is designed to promote research-driven technologies to the next stages of commercialization through proof of concept funding. NUseeds is a \$4 million fund to support and accelerate business development for early stage start-ups that is targeted to student entrepreneurs.

These Illinois university investment efforts accelerate the successful launch of innovations by providing the most promising early-stage ventures with financing, advising, and commercial connections.



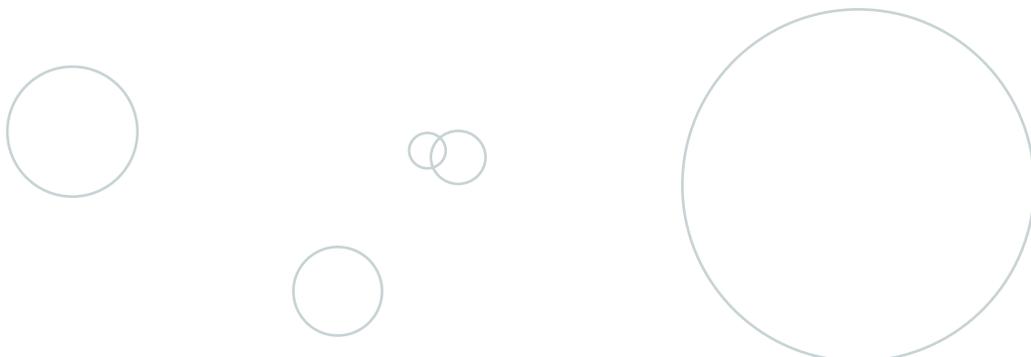
## Spotlight: **Agrible**

Agrible started as a seed—an idea in the minds of three University of Illinois graduate students in 1997. Bill Northcott, Chris Harbourt and Paul Miller dreamed of providing accurate rainfall measurements to farmers and growers. They quickly realized, however, that their idea was too big for existing technology. A decade later, their vision started to become a reality—they were able to provide this service to growers around the Midwest. As demand grew, Agrible followed suit. In 2014, after working from Chris’s home on the initial company, he moved with one other employee to a space at the EnterpriseWorks Incubator. They remained there until just last September, when the company moved to a new office at the Research Park at the University of Illinois at Urbana-Champaign where the company has grown to 60 employees.

The company now offers not just rainfall tracking but also a range of services such as soil compaction data to inform the best times to work in the field as well as yield modeling for 11 major crops—all tailored to individual growers and their fields. And these days, Agrible doesn’t just serve growers; it has added software developers, soil test laboratories, crop consultants, insurance agencies, commodities companies, traders, and major agriculture chemical companies to its client base. Agrible’s leading product, Morning Farm Report, attracted \$4.1 million in Series A Funding led by Serra Ventures, and a partnership with ADM Crop Risk Services.

### **University research and technology parks and incubation spaces**

Beyond the creation of research and intellectual property, business education, programmatic initiatives, and seed funding, institutions also offer access to research and technology parks and incubation spaces. These facilities house companies that are emerging from within the universities and also support discovery, multidisciplinary collaboration, entrepreneurs-in-residence, and other amenities and resources. In addition, research and technology parks provide facilities (such as wet and dry labs) that act as magnets for talent— independent engineers, scientists, and inventors as well as entrepreneurs who need specialized facilities and communities of other experts in order to establish and build their business. They also serve as a resource that captures and retains technology entrepreneurs from Illinois’ ecosystem more broadly.



Illinois boasts 10 research and technology parks and other incubation and innovation hubs around the state that are affiliated with an Illinois institution of higher education (Exhibit 7). The impact of these facilities on the local innovation ecosystem is evident in success stories such as Cleversafe, which was recently acquired by IBM.

### University technology parks and incubation spaces



#### Research/technology parks

- 1 Health, Technology, Innovation (HTI) Center, UIC
- 2 PeoriaNEXT, Bradley University
- 3 SIU Research Park, SIU-C
- 4 University of Illinois Research Park, UIUC
- 5 University Park, SIU-E
- 6 University Technology Park (UTP), IIT

#### Incubation spaces/innovation hubs

- 7 Chicago Innovation Exchange (CIE), University of Chicago
- 8 Quad City Manufacturing Lab, WIU
- 9 EIGERLab, NIU
- 10 The Garage, Northwestern University

Source: ISTC

Spotlight:  
**Cleversafe**

Founded in 2004 by CEO Chris Gladwin, Cleversafe was a tenant at the IIT University Technology Park for its nascent three years, and consequently the company hired much of its initial talent from the university. Cleversafe later expanded in Chicago, employing hundreds and boasting one of the nation's highest volumes of patents per employee, before being acquired in 2015 by IBM for a reported \$1.3 billion. Cleversafe's foundational data storage technology, Dispersed Storage Networks, was developed in large part by [a cast of Illinois Math and Science Academy \(IMSA\) educated inventors](#). This technology enhances on-premise storage options for clients and service providers with large

scale active archives and unstructured data content stores. In recognition of the contribution the university and technology park made to Cleversafe's success, Gladwin donated \$7.6 million to the university computer science department. Speaking of the role that universities and research and technology parks plays in the local innovation ecosystem by enabling early stage entrepreneurs to find affordable and communal office space and high-skilled talent, Gladwin explained "[IIT] were instrumental in our success and so I wanted to give back to the institution that helped make Cleversafe the powerhouse it is today in data storage."

Spotlight: **EIGERlab**

EIGERlab was created in 2004 by Rockford Area Ventures and later absorbed by a nonprofit division of the Rockford Area Economic Development Council (RAEDC) in 2010. In its latest merger, Northern Illinois University (NIU) acquired the Rockford-based mixed-use incubator with hopes of expanding the scope of the company, which currently serves Boone and Winnebago counties. EIGERlab services about 615 clients per year, but NIU intends to increase those numbers by

extending the incubator's reach further into northern Illinois. The acquisition will benefit budding entrepreneurs in the region and is expected to usher in economic growth. "With NIU behind it, it's a much stronger entity," said Mike Nicholas, president of the RAEDC. "They're going to bring their engineering students, their business students, and their whole depth of academic talent that they have to help companies move forward."

### Fueling startups in Illinois

Illinois' universities play a vital role in the innovation and entrepreneurial ecosystem: beyond providing the facilities and attracting the talent to discover breakthrough technologies, they also protect, promote, and license these innovations. Further, the entrepreneurial programs, research parks, and incubators have served as a launching pad for promising startups as well as centers for mentorship. These efforts also attract significant funding from the state's investor base, ensuring that the ideas developed in Illinois become the Illinois-based industry leaders of the future, making the continued support and funding of these institutions a critical element of the state's economy. ■

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