As technology continues to permeate nearly every aspect of our daily lives, our notion of what it means to be a part of the tech community has expanded exponentially. From manufacturing, to finance, to healthcare, every industry is a part of this new tech community, and as emergent technologies empower and enable new growth opportunities for every business, we have all come to see ourselves as a part of a technology-enabled ecosystem.

With the lines between tech and non-tech continually blurred, the success of the Chicago technology sector is a key part of the success of our overall economy, as we see in the Chamberland Chamber of Commerce's Chicago Tech Effect study.

The study, conducted by the Chicagoland Chamber of Commerce and HR&A Advisors with the support of our member Google, represents the most comprehensive analysis of the impact of the Chicago tech ecosystem to-date, establishing several key economic indicators that point to the overall growth of the city's tech sector.

But at its core, the findings paint a clear and definitive picture: Chicago is one of America's leading tech hubs. Given the strength and size of our booming tech sector, it is time that we, as a city, fully embrace this identity as a world-leading technology destination.

Yet, it's important that we remember that the success of the Chicago tech sector didn't happen by accident. Strong, pro-growth public policy frameworks helped to differentiate our city and state.

To ensure that Chicago remains a friendly place for tech companies – both large and small – to do business, our advocacy work is far from over. We at the Chamber are leading the charge to support policies that drive the continued success of the Chicago tech ecosystem and oppose those that will stifle growth and job creation.

Today, as we look to the future of a growing Chicago economy and thriving local community, we ask you to join us in our advocacy efforts, as we push for an even brighter future for our city's tech ecosystem and our overall economy.

- Jack Lavin
President and CEO, Chicagoland Chamber of Commerce
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At a Glance
Chicago's Tech Ecosystem Today
Strengthening Chicago's Tech Ecosystem for the Future
Technical Appendix
Chicago is one of America's leading tech hubs with 18% growth in the tech workforce in the last decade.

- **Chicago's tech ecosystem is essential to the city's economy**, employing over 106,000 people – 8% of the Chicago workforce – and spurring significant economic activity and hundreds of millions of dollars in tax revenues for our state and local governments.

- **The tech ecosystem grew 18% in Chicago over the past decade compared to the overall economy**, which saw growth of just 1%. Tech has also demonstrated greater resilience and supported Chicago's recovery during the COVID-19 pandemic.

- The growth is due in part to new start-ups, but also because **tech cuts across every industry** in Chicago, from government to healthcare, Fortune 500 and small and mid-sized businesses.

- Drawing people to Chicago are the region's **deep bench of talent from local universities, a diverse workforce pipeline, central location, and affordable cost of living**.

<table>
<thead>
<tr>
<th></th>
<th>106K Direct Tech Jobs</th>
<th>$73.8B Economic Output</th>
<th>$651M Total Fiscal Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-COVID 2011-2019</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tech Ecosystem</td>
<td>10%</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Overall Economy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Post-COVID 2019-2021</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tech Ecosystem</td>
<td></td>
<td>-8%</td>
<td></td>
</tr>
<tr>
<td>Overall Economy</td>
<td></td>
<td>-2%</td>
<td></td>
</tr>
</tbody>
</table>
Widespread tech growth in Chicago is fueling upward mobility and greater economic equality.

- The median wage in the tech ecosystem is $42/hour - 1.5X higher than the $28/hour for the overall economy. Even jobs that have an educational attainment below a bachelor's degrees experience higher wages on average.

- Of the ten largest tech occupations in Chicago, half are accessible to those without a college degree.

- Tech opportunities cut across Chicago’s diverse economy – close to 50% of tech ecosystem jobs are in industries not traditionally considered tech. In today’s ever-evolving world, digital skills and jobs that leverage technology will only continue to grow in importance in every sector.
Chicago outperforms national averages for diversity in tech and must continue to invest in efforts to support equity.

- **Chicago boasts the highest share of female founders of any of the top 20 tech hubs in the world** with 34% of startups being founded by women, over two times the global average.

- **The city’s diversity supports greater inclusion in tech.** Chicago's tech ecosystem sees greater Black and Latino participation than the national average, with 32% of diverse participation compared to the national U.S. average of 19%. More must be done to close the representation gap.

---

**Black & Latinx Representation**

<table>
<thead>
<tr>
<th></th>
<th>Chicago Tech Ecosystem</th>
<th>U.S. Tech Ecosystem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Founders are women</td>
<td>34%</td>
<td>19%</td>
</tr>
</tbody>
</table>

*Highest among global tech hubs*
RECOMMENDATIONS TO FUEL GREATER TECH GROWTH IN CHICAGO:

1. Promote Chicago as a leading tech and innovation hub nationally and globally.

2. Expand efforts to strengthen our diverse tech talent pipeline – and help Chicago achieve its goals towards inclusive prosperity.

3. Ensure a positive public policy environment that allows Chicago's tech ecosystem to continue to grow and produce positive impacts on our local economy.
POLICY CONSIDERATIONS

1. **Lean into Chicago’s assets and create marketing avenues to sell Chicago’s strengths and successes.** Chicago needs to tout its core strengths – talent, diversity, affordability, connectivity, and its strong startup and corporate presence – to remain competitive with other markets.

2. **Advocate for policies and initiatives that will advance high-tech and deep-tech innovation in Chicago and not hinder the tech ecosystem’s momentum.** Chicago can leverage tax credits to offer additional incentives to spur innovation and development in the future of sectors like autonomous vehicles or quantum.

3. **Develop policies to address current gaps in Chicago’s tech talent pipeline.** More can be done to strengthen the tech talent pipeline starting from the K-12 level to creating more apprenticeship and mentorship programs to connect students with employers.

4. **Bring greater awareness to all tech opportunities across Chicago’s economy by changing how tech is discussed.** Roughly half of Chicago’s tech jobs are in non-tech industries – by expanding the definition of tech, Chicago can promote the true scale of the tech ecosystem and improve talent attraction and retention.

5. **Lead with equity.** Chicago’s diverse workforce puts the city in a unique position to build the most equitable tech ecosystem in the country. The ecosystem should leverage its existing diverse local talent and continue to invest in efforts and initiatives to increase Black, Latinx, and female participation in tech. City and state governments can also increase pathways to tech by closing the digital gap and expanding broadband access across the region.
At a Glance

Chicago’s Tech Ecosystem Today

Strengthening Chicago’s Tech Ecosystem for the Future

Technical Appendix
Chicago’s Tech Ecosystem Today
Ecosystem Overview
Economic & Fiscal Impact
Drivers of Growth
From the invention of the vacuum in 1869, to the wireless remote control in 1950, and later the first smartphone in 1999, Chicago has a long history and culture of innovation. This rich history, paired with significant public and private investments in the last decade, have been instrumental in shaping Chicago’s tech ecosystem to the scale it is today.

**Chicago’s tech ecosystem plays a large role in the overall economy** – the ecosystem’s 106,000 jobs represent 8% of Chicago’s workforce, a significant figure considering no industry in Chicago makes up more than 13% of the economy. Tech ecosystem jobs are relatively evenly split between tech industries (54K jobs) and non-tech industries (52K jobs).

**Strong growth in the past decade has cemented tech’s importance within the broader economy.** The Chicago tech ecosystem added 15,000 new jobs between 2011 and 2021, 87% of which are in tech industries. Chicago’s tech growth has also driven the growth of the tech ecosystem at a state level – the 15,000 jobs added in Chicago represent 43% of Illinois’ tech ecosystem growth in the past decade.

**Chicago’s tech ecosystem supported the city in its recovery from the pandemic.** Over the last decade, the tech ecosystem grew 18% compared to just 1% for the overall economy. Between 2019-2021, the city of Chicago lost 8% of its jobs while the tech ecosystem only lost 2%, demonstrating great resilience during the COVID-19 pandemic. This growth has been largely led by tech industries. Between 2011 and 2021, tech and non-tech jobs in tech industries grew 68% and 17% respectively. By comparison, tech occupations within non-tech industries grew 5%.

**Chicago’s tech growth has been driven by both expansions within the city, as well as relocations to the city** – Chicago’s low cost of living and strong talent base has encouraged large tech companies to expand their footprint within the city. Salesforce, Google, LinkedIn, Meta, and Yelp have all added offices or increased office size within the past 3 years. Meanwhile, Chicago’s strengths as a tech hub are also attracting younger tech companies to relocate from Silicon Valley. In recent years, BlueCrew, Uber Freight, Tegus, and G2 have all moved their offices to Chicago.

An economic “ecosystem” is a network of organizations that enables the provision of goods or services. Chicago’s tech ecosystem jobs are distributed throughout tech and non-tech industries and occupations, incorporating a broad range of jobs that rely on tech and require tech talent. Tech ecosystem jobs fall into three broad categories:

1. **Tech Occupations in Tech Industries** – for example, a software engineer at Braintree.
2. **Non-Tech Occupations in Tech Industries** – for example, a human resources manager at Meta.
3. **Tech Occupations in Non-Tech Industries** – for example, an engineering manager at United Airlines.

In 2021, Chicago’s tech ecosystem consisted of 106,000 jobs. Across tech industries, there were 23,000 tech workers and 31,000 non-tech workers. The non-tech industry held 52,000 additional jobs.
Over 106K people work in Chicago's tech ecosystem, with half in industries not traditionally considered tech.

**TECH INDUSTRIES**
- 23,000 Tech Jobs
- 31,000 Non-Tech Jobs

**NON-TECH INDUSTRIES**
- 52,000 Tech Jobs

**CHICAGO TECH ECOSYSTEM**
- 106,000 Total Jobs
  - 8% of Overall Workforce

**Tech in Tech:**
a software engineer at Braintree.

**Non-Tech in Tech:**
a human resources person at Grubhub.

**Tech in Non-Tech:**
an engineering manager at United Airlines

Source: HR&A analysis of EMSI data.

Chicagoland Chamber of Commerce & HR&A Advisors

The Chicago Tech Effect | 13
THE NATION’S MOST ECONOMICALLY INTEGRATED TECH ECOSYSTEM

Chicago's tech ecosystem is essential to the city’s economy, employing 8% of the workforce across Chicago's diverse industries. No other city has such an integrated relationship with its tech ecosystem.

Largest Industry vs. Tech Industry by City (2021)

Source: HR&A analysis of EMSI data.
Chicagoland Chamber of Commerce & HR&A Advisors
TECH ECOSYSTEM REGIONAL COMPARISON

Compared to other midwestern cities, Chicago's tech ecosystem is significantly larger.

Tech Ecosystem Jobs (2021)

- **Chicago**: 106K
- **St. Louis**: 60K
- **Minneapolis**: 86K
- **Detroit**: 22K

Source: HR&A analysis of EMSI data.

Chicagoland Chamber of Commerce & HR&A Advisors
CHICAGO TECH ECOSYSTEM GROWTH

The Chicago tech ecosystem has grown rapidly in the past decade – increasing by **18% compared to the overall economy, which only grew by 1%**.

### Chicago Tech Ecosystem Growth (2011-2021)

<table>
<thead>
<tr>
<th>Year</th>
<th>Jobs</th>
<th>Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>91k</td>
<td>50k</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+5%</td>
</tr>
<tr>
<td>2021</td>
<td>106k</td>
<td>52k</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+5%</td>
</tr>
</tbody>
</table>

Source: HR&A analysis of EMSI data.

Chicagoland Chamber of Commerce & HR&A Advisors

18% TECH ECOSYSTEM GROWTH (2011-2021) vs.
1% CHICAGO ECONOMY GROWTH (2011-2021)
CHICAGO TECH ECOSYSTEM GROWTH

Tech companies are fueling Chicago’s growth, accounting for 87% of new jobs in the last decade.

Source: HR&A analysis of EMSI data.

Chicagoland Chamber of Commerce & HR&A Advisors
CHICAGO TECH ECOSYSTEM RESILIENCE

Regardless of geography, **tech is driving the region’s growth** and helped to stabilize it during COVID.

**Tech Ecosystem Growth**

<table>
<thead>
<tr>
<th>Region</th>
<th>Pre-Covid</th>
<th>Post-Covid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicago</td>
<td>20%</td>
<td>-8%</td>
</tr>
<tr>
<td>Chicagoland</td>
<td>15%</td>
<td>-7%</td>
</tr>
<tr>
<td>Illinois</td>
<td>14%</td>
<td>-7%</td>
</tr>
</tbody>
</table>

Source: HR&A analysis of EMSI data.

Chicagoland Chamber of Commerce & HR&A Advisors
HIGH-TECH OCCUPATIONS

High tech jobs make up roughly 46% of the Chicago tech ecosystem. This proportion is similar across the region and State.

49K HIGH-TECH JOBS (46%)

High-tech jobs are those focused on the creation and management of high-tech tools, products, systems, and support services. Within Chicago’s tech ecosystem, these jobs are at the forefront of technology and are typically concerned with the application of technical and digital skills across a range of industries and activities. They are distinct from other tech jobs that focus on low-tech activities such as the operation of hardware or jobs that make use of basic digital skills. These jobs have also shown strong growth in Chicago in the past decade – 7 out of the top 10 fastest growing, tech occupations were high-tech. Additionally, the largest tech occupation in Chicago, software developers, is classified as a high-tech occupation and accounts for over 16,000 jobs in the city.

Source: HR&A analysis of EMSI data.

Chicagoland Chamber of Commerce & HR&A Advisors
EDUCATIONAL ATTAINMENT

Tech ecosystem jobs are far more likely to have an average educational attainment of a B.A. or above. 65% of tech ecosystem jobs have an average attainment of a B.A. or above compared to just 34% of all jobs in Chicago.

In Chicago, 65% of tech jobs have an average educational attainment of a B.A. or above compared to just 34% for the overall economy (and 33% for all jobs in the United States).

This is driven primarily by tech jobs in tech and non-tech industries. 76% of tech in tech jobs and 68% of tech in non-tech jobs have an average educational attainment of a B.A. or above. Meanwhile, only 51% of non-tech in tech jobs have an average educational attainment of a B.A. or above, which represents a significant opportunity for people with non-technical skills to find a career in tech.

Source: HR&A analysis of EMSI data, U.S. Census Bureau

Chicagoland Chamber of Commerce & HR&A Advisors
EDUCATIONAL ATTAINMENT & WAGES

The tech ecosystem offers meaningful economic opportunities, even for jobs that have an average educational attainment below a bachelor’s degree.

Tech jobs offer higher earning opportunities and potential for economic mobility for individuals of varying education levels. The median wage for tech ecosystem jobs is $42 - 1.5X higher than the $28 median wage for the overall economy. Across the ecosystem, the highest wages are concentrated in tech jobs (both in tech and non-tech industries), although non-tech in tech jobs still pay more than the Chicago overall economy.

Even jobs that have an average educational attainment below a bachelor’s degrees experience higher wages on average. For those without a bachelor’s degree, the median hourly wage in Chicago's tech ecosystem is $26.90/hour compared to $20.00/hour in the overall economy.

Source: HR&A analysis of EMSI data.

Chicagoland Chamber of Commerce & HR&A Advisors

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Software Developers account for the largest number of tech jobs in Chicago with 16,100 jobs in 2021. Of the 10 largest tech occupations in Chicago, half are accessible to those without a B.A.

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Software Developers</td>
<td>60%</td>
<td>$53.80</td>
</tr>
<tr>
<td>Computer Systems Analysts</td>
<td>44%</td>
<td>$46.40</td>
</tr>
<tr>
<td>Computer and Information Systems Managers</td>
<td>70%</td>
<td>$74.70</td>
</tr>
<tr>
<td>Computer User Support Specialists</td>
<td>6%</td>
<td>$25.60</td>
</tr>
<tr>
<td>Clinical Laboratory Technologists and Technicians</td>
<td>34%</td>
<td>$25.70</td>
</tr>
<tr>
<td>Computer Network Support Specialists</td>
<td>140%</td>
<td>$32.40</td>
</tr>
<tr>
<td>Computer Occupations, All Other</td>
<td>-26%</td>
<td>$45.30</td>
</tr>
<tr>
<td>Network and Computer Systems Administrators</td>
<td>-9%</td>
<td>$44.10</td>
</tr>
<tr>
<td>Sales Representatives of Services</td>
<td>146%</td>
<td>$27.70</td>
</tr>
<tr>
<td>Customer Service Representatives</td>
<td>14%</td>
<td>$19.40</td>
</tr>
</tbody>
</table>

Source: HR&A analysis of Emsi data.
MULTI-SECTORAL TECH ECOSYSTEM

Tech permeates throughout Chicago’s economy – tech jobs in non-tech industries make up close to half of Chicago’s tech ecosystem and are spread relatively evenly across a wide range of industries.

Tech jobs span a wide range of industries, reflecting diverse job opportunities and work environments. Nearly half (49%) of all tech jobs are found in non-tech industries, including professional services, finance, healthcare, transportation & warehousing, retail, and more. Companies such as United Airlines, Walgreens, Target, and others with large presence in Chicago are continuing to see higher need for tech talent. In today’s ever-evolving technological world, digital skills and jobs that leverage technology will only continue to grow in importance. In turn, the need to provide access to tech training and skill development is ever more critical for workers and businesses of all sizes, no matter the industry.

Source: HR&A analysis of EMSI data.

Chicagoland Chamber of Commerce & HR&A Advisors
United Airlines brings attention to the company’s robust tech employment opportunities through partnerships that can reach diverse talent.

Headquartered in Chicago, United Airlines is one of the city's largest companies, employing roughly 1,500 high-tech jobs out of its 95,000-employee workforce. Some of United’s tech operations includes traditional aerospace engineering, web app development, and digital products management, such as e-commerce.

Strategic partnerships have been key to United Airlines' recruiting and hiring efforts. United has worked with organizations, such as P33, Hispanic IT Executive Council, and Black Women in Science and Engineering to bring greater awareness to United's vast tech opportunities, which otherwise may be lesser known.

United also runs a nationwide 2-year tech apprenticeship program called The Early Career in Digital Leadership Program (ECDLP). ECDLP offers STEM graduates from neighboring universities a variety of leadership and training opportunities across the entirety of United's Digital Technology team. As a result of this program, the airline has supported the matriculation of graduates into senior- and junior-level staff positions.

TECH COMPANIES MOVING TO CHICAGO

In recent years, the Chicago area has attracted both well established and newer tech companies from Silicon Valley.

**RECENT EXPANSIONS:**

- Salesforce plans to add 1,000 jobs by 2024
- Google expanded finance division in Chicago (2019-2021)
- LinkedIn expanded into a 46K SF HQ in 2019
- Meta added 260K SF of office in 2018
- Yelp added a Chicago office in 2015

**RECENT RELOCATIONS:**

- BlueCrew relocated in 2019
- Tegus relocated in 2019
- G2 relocated in 2019
- Uber Freight relocated in 2019

Illinois’ Data Center Investment Program has also led to expansions and relocations of data centers to the region.

- Meta plans to expand its $1B DeKalb data center campus to 2.4M SF in 2022
- CloudHQ announced $2.5B data center in Mount Prospect in 2021
- Digital Realty launched Franklin Park data center in 2017

Sources: Built in Chicago, Chicago Business Journal, RE Journals, Crain’s Chicago Business

Chicagoland Chamber of Commerce & HR&A Advisors

The Chicago Tech Effect | 25
## BUILT ON STRONG FOUNDATIONS

Chicago's deep talent pool, diverse population, relatively low cost of living, strong corporate and startup presence, and connectivity continue to attract and retain businesses and workers to the city and region.

### TALENT

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicago's concentration of top universities and educational institutions produces quality STEM talent for the tech ecosystem.</td>
</tr>
<tr>
<td>Not only do nonwhites make up 60% of the overall workforce, but Chicago is also home to some of the largest immigrant populations across the nation. This diversity is a major asset to the city.</td>
</tr>
<tr>
<td>Chicago produces the 4th highest number of college grads among the five largest U.S. cities.</td>
</tr>
<tr>
<td>Between 2014-2019, the number of tech degrees completed in the city grew 50%.</td>
</tr>
</tbody>
</table>

### DIVERSITY

<table>
<thead>
<tr>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Chicago produces the 4th most engineering graduates in the U.S.</td>
</tr>
<tr>
<td>Chicago has the second highest number of college grads among the five largest U.S. cities.</td>
</tr>
<tr>
<td>Chicago is also home to the highest share of female founders, among the top 20 tech hubs in the world at 34%, over 2X the global average.</td>
</tr>
</tbody>
</table>

### AFFORDABILITY

<table>
<thead>
<tr>
<th>Description</th>
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<tbody>
<tr>
<td>Chicago offers much lower cost of living compared to coastal tech hubs like San Francisco or New York.</td>
</tr>
<tr>
<td>Cost of living in Chicago is 78% lower than San Francisco and 28% lower than New York City.</td>
</tr>
<tr>
<td>Operating a tech office also costs 50% more in San Francisco than in Chicago.</td>
</tr>
</tbody>
</table>

### STARTUP & CORPORATE PRESENCE

<table>
<thead>
<tr>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Not only is it home to 27 Fortune 500 companies, such as Walgreens, Chicago is ranked as the number one city in the U.S. for corporate relocations and foreign direct investment.</td>
</tr>
<tr>
<td>Chicago has a strong and growing entrepreneurial sector. Over 65 incubators and accelerators are fueling Chicago's start-up scene, including 1871, the #1 incubator in the world.</td>
</tr>
</tbody>
</table>

### CONNECTIVITY

<table>
<thead>
<tr>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Chicago is uniquely connected regionally and internationally.</td>
</tr>
<tr>
<td>Chicago is a gateway to the rest of the world, compared to other growing tech hubs such as Austin or Denver. O'Hare is the 3rd busiest airport in the U.S. with around 80M passengers per year.</td>
</tr>
<tr>
<td>The city's urban transportation system is also ranked 7th in the world.</td>
</tr>
<tr>
<td>Programs like Connect Illinois and Chicago Connected continue to expand broadband access.</td>
</tr>
</tbody>
</table>


Chicagoland Chamber of Commerce & HR&A Advisors
Chicago’s Tech Ecosystem Today

Ecosystem Overview

Economic & Fiscal Impact

Drivers of Growth
ECONOMIC AND FISCAL IMPACT

Chicago’s tech ecosystem creates significant jobs, earnings, and economic output for the city. The direct, indirect, and induced impacts of the tech ecosystem account for a total of 253,000 jobs, $23.5B in earnings, and $73.8B in economic output annually.

Tech jobs create a disproportionately large number of multiplier jobs compared to other industries. For every tech job created in Chicago, 1.4 additional indirect and induced jobs are created. This means that the 106,000 tech ecosystem jobs are responsible for the creation of an additional 147,000 jobs in Chicago, collectively accounting for 18% of Chicago’s overall workforce. This is the second highest multiplier of any industry in Chicago, trailing only finance & insurance. By growing the tech industry, Chicago can greatly increase the rate of growth for the rest of the economy due to the large job multiplier of tech.

Earnings created by the tech ecosystem make up 18% of the city’s total earnings. The $13.5B of earnings collected by workers in the tech ecosystem generates an additional $10.0B for a total of $23.5B. In other words, for every dollar of earnings within the tech industry, an additional $0.74 in earnings is created.

Economic output from the tech industry accounts for 17% of the city’s overall output. The $41.6B of economic output created directly by the tech ecosystem spurs a total of $73.8B within the city. This means that for every dollar spent in the tech ecosystem, an additional $0.77 in spending is generated. This multiplier is relatively large compared to other major industries in Chicago, such as Manufacturing, Trade, Transportation & Warehousing (0.69 multiplier).

HR&A’s economic impact analysis estimates the multiplier effects of the tech ecosystem in the economy in terms of jobs, earnings, and economic output.

<table>
<thead>
<tr>
<th>Total Jobs</th>
<th>Earnings</th>
<th>Economic Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>253K</td>
<td>$23.5B</td>
<td>$73.8B</td>
</tr>
</tbody>
</table>

HR&A's analysis highlights the following impacts:

- **Direct Impacts**: The direct impact is the employment, compensation, and output in the tech occupations or tech industries that collectively comprise the Chicago tech ecosystem.
- **Indirect Impacts**: The indirect impact is the employment, compensation, or output associated with businesses that supply the industries comprising the Chicago tech ecosystem.
- **Induced Impacts**: The induced impact represents the employment, compensation, or output associated with household spending of employees who work in industries directly and indirectly affected by the Chicago tech ecosystem.
The 106K direct jobs in the tech ecosystem contributes 147K additional multiplier jobs in Chicago.

Source: HR&A analysis of EMSI data. HR&A’s economic impact analysis estimates the multiplier effects of the tech ecosystem in the economy in terms of jobs, earnings, and economic output. Multiplier impacts include indirect and induced impacts associated with businesses that supply the industries comprising the Chicago tech ecosystem, as well as household spending of employees who work in industries directly and indirectly affected by the Chicago tech ecosystem.
Every 1 direct job hired in the tech ecosystem supports 1.4 additional jobs in the City of Chicago.

With the exception of Finance & Insurance, the tech ecosystem has the highest job multiplier in Chicago. In comparison, for every 1 job:

- Finance and Insurance +2.0 jobs
- Real Estate +1.1 jobs
- Government +1.0 jobs
- Professional Services +1.0 jobs
- Manufacturing, Trade, Transportation & Warehousing +0.9 jobs
- Healthcare +0.5 jobs

Source: HR&A analysis of EMSI data.

Chicagoland Chamber of Commerce & HR&A Advisors
Chicago's tech ecosystem generates $23.5B in total earnings for workers directly and indirectly employed by the ecosystem.

$13.5B Earnings + $4.8B Earnings + $5.2B Earnings = $23.5B EARNINGS

18% of Chicago's overall worker earnings

Source: HR&A analysis of EMSI data.
The city’s tech ecosystem’s **$41.6B in direct economic output** contributes **$32.2B additional output**.

$41.6B Economic Output + $14.6B Economic Output + $17.6B Economic Output = **$73.8B ECONOMIC OUTPUT**

17% of Chicago’s overall economic output

Source: HR&A analysis of EMSI data.

Chicagoland Chamber of Commerce & HR&A Advisors
CHICAGO TECH ECOSYSTEM ECONOMIC OUTPUT

Tech investments drive additional spending. Every $1 spent in the tech ecosystem supports $0.77 in additional economic output.

Tech industries have a particularly high economic output multiplier. For every 1 dollar spent in tech industries, $0.77 of additional spending is generated. In comparison, for every 1 dollar spent:

- Government +$0.47
- Manufacturing, Trade, Transportation & Warehousing +$0.69
- Professional, Scientific, and Technical Services +$0.83
- Health Care and Social Assistance +$0.84
- Finance and Insurance +$0.96
- Real Estate and Rental and Leasing +$0.98

Source: HR&A analysis of EMSI data.

Chicagoland Chamber of Commerce & HR&A Advisors
Chicago's tech ecosystem contributes **$274M** in total sales tax.

**Chicago Tech Ecosystem Sales Tax Revenue Collected by Governmental Entity (2021)**

- **$27M**
- **$33M**
- **$47M**
- **$167M**

**$274M**

- 9.2% of total Chicago Sales Tax Revenue
- 1.7% of State Sales Tax Revenue

*Source: HR&A analysis of EMSI data. HR&A calculated the sales tax generated by the Chicago tech ecosystem based on worker spending estimates.*
CHICAGO TECH ECOSYSTEM’S FISCAL IMPACT

Chicago’s tech ecosystem contributes $274M in sales tax and $377M in income tax for a combined total fiscal impact of $651M across the city, region, and state.

$274M
SALES TAX
~2% of State Sales Tax Revenue

+$377M
INCOME TAX
~2% of State Income Tax Revenue

= $651M
TOTAL FISCAL IMPACT

Chicago sales taxes are paid at the city, county, and state-level, in addition to a Regional Transit Authority tax. Between these four tax-collecting entities, the total sales tax rate in Chicago is 10.25% and results in $274M in total sales taxes. This represents 9.2% of the total sales tax collected by Chicago and 1.7% of the total sales tax collected by Illinois. Income tax is only paid at the state-level and the Chicago tech ecosystem contributes roughly $377M in income tax to Illinois annually.

Source: HR&A analysis of EMSI data.
Chicago’s Tech Ecosystem Today

Ecosystem Overview
Economic & Fiscal Impact
Drivers of Growth
Chicago's thriving tech ecosystem stems from intentional public and private commitments, a robust incubator network and entrepreneurial culture, and a deep talent bench. The following section explores each of these assets that distinguishes Chicago from other tech hubs and continues to propel the ecosystem forward.
DRIVERS OF GROWTH

KEY INVESTMENTS

Since the early 2000s, the city of Chicago and state of Illinois have been closely invested in the success of the tech ecosystem. Through programs like the Illinois Angel Investment Tax Credit (2010), the Illinois Growth and Innovation Fund (2015), and the Data Center Investment Program (2019), both local and state governments have helped to facilitate the flow of capital to tech companies through tax incentives and direct investment. The Data Center Investment Program has resulted in the creation of over 60 data centers in Chicago and has made the city the 4th largest data center market in the world. The Chicagoland Chamber of Commerce has also been influential in the growth of the tech ecosystem by advocating for policies that support tech, creating the Tech Council to develop the tech network in Chicagoland, and incubating 1871 which has widely been considered the #1 incubator in the world.
PUBLIC INVESTMENTS
For nearly a decade, both local and federal governments have made serious investments to bolster Chicago’s tech economy and workforce.

**2013** Mayor Rahm Emanuel commits to doubling Chicago’s tech economy in ten years.

**2013** The Mayor’s office releases the City’s first technology plan.

**2017** Mayor Emanuel and Mayor Huldai sign an economic partnership agreement that promotes collaboration between Chicago and Tel Aviv, particularly around technology and innovation.

**2019** The Department of Defense commits to funding MxD, a digital manufacturing institute on Goose Island, with up to $60 million over the next five years.

**2021** Mayor Lightfoot And Kennedy-King College announces Tech Launchpad, an initiative that offers easily-accessible training courses co-developed by leading tech companies.

**2021** The Discovery Partners Institute and healthcare startup incubator Matter receive $2.8M in grants from the U.S. Economic Development Administration’s “Build to Scale” Program.

**2021** The Pritzker administration secures $500M through the Rebuild Illinois Capital Grant to fund critical infrastructure needs in Illinois.

*Source: Chicago Tribune, Mayor Office of Chicago, City Colleges of Chicago, World Business Chicago, the U.S. Economic Development Administration*
## RECENT POLICY INITIATIVES

Specific state-level initiatives have also increased funding, incentives, and investments to growing Chicago’s tech ecosystem.

### Illinois Angel Investment Tax Credit Program (2010)

- $10M in tax credits allocated annually to provide investors of qualified early-stage companies a 25% tax credit. $500K is set aside for MWBEs and other underserved business owners.

### Illinois Growth and Innovation Fund (2015)

- $1B evergreen fund to invest in ways to attract, assist, and retain tech companies in Illinois.

### Illinois Data Center Investment Program (2019)

- Provides sales and use tax exemption, and tax credits for projects located in underserved areas, to attract large-scale data centers.

### Impact

- Since 2011, the program has provided $325M in total funding to early-stage companies. In 2020, 67 businesses were funded and nearly 30% of these businesses were from underserved backgrounds. Notably, the percentage of investments to new minority-owned businesses increased by 267%. In the same year, minority-owned and women owned investors received a total of $2.4M in tax credits from the program.

- As of 2016, the fund has attracted $9.2B in private investment across 213 Illinois-based companies. This past year, the fund has committed $500M across 49 offices, of which $211M was invested in MWBE funds. Furthermore, since 2020, the fund helped support 110 businesses owned by underserved groups, including women, minorities, veteran, and disabled persons.

- The program has generated more than $6B in committed investment in Illinois since 2019 with many more projects in the pipeline. In 2020, the program executed agreements with 6 new data centers in the state (3 of which are in underserved areas). The Chicagoland Chamber of Commerce has continued to support the growth of Illinois’ burgeoning data center industry, now recognized as the 4th best data center market in the world.


Chicagoland Chamber of Commerce & HR&A Advisors
The Chicagoland Chamber of Commerce has invested in numerous efforts to support emerging technologies and strengthen the region’s tech ecosystem.

1871 Tech Incubator: Chicagoland Chamber of Commerce incubated the now world-famous 1871 incubator in the early 2000s.

Tech Council: Convenes over 50 tech industry leaders to discuss emerging technologies such as AI, 5G, IoT, blockchain, AR/VR, and more, and share best practices and resources to advance tech in Chicago.

Policy Advocacy: The Chamber has successfully advocated for policies that improve the region’s technology and entrepreneurial infrastructure, supports economic and workforce development, and advances diverse, equitable, and inclusive opportunities, including:

- The 2019 Data Center Investment Program which provides tax credits and exemptions to attract large-scale data centers and has led to significant investments to the region.
- An extension of the Small Wireless Facilities Deployment Act, which helps phone companies build small-scale 5G networks faster by limiting how much local governments can regulate the installation and maintenance of the equipment.
- A state-match grant program for the federal Small Business Innovation Research (SBIR) Program to support small businesses in tech.
- The newly-established Illinois Innovation Voucher Program, which awards up to $25K to manufacturers looking to incorporate technology in their products to improve productivity and sustain a competitive edge.
- A five-year extension of the EDGE tax credit program and additional provisions to make the program refundable for start-ups, particularly in tech, to ensure they have the capital to advance their project and business.
- Supported a coalition with mHub to secure $25M for the Build Back Better Regional Challenge application that, if won, will leverage $100 million in federal funds to support clean tech projects across Illinois.
- Most recently, the Chamber has been leading the fight to reform the Biometric Information Privacy Act (BIPA), which has especially targeted and burdened smaller businesses.

Source: Chicagoland Chamber of Commerce
INVESTMENTS IN EMERGING SECTORS: DATA CENTERS

The Chicagoland Chamber of Commerce has been a champion of the Illinois' Data Center Investment Program, which has fostered the growth of data centers in Chicago. The city now boasts the 4th best data center market in the world.

4TH BEST DATA CENTER MARKET GLOBALLY

60+
TOTAL DATA CENTERS (2022)

+400 MW
TOTAL INVENTORY (2022)

Chicago’s data center market benefits the overall economy in the following ways:

INNOVATIONS IN ENERGY
Data center owners have been involved in public energy efficiency and renewable energy development to lower power costs, their largest expenditure.

UPGRADED INFRASTRUCTURE
Building data centers in underdeveloped areas creates a demand for the expansion of public roads, power, water, and sewer systems.

ADJACENT BUSINESS ATTRACTION
Data centers attract other companies that provide services to the data center industry, such as power and energy monitoring companies.

INCREASED TALENT POOL
Data centers rely on skilled workers, such as building architects, engineers, and technicians. This available concentration of talent allows local communities to also attract other data centers and industries.

Source: U.S Chamber of Commerce, Cushman & Wakefield, Patch, Datacenters.com. Cushman Wakefield ranked Chicago fourth based on its market size, cloud availability, and fiber connectivity. In comparison, Northern Virginia’s market size (#1) is 1.7GW, while Singapore and the Bay Area (tied for #2) is ~600 MW.
INVESTMENTS IN EMERGING SECTORS: QUANTUM

Investments by Chicago's academic institutions, national laboratories, and businesses have created foundational infrastructure to transform Chicago into a hub for quantum innovation.

**Chicago Quantum Exchange (2017)**
Premier quantum intellectual hub that connects academia, top scientific facilities, corporations, and nonprofit to advance quantum research and innovation. The exchange organizes events such as the annual Chicago Quantum Summit which centers discussions on how to grow the quantum ecosystem.

**Quantum Research Centers at Argonne and Fermilab (2020)**
2 of the 5 U.S. Department of Energy quantum research centers are in Chicagoland's national labs. Fermilab's Superconducting Quantum Materials and Systems Center aims to build a top-tier quantum computer using superconducting technologies, while Argonne leads Q-Next, which convenes leading researchers to develop the science and technology to distribute quantum information.

**National Science Foundation QuBBE Quantum Leap Challenge Institute (2021)**
Led by UChicago, the $25M institute is one of five funded by the NSF that will investigate quantum sensing in biophysics and bioengineering and bring quantum curricula to Chicago's K-12 Public school students. Planned activities include the creation of a certificate program in quantum science and pairing students with both academic and industry partners to prepare them for success in this growing workforce.

**Duality (2021)**
The nation's 1st quantum startup accelerator program is based in Chicago. The 12-month program provides startups with business and entrepreneurship training from the Booth School of Business and the Polsky Center, along with engagement opportunities from the Chicago Quantum Exchange, the University of Illinois Urbana-Champaign, Argonne, and P33.

**P33 Quantum Cohort (2021)**
A venue that will facilitate interactions between experts and companies, so that companies can make connections with quantum researchers, understand how quantum will affect financial services and FinTech business, and make informed investments in the sector.

Source: Uchicago News, NSF, P33, The Polsky Center
Chicago is home to a large network of incubators and accelerators, including top programs such as 1871, the Polsky Center, mHUB, and MATTER. Chicago's incubators have different specializations, allowing the city to cater to startups in software, hardware, manufacturing, retail, healthcare, and many other fields. Highly successful tech companies including Braintree, Grubhub, Tovala, Groupon, and Cameo were born in Chicago. Since COVID-19, startups have shown even more growth and success. In 2021, Chicago saw 12 new unicorns, a record for the city. The success of Chicago’s startups is due in part to the growth of venture capital in the city, which deployed a record $5.5B in 2021. The entrepreneurial environment in Chicago is also much more diverse than other tech hubs, due in part to the city’s diverse workforce. 34% of founders in Chicago are female which is over 2X the global average.
INCUBATORS & ACCELERATOR NETWORK

Chicago’s strong entrepreneurial and startup environment can be partially attributed to a robust network of over 65 tech incubators and accelerators.

<table>
<thead>
<tr>
<th>Incubator</th>
<th>Founded Year</th>
<th>Description</th>
<th>Total Capital Raised by Alumni</th>
<th>Notable Startups</th>
</tr>
</thead>
<tbody>
<tr>
<td>1871</td>
<td>2012</td>
<td>Founded in 2012, 1871 now supports early stage, growth stage, and corporate innovators and is named the #1 incubator in the world.</td>
<td>$3.5B</td>
<td>Cameo, Spot Hero</td>
</tr>
<tr>
<td>Polsky Center</td>
<td>1998</td>
<td>Founded in 1998 at the University of Chicago, the Polsky Center provides venture support for students, faculty, and alumni.</td>
<td>$1.2B</td>
<td>Braintree, GrubHub, Tovala</td>
</tr>
<tr>
<td>mHUB</td>
<td>2017</td>
<td>Founded in 2017, mHUB offers incubation space for hard-tech and manufacturing startups.</td>
<td>$544M</td>
<td>Amber Agriculture, NuCurrent</td>
</tr>
<tr>
<td>Matter</td>
<td>2014</td>
<td>Founded in 2014, Matter serves as a non-profit startup incubator for healthcare tech.</td>
<td>$1.7B</td>
<td>Siris Medical, AskBio, Altertive Healthcare</td>
</tr>
</tbody>
</table>

Source: 1871, Polsky Center, mHUB, Matter, Built in Chicago

Chicagoland Chamber of Commerce & HR&A Advisors

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SPOTLIGHT: 1871
1871’s tailored resources, quality programming, and highly collaborative space, supports entrepreneurs through every stage of their development.

Located in the iconic Merchandise Mart in the heart of Chicago, 1871 serves as one of the leading hubs for the city’s thriving technology and entrepreneurial ecosystem. Incubated in 2012 by the Chicagoland Chamber of Commerce, 1871 exists to inspire, equip, and empower founders, growth teams, and innovators building extraordinary businesses across the maturity curve from idea to Fortune 50.

Over the last ten years, the nonprofit has supported nearly 14,500 jobs and $3.5B in capital raised. Many of its programs focus on inclusion and equity, including: WMN- Fintech, an accelerator for women in fintech, BLK-Tech an accelerator for black entrepreneurs, and PYROS, a world-class curriculum for early-stage founders.

Pre-pandemic, 1871 also hosts 1,000+ events per year and continues to offer in-person and virtual events that are open to the public and centered on fostering inclusion in innovation and entrepreneurship. ScaleUp is a signature event that allows leaders to connect with peers, discuss best practices for scaling their business, and learn from Chicago entrepreneurs who have been able to effectively grow.

1871’s network now includes over 400 early-stage startups, 200 growth stage companies, 200 corporate innovation partners, 850 alumni startups still scaling, venture capital firms, universities, and hundreds of mentors.

Source: 1871
Chicagoland Chamber of Commerce & HR&A Advisors
ENTREPRENEURSHIP SUCCESS STORIES

Chicago's incubators have seen success with the launch of several well-known companies prior to COVID-19.

**GRUBHUB**
- Status: Public (NASDAQ)
- Total Funding: $284M
- Employees: 2,700
- Founded: 2004
- Chicago Incubator: Polsky Center

**Braintree**
- Status: Acquired by PayPal ($800M)
- Total Funding: $69M
- Employees: 366
- Founded: 2007
- Chicago Incubator: Polsky Center

**TOVALA**
- Status: Private
- Total Funding: $68.6M
- Employees: 125
- Founded: 2015
- Chicago Incubator: Polsky Center

**CAMEO**
- Status: Private
- Total Funding: $165M
- Employees: 425
- Founded: 2017
- Chicago Incubator: 1871

The Polsky Center New Venture Challenge (NVC) at the University of Chicago is consistently ranked as the top university-based accelerator in the country. Alumni have collectively raised over $1.2B in capital and companies like Grubhub, Braintree, and Tovala were all founded by MBA students at the University of Chicago. Grubhub won the NVC in 2006, Braintree won in 2007, and Tovala won in 2015 before going on to raise millions in venture capital funding.

Cameo was founded in 2015 and raised roughly $65M before the pandemic. The company is an 1871 alum and won the 1871 Momentum Award in 2019 for achieving significant growth and making a “substantial impact on Chicago’s tech and startup community.”

Source: Crunchbase, LinkedIn, The Polsky Center, 1871, Chicago Business Journal
ENTREPRENEURSHIP SUCCESS STORIES POST COVID

In 2021, 12 additional Chicago tech companies gained “unicorn” status, valuing at over $1 billion. These companies reflect Chicago’s strengths in FinTech and Logistics & Transportation.

Source: World Business Chicago
Chicagoland Chamber of Commerce & HR&A Advisors
**SPOTLIGHT: CAMEO**

Unicorn startup Cameo found tremendous opportunities in Chicago, but more can be done to strengthen Chicago's tech ecosystem to enable other entrepreneurs to find similar paths of success.

Founded in 2016 by Steven Galanis, Cameo is one of Chicago’s fastest growing startups with funding totaling more than $165 million. Like many Chicago startups, Cameo’s story began at a small office desk in the 1871 incubator. Despite an initial lack of support, Galanis was able to get pre-seed capital through his mentor. In 2018, a chance meeting with a staff member from Chicago Ventures at 1871 allowed Galanis to secure a $100,000 investment from the VC firm, and from there, Cameo’s investors continued to grow. Today, Cameo is a roughly 400-employee media-tech business connecting people and celebrities through its app platform.

Chicago supported Cameo on its path to unicorn status:

<table>
<thead>
<tr>
<th>2017</th>
<th>2018</th>
<th>2019-21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Galanis co-founds Cameo and is able to raise pre-seed capital from his mentor and fellow Chicago entrepreneur, Mike Gamson, CEO of Relativity.</td>
<td>Cameo continues to grow at 1871, taking advantage of the incubator’s many resources, including its large network. At 1871, Galanis meets a staff member at Chicago Ventures who invests in Cameo’s Seed and Series A rounds.</td>
<td>Investors tell Galanis to move Cameo to L.A., but recognizing Chicago’s strong and unique talent base, he decides to stay in Chicago. This decision helps grow Cameo to a $1B+ valuation in 2021.</td>
</tr>
</tbody>
</table>

Source: Steven Galanis, CEO and Co-founder of Cameo, Chicago Tribune, 1871
Chicagoland Chamber of Commerce & HR&A Advisors
ENTREPRENEURSHIP: FEMALE FOUNDERS

Chicago's entrepreneurial environment has extended opportunities to women – Chicago has the highest share of female founders among the top 20 tech hubs in the world at 34%, over 2X the global average.

Chicago's diverse economy potentially offers lower barriers to entry for women joining the startup scene. Stakeholders interviewed for this study observed that women often enter tech with a corporate background or demonstrated prior business experience from working in one of Chicago's many industries. This experience may position women well to start their own businesses.

Chicago has invested in incubator programs and resources that intentionally invest in women-led ventures, such as 1871's WMNtech founder program (formerly WiStem) and WMNfintech program, InvestHER, an early-stage investment firm focused on investing in female entrepreneurs, as well as GET Cities ongoing work to close the gender gap in tech.

With that said, much more still needs to be done to achieve gender equity among entrepreneurs. In 2020, only 2.3% of venture funds went to women-led startups nationally, down from 2.8% in 2019. With the highest share of female founders globally, Chicago can lead the way to change the narrative.

Share of Female Startup Founders

<table>
<thead>
<tr>
<th>Chicago</th>
<th>Global Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>34%</td>
<td>16%</td>
</tr>
</tbody>
</table>

Notable Chicago Female Founders:

- Genevieve Thiers is considered one of the first female disruptors in Chicago tech when she sold a majority stake in her company, Sittercity, in 2019. Today she is an investor of women tech CEO's and female political candidates.
- Melissa Bodford founded uBack, a platform supporting nonprofits, in 2014 and raised $1.6M and 11,000 volunteer hours for local nonprofits. uBack was part of 1871’s WiStem cohort.
- Kristi Zuhlke co-founded KnowledgeHound in 2013 to make consumer data more accessible and has since raised $3.9M to date.
- Arena Pay, Caribou, HomeZada, Indie Tech, and Trustate are all women-led companies that were invited to participate in WMN-Fintech’s 2021 cohort.
- 1871 WiStem’s celebrated seven female founders from its cohort 10 and 11 showcase, including Jill Dilingham (Tight Ship), Kim Michelson (Honest Game), Dana Todd (Balodana), Ali Briggs (LifeWeb 360), Meenakshi Lakshmanan (Manifest Ledger), Tiffany Griffin (LeveledPro), and Kati Deutschle (EmBorrow)

Sources: Built in Chicago, Crunchbase, GET Cities, InvestHer, Startup Genome
Illinois-based tech startups have grown rapidly in recent years in terms of headcount, office space, and funding.

Relativity was founded in 2001 by Andrew Sieja and originally focused on solving knowledge management problems before switching to legal software. The company has raised $125M to date and made 300 new hires in 2019 to reach a headcount of over 1,500 employees.

Matt Elenjickal founded FourKites in 2014 to improve supply chain visibility for the logistics industry. The company has raised $150M since 2019 and doubled its headcount to 720 employees in 2020.

Truss is a real estate tech platform that helps small office tenants find space and sign a lease. The company was founded in 2016. Truss raised $15M and made 100 new hires in 2019 and was acquired by Avison Young in 2020.

Vistex, an enterprise resource planning platform, was founded in 1999 by Sanjay Shah. The company now has over 1,500 employees and provides software to some of the largest companies in the world. Vistex raised $105M and added 300 new employees in 2019.

Source: Built in Chicago, Techweek, FourKites, Hyde Park Angels, Avison Young, Vistex
VENTURE CAPITAL GROWTH

Chicago has seen a steady rise in venture capital investment. In 2021, Chicago saw a **96%** year over year increase in VC investment across 275 deals.

---

**Chicago’s Total Venture Capital Investment (2018-2021)**

- **$1.9 B** in 2018
- **$2.2 B** in 2019 (47% growth)
- **$2.8 B** in 2020 (96% growth)
- **$5.5 B** * in 2021

<table>
<thead>
<tr>
<th>Year</th>
<th>Deals</th>
<th>Capital Raised</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>140</td>
<td></td>
</tr>
<tr>
<td>2019</td>
<td>302</td>
<td></td>
</tr>
<tr>
<td>2020</td>
<td>273</td>
<td></td>
</tr>
<tr>
<td>2021</td>
<td>275</td>
<td></td>
</tr>
</tbody>
</table>

**Biggest Deals in 2021**

- **$720M** ThoughtWorks
- **$350M** Fynd
- **$240M** ActiveCampaign
- **$236M** COPADO
- **$202M** Project44
- **$200M** ShipBob
- **$200M** Clearcover

*As of Q3

**Source:** MoneyTree, PitchBook, Built in Chicago

Chicagoland Chamber of Commerce & HR&A Advisors

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VENTURE CAPITAL BY INDUSTRY

Chicago's VC funding is reflective of the tech ecosystem's concentration in Finance and Information sectors. Of the top 50 tech companies in Chicago, Infotech, Fintech, and AgTech companies raised the most funding in 2021.

2021 Funding by Category

- Infotech: $853M
- Fintech: $352M
- AgTech: $270M
- Sales: $257M
- Data: $240M
- eCommerce: $150M
- Healthcare: $135M
- Admin: $82M
- Internet: $35M
- Hardware: $7M
- EdTech: $7M
- Media: $0M
- AI: $0M
- Transportation: $0M
- RE tech: $0M
- Fashion: $0M

Source: Crunchbase

Chicagoland Chamber of Commerce & HR&A Advisors
Chicago is home to some of the top academic institutions in the country which have been producing more tech talent in recent years. The city has the 2nd highest number of college graduates of the top 5 largest cities in the U.S., and the 4th most engineering graduates of any city in the country. Between 2014 and 2019, the number of tech degrees increased by 50%, demonstrating the success of initiatives across the full educational continuum. From CS4All to programs offered by the Discovery Partners Institute, to training programs such as I.C. Stars and Year Up, Chicago has continued to see investment in its tech talent pipeline, especially for those who have been historically underrepresented and underinvested in.
TALENT PIPELINE
Chicago's high concentration of top universities and educational institutions produces quality STEM talent for the tech ecosystem.

4th
Most engineering graduates in the U.S

2nd
Highest number of college grads among the five largest U.S cities

50%+
Increase in tech degrees completed in Chicago between 2014-2019

The state has a high concentration of top academic institutions:

- University of Chicago
- Northwestern University
- Loyola University
- DePaul University
- University of Illinois Chicago
- University of Illinois--Urbana-Champaign
- Illinois Institute of Technology

Source: US News, CBRE Scoring Tech Talent, WBCRC, IPEDS
Chicagoland Chamber of Commerce & HR&A Advisors
TALENT PIPELINE INITIATIVES

Public, private, and non-profit actors have launched several programs to increase and develop home-grown tech talent, particularly in the last decade.

<table>
<thead>
<tr>
<th>K-12</th>
<th>Post-Secondary Students</th>
<th>Reskilling &amp; Upskilling</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS4All</td>
<td>ThinkChicago’s Lollapalooza</td>
<td>I.C. Stars</td>
</tr>
<tr>
<td>2014</td>
<td>2010</td>
<td>1999</td>
</tr>
<tr>
<td>ISTI STEM Challenges</td>
<td>DPI City Scholars Program</td>
<td>Year Up Chicago</td>
</tr>
<tr>
<td>2014</td>
<td>2018</td>
<td>2010</td>
</tr>
<tr>
<td>DPI &amp; UIC Digital Scholars</td>
<td>DPI’s Digital Bridge Program</td>
<td>DPI’s TechReady Illinois</td>
</tr>
<tr>
<td>2020</td>
<td>2021</td>
<td>2020</td>
</tr>
<tr>
<td>DPI’s Discover Computing Program</td>
<td>P33’s Strong Start</td>
<td>Accelerate Chicago</td>
</tr>
<tr>
<td>2021</td>
<td>2021</td>
<td>2021</td>
</tr>
</tbody>
</table>

Sources: Illinois 2020 Innovation Index, Year Up, I.C Stars, CS4All, University of Illinois Discovery Partners Institute (DPI), Microsoft, Chicagoland Chamber of Commerce & HR&A Advisors
TALENT PIPELINE INITIATIVES: K-12

**CS4All**
Launched in 2014, CS4All made Chicago the first urban district to offer K-8 computer science pathways. CS4All has increased students' access to computer science courses, but quality instruction remains a key pipeline issue.

**ISTI STEM Challenges**
The Illinois Science & Technology Coalition's STEM Challenges provide high schoolers with the opportunity to work with STEM professionals for 6 months to build solutions to real-world problems.

**DPI & UIC Digital Scholars**
Digital Scholars is a summer program for high school and college students to build computing skills, increase college and career-readiness, and make connections in Chicago's tech community. This program is run by the University of Illinois Discovery Partners Institute.

**DPI’s Discover Computing Program**
The Discovery Partners Institute's Discover Computing is designed to build a deeper and more diverse pool of students pursuing computer science and tech-related fields of study in Illinois.

Sources: CS4All, ISTI, DPI Illinois
SPOTLIGHT: Chicago Public Schools CS4All

CS4All has increased students’ access to computer science courses across Chicago Public Schools, but quality instruction remains a key pipeline issue.

Launched in 2014 by Mayor Emanuel and former Chicago Public Schools (CPS) CEO Barbara Byrd-Bennett, CS4All made Chicago the first urban district to offer K-8, science pathways. The initiative makes computer science a high school graduation requirement. Within a year of the policy taking effect, the percent of students enrolled in at least one CS course by the end of their ninth-grade doubled. CS4All also led to a full-fledged Office of Computer Science (OCS) at the Chicago Public School. As of 2019, OCS has trained 1,000 new teachers and put computer science in over 300 schools. OCS is dedicated to support communities that have been historically underrepresented in the field of computer science.

“Recruiting, training, and retaining skilled teachers may be one of the main challenges which are likely prevalent in high schools that face difficulties in staffing teachers due to small overall enrollment or shortages of teachers in particular areas of study.”

- UChicago Consortium on School Research

Percentage of Chicago Public High Schools Offering at least one CS course

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>33%</td>
</tr>
<tr>
<td>2013</td>
<td>39%</td>
</tr>
<tr>
<td>2014</td>
<td>39%</td>
</tr>
<tr>
<td>2015</td>
<td>53%</td>
</tr>
<tr>
<td>2016</td>
<td>52%</td>
</tr>
<tr>
<td>2017</td>
<td>70%</td>
</tr>
<tr>
<td>2018</td>
<td>80%</td>
</tr>
</tbody>
</table>

Launched in 2014 by Mayor Emanuel and former Chicago Public Schools (CPS) CEO Barbara Byrd-Bennett, CS4All made Chicago the first urban district to offer K-8, science pathways. The initiative makes computer science a high school graduation requirement. Within a year of the policy taking effect, the percent of students enrolled in at least one CS course by the end of their ninth-grade doubled. CS4All also led to a full-fledged Office of Computer Science (OCS) at the Chicago Public School. As of 2019, OCS has trained 1,000 new teachers and put computer science in over 300 schools. OCS is dedicated to support communities that have been historically underrepresented in the field of computer science.

“Recruiting, training, and retaining skilled teachers may be one of the main challenges which are likely prevalent in high schools that face difficulties in staffing teachers due to small overall enrollment or shortages of teachers in particular areas of study.”

- UChicago Consortium on School Research

Source: UChicago Consortium on School Research, Tech Crunch
TALENT PIPELINE INITIATIVES: POST-SECONDARY STUDENTS

ThinkChicago’s Lollapalooza
ThinkChicago’s Lollapalooza takes place in the week leading up to Chicago’s famous music festival with the goal of attracting and retaining tech talent to Chicago.

DPI City Scholars Program
The Discovery Partners Institute’s City Scholars Program exposes exceptional college students to Chicago tech companies and executives and places students in semester-long internships in Chicago.

DPI’s Digital Bridge Program
The Discovery Partners Institute’s Digital Bridge Program sets aside $2M for Local Education Agencies in response to Covid and the resulting digital learning gap.

P33’s Strong Start
P33’s Coalition members speak at universities, become mentors for students, and provide internships with the goal of helping students of color earn tech degrees to find careers in tech.

Sources: DPI, HR&A Stakeholder Interviews
Chicagoland Chamber of Commerce & HR&A Advisors
SPOTLIGHT: Discovery Partners Institute (DPI)

With a strong commitment to DEI, DPI offers multiple programs and initiatives to ensure that every resident can access and thrive in Illinois’ tech community.

Part of the University of Illinois System, Discovery Partners Institute (DPI) is a coordinated partnership among the state’s top research universities and facilities to develop, attract, and retain tech talent in Illinois. With $230M taxpayer funding, DPI serves as the state’s innovation hub, devoting resources to applied R&D and talent development, such as through Pritzker Tech Talent Labs. DPI’s Pritzker Tech Talent Labs are a systemic approach fostering diverse tech talent, particularly among women and people of color, at every stage of a person’s education journey.

**Teacher Training Initiative** strengthens teacher capacity to enable greater CS learning for students.

The initiative provides teachers with computer science certifications and professional development training to ensure that every classroom has competent computer science teachers.

**Community Education Unit** focuses on tech skill-building for middle, high school and community college students.

The initiative seeks to change the face of Chicago’s tech sector by preparing historically underrepresented groups for tech careers through programs such as Discover Computing, Digital Scholars, and Digital Bridge.

**DPI Tech Scholars** offers a network for undergrad and graduate students to explore opportunities in tech.

The initiative offers undergrad and graduate students hands-on immersive experiences at a tech company in Chicago, DPI Science team, or local civic or nonprofit organization, in addition to full semester of courses.

**DPI Workforce Education** upskills and reskills individuals for 21st-century jobs.

In particular, TechReady Illinois – created in partnership with P33 – trains unemployed, furloughed, and underutilized Illinois residents for tech careers, including in cybersecurity, software programming, and data science.
TALENT PIPELINE INITIATIVES: RESKILLING & UPSKILLING

I.C. Stars
I.C. Stars is a tech training provider focused on skilling underserved young adults. The 4-month program provides on-the-job experience to develop business, tech, and leaderships skills and has seen an 82% job placement rate.

Year Up Chicago
Year Up is a nonprofit workforce development organization dedicated to closing the tech opportunity divide by ensuring young adults gain the skills, experiences, and support to empower them to reach their potential through careers and higher education.

DPI’s TechReady Illinois
Founded by DPI and P33, TechReady Illinois was created to help Illinois residents impacted by COVID-19 gain new digital skills. The program now helps professionals as well as those looking to switch to a tech career by providing training programs in tech.

Accelerate Chicago
Accelerate Chicago is a Microsoft program that works with local community leaders and businesses to increase access to in-demand careers and support job placement by providing upskilling and cross-skilling digital courses.

Chicagoland Chamber of Commerce Employee Training Program
The Chamber offers workforce training at up to 50% off the cost to support job seekers with greater access to expanding skill sets. Since 2019, over 100 companies and 5,200 employees have participated in the program.

Sources: I.C. Stars, Year Up, DPI, Microsoft
Chicagoland Chamber of Commerce & HR&A Advisors
SPOTLIGHT: GOOGLE CAREER CERTIFICATES

Google Career Certificates offer flexible online training designed to put learners on the fast track to jobs in high-growth fields, with no experience or degree necessary.

Google Career Certificates provide job seekers with access to more than 1.5 million in-demand jobs without the need for a college degree or prior experience in the fields of data analytics, digital marketing & e-commerce, IT support, project management, and user experience design. These certificates are taught and developed by Google employees and can be completed in three to six months of part-time study. The program has helped more than 70,000 people in the U.S. acquire new skills in in-demand jobs. 75% of program graduates report an improvement in their career trajectory (e.g., new job, promotion, or raise) within 6 months of program completion.*

Key to the success of the program is the Google Career Certificate Employer Consortium, which convenes over 150 employers across multiple sectors who are committed to considering graduates for entry-level jobs. Consortium members hiring in Chicago include Accenture, Crate & Barrel, Salesforce, Nasdaq, Google and others. Google Career Certificates provide no-cost resources including mock interviews, resume building tools, and career coaching services to prepare graduates for their job search. Google also partners with non-profit organizations, community colleges, and universities to provide learners with wraparound services.

Google has devoted resources to serving individuals from traditionally underrepresented groups

Google has funded 130,000 scholarships in the U.S. for need-based learners to complete any certificate. Most recently, Google announced a $100M Google Certificates Fund with nonprofit Social Finance with the goal of driving $1B in aggregate wage gains for more than 20,000 Americans. Under this model, participants receive training at no upfront cost, and graduates only make low, no-interest monthly payments if they land a job earning at least $40K a year. Across Chicagoland, Google has also partnered with the City Colleges of Colleges, workforce boards, and other community organizations to reach underserved talent. Currently, 55% of graduates across the U.S. identified as Asian, Black, or Latino, and 38% came from the lowest income strata, earning under $30K annually.*

Google also offers opportunities for businesses to upskill or reskill its existing workforce. Every U.S. business can receive up to 500 Google Career Certificate scholarships to help upskill their employees.

Source: Google, *Based on the program graduates survey responses, US 2021

Alex Corral spent years managing restaurants on Chicago’s South Side. He couldn’t afford to finish college; then a work injury and the pandemic forced him to rethink his future. He found Google Career Certificates program and completed a certificate in IT Support through a scholarship with the City Colleges of Chicago. He now works as an Information Security Analyst at TEKSystems.
At a Glance

Chicago’s Tech Ecosystem Today

**Strengthening Chicago’s Tech Ecosystem for the Future**

Technical Appendix
Strengthening Chicago’s Tech Ecosystem for the Future
Opportunities for Equity

Talent Retention
Policy Considerations
OCCUNPTUNES FOR EQUITY

Chicago needs to lean into and invest much more into diversity and equity efforts to close the racial and gender gaps within Chicago's tech ecosystem.

As this report demonstrates the strengths and importance of tech to the overall Chicago and regional economy, it would be remiss to not discuss the tremendous opportunity tech has to closing generational racial and gender wealth disparities. The national reality is that Black and Latinx workers only make up 19% of the U.S. tech ecosystem despite representing 29% of the country’s workforce. Women make up 34% of the ecosystem despite representing half of all jobs across the U.S. Given this landscape, Chicago’s highly diverse workforce is a major asset for addressing equity in tech. Not only do non-whites make up 60% of the overall workforce, but Chicago is also home to some of the largest immigrant populations across the nation.

Chicago's tech ecosystem sees greater Black and Latinx participation than the national average – 32% compared to the US average of 19%. With continued investments, Chicago could become the most diverse tech hub in the country. Today, Black and Latinx workers make up 32% of the tech ecosystem despite representing 52% of the Chicago workforce. Public, private and civic leaders of Chicago are working together to close the gap and ensure that there are accessible pathways into tech for communities and populations that have traditionally been underinvested in or underrepresented. At venture capital firms, Black and Latinx employees grew from 100% to 328%, respectively from 2018 to 2021 thanks to organizations like Chicago:Blend which aims to measure and increase diversity, equity, and inclusion in venture capital firms. Black participation in VCs at 6% is outpacing the rest of the country where only 4% of the national VC workforce is Black. Programs working to increase racial equity include 1871’s BLKtech and LTNtech incubators which are designed to increase founders of color in tech, P33’s Strong Start, and Break Through Tech, which focus on expanding diversity across Chicago's tech talent pipeline, as well as funds such as Cleveland Avenue's State Treasurer Urban Success Initiative and Founders First CDC 2022, which are created to invest in companies founded by underrepresented founders.

Chicago is well-positioned to close the gender gap that exists in every tech hub around the world. Women make up 35% of the Chicago tech ecosystem, 39% of jobs at tech startups, and 16% of board positions at tech startups. At venture capital firms, female representation grew 21% between 2018 and 2021. Although Chicago is outperforming other cities when it comes to share of female founders in tech, there is still an opportunity to close the gender gap. 52% of Chicago's workforce is female, representing the potential to significantly increase female representation in tech and improve economic mobility for women while growing the tech ecosystem. Multiple organizations in Chicago are already working to address the gender gap, such as GET Cities (Gender Equality in Tech) and the Pritzker Tech Talent Labs, which are investing in programs to increase gender representation in tech. 1871 and mHUB also offer incubator programs designed specifically for female founders.
EXISTING EFFORTS TO ADDRESS GENDER DIVERSITY

Chicago has built great momentum to improving diversity, equity, and inclusion in the tech ecosystem. And the outcomes are promising. Today, Chicago has the highest share of women founders across all tech hubs globally.

**GET Cities:** GET Cities’ Tech Equity Working Group convenes multiple organizations around the city to address gender representation in tech and provides $150K in seed funding per year for initiatives that increase representation. Its Venture Fellowship Program also uses Venture Scouts to help women and BIPOC-led companies get started.

**Pritzker Tech Talent Labs:** Programs aimed at helping women and people of color secure tech jobs, including programs for high schoolers that teaches them how to code and connects them to internships.

**WMNtech Founders:** 12-week program and mentoring initiative at 1871 designed for women-identifying tech founders.

**WMN-FINTECH:** 12-week program and mentoring initiative at 1871, powered by BMO Financial Group, designed for women-identifying founders of FinTech startups.

**mPOWER by mHUB:** 6-month membership to mHUB for companies founded by women and people of color.

**Chicago:Blend:** Launched in 2018, ChicagoBlend is a collaborative effort of Chicago VCs to increase and measure DEI in VC firms and startups.

*Source: 1871, Chicago Business Journal*
OPPORTUNITIES FOR GENDER EQUITY IN THE WORKFORCE

In Chicago women hold 35% of tech ecosystem jobs (37K), a share that is on par with the nation's tech ecosystem. In comparison women represent 52% of Chicago’s workforce.

While Chicago's entrepreneurial environment has extended opportunities to women – Chicago has the highest share of female founders among the top 20 tech hubs in the world at 34%, over 2X the global average – more needs to be done to reach gender equity, especially in the overall tech workforce where women only hold 35% of jobs. Among startups, women represent 39% of employees and only 16% of startup boards.

Continuing to invest in policies and programs to close the gender gap by creating more pathways into tech jobs can potentially support 17K women earn $25K more annually in Chicago.

Greater investments are needed especially efforts focused on training women in software development, computer networks, computer programming, and information systems – these occupations offer higher-paying opportunities yet see some of the lowest female representation today.

Source: HR&A analysis of EMSI data, Chicago:Blend.

Chicagoland Chamber of Commerce & HR&A Advisors

Gender Distribution (2021)

<table>
<thead>
<tr>
<th>Category</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicago All Jobs</td>
<td>48%</td>
<td>52%</td>
</tr>
<tr>
<td>Chicago Tech Ecosystem</td>
<td>65%</td>
<td>35%</td>
</tr>
<tr>
<td>U.S. Tech Ecosystem</td>
<td>66%</td>
<td>34%</td>
</tr>
</tbody>
</table>
OPPORTUNITIES FOR INCREASED ECONOMIC MOBILITY

Of the top 20 largest tech ecosystem occupations, women tend to make up a smaller percentage of the highest paying occupations. Expanding access into higher-paying roles could generate $9K more in annual earnings.

Share of Women in Top 20 Largest Tech Ecosystem Occupations (2021)

Average Wage

<table>
<thead>
<tr>
<th>Above a B.A.</th>
<th>Below a B.A.</th>
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</thead>
<tbody>
<tr>
<td>$19</td>
<td>93%</td>
</tr>
<tr>
<td>$30+</td>
<td>42%</td>
</tr>
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<td>$40+</td>
<td>32%</td>
</tr>
<tr>
<td>$50+</td>
<td>42%</td>
</tr>
<tr>
<td>$75</td>
<td>31%</td>
</tr>
</tbody>
</table>

Source: HR&A analysis of EMSI
Opportunities for Gender Equity in Venture Capital

Venture capital in Chicago is rapidly growing and although the industry is largely male dominated, female participation has increased by 21% between 2018 and 2021.

While the industry is still predominately male (68%), women are making up an increasingly large share of the industry. Between 2018 and 2021, Chicago saw a 21% increase in female representation in venture capital firms, a 7% annual increase. This positive trend was particularly felt within First-Time Funds, where women make up 43% of first-time fund employees (up 8.5% year over year from 2020).

While this is positive, more needs to be done to increase opportunities for women to participate in venture capital in Chicago. Women at Chicago-area VCs still make up a smaller share when compared to the rest of the country where women make up 45% of the overall VC workforce. Women are also less likely to get promoted – in 2021, 60% of promotions went to men.

Source: Chicago:Blend. This data was collected by Chicago:Blend in July and August of 2021 and includes 771 employees from 114 firms with a Chicago office that have made at least one venture investment within the past two years. These firms include venture funds that are $5M+, family offices, angel investment networks, and a handful of other investors that do venture deals.
EXISTING EFFORTS TO ADDRESS RACIAL DIVERSITY

Public and private initiatives have also driven improvements in increasing racial diversity. Between 2018-2021, Black and Latinx participation in VCs grew two- and four-fold respectively.

**P33 Talent Coalition & Tech Rise:** P33 has convened 39 companies dedicated to improving Chicago’s tech talent pipeline through programs such as Strong Start and Tech Pass. P33’s $5M Tech Rise fund also distributes grants to Black and Latinx founders who win weekly pitch competitions at P33.

**Break Through Tech:** Works at the intersection of academia and industry to help increase the number of women and people from underrepresented backgrounds in tech careers. The initiative is a partnership with the University of Chicago and Pivotal Ventures.

**LTNtech Founders:** 12-week program and mentoring initiative created by IHCC and 1871 to equip Latin tech founders.

**BLKtech Founders:** 12-week program and mentoring initiative at 1871 designed to equip Black founders.

**Chicago:Blend:** Launched in 2018, Chicago:Blend is a collaborative effort of Chicago VCs to increase and measure DEI in VC firms and startups.

**Founders First CDC 2022:** Awards 30 grants for a total of $100K to small companies in Chicago run by people from underrepresented groups.

**Cleveland Avenue State Treasurer Urban Success Initiative:** $70M fund to invest in companies owned by Black, Latinx, and female entrepreneurs.

*Sources: Black Enterprise, Chicago:Blend, GET Cities, Chicago Business Journal*
OPPORTUNITIES FOR RACIAL EQUITY IN THE WORKFORCE

Chicago has a more racially diverse tech ecosystem as compared to the nation, with Black and Latinx workers holding 32% (34,000 jobs), vs only 19% nationally.

The endless work of Chicago’s many equity-focused tech organizations and intentional state and local policies has helped Chicago lead in forming a more diverse tech workforce.

Continuing to invest in policies and programs to close the 20% racial gap by creating more pathways into tech jobs can potentially support 22K Black and Latinx workers earn $24K more annually.

Efforts that remove barriers to entry for Black & Latinx workers to tech jobs, particularly in computer programming, software development, and computer network architecture, would be especially impactful, given that these are higher-paying opportunities.

Source: HR&A analysis of EMSI data.

Chicagoland Chamber of Commerce & HR&A Advisors
Among the tech ecosystem’s largest occupations, Black and Latinx workers tend to make up a smaller share of the highest-paying occupations. Creating more equitable pathways into occupations could potentially generate $10K in additional annual earnings for every Black and Latinx worker in the tech ecosystem.

### Share of Black & Latinx Workers in Top 20 Largest Tech Ecosystem Occupations (2021)

<table>
<thead>
<tr>
<th>Average Wage</th>
<th>$19</th>
<th>$30+</th>
<th>$40+</th>
<th>$75</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below a B.A.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above a B.A.</td>
<td>55%</td>
<td>43%</td>
<td>36%</td>
<td>38%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Above a B.A.</th>
<th>Below a B.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Service Representatives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales Representative of Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer User Support Specialists</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales Representative of Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer Network Support Specialists</td>
<td></td>
<td></td>
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<tr>
<td>Sales Representative of Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marketing Specialist</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telecommunications Equipment Installers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web Developers &amp; Digital Interface Designers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Management &amp; Business Operations Designers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network and Computer Systems Administration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Engineers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer Systems Analysts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer Occupations, All Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer Programmers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Software Developers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General and Operations Managers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer Network Architects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer and Information Systems Managers</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: HR&A analysis of EMSI

Chicagoland Chamber of Commerce & HR&A Advisors
OPPORTUNITIES FOR RACIAL EQUITY IN VENTURE CAPITAL

Latinx and Black participation in venture capital firms has grown 328% and 100% respectively between 2018-2021, demonstrating the active work of many organizations that are investing in increasing racial equity in VC.

While the venture capital ecosystem is still predominately white, Chicago has seen meaningful improvements in recent years. Black and Latinx professionals working in venture capital grew 100% and 328% between 2018 and 2021.

In the last year, Latinx representation saw the biggest gains – 80% year over year increase from 2020, and this group now represents 4.3% of the region's VC workforce. Representation among Latinx women were also particularly pronounced – 168% YOY increase.

Black workers now represent 6% of Chicago's VCs, growing 26% annually since 2018. Black participation in VCs is outpacing the rest of the country where only 4% of the national VC workforce is Black.

Organizations such as ChicagoBlend are working to improve diversity by measuring representation in the industry and making that data more readily available. Continued work in this area will help to make VC more diverse which in turn will make it easier for startups with diverse founders to access capital.

Source: ChicagoBlend, Crunchbase

Chicagoland Chamber of Commerce & HR&A Advisors
SPOTLIGHT: P33 TECH TALENT ALLIANCE

P33’s Tech Talent Alliance convenes employers to shape the future of Chicago’s workforce with an emphasis on high quality, diverse, tech talent.

P33’s Tech Talent Alliance aims to make big, long-term bets to transform the city’s workforce through a powerful network, novel programming, and actionable insights centered on its demand-driven perspective of the tech talent ecosystem.

The 50 member companies range from Fortune 100 companies to high-growth startups and include Aon, Accenture, Allstate, Microsoft, Google, Relativity, Salesforce, and United Airlines. In total, this group represents over 100,000 local employees.

P33 is a nonprofit focused on driving inclusive, global tech and innovation leadership for Chicagoland. Its work is anchored in creating equitable access to digital careers, talent retention, deep science commercialization, and addressing gaps in the region’s growth stage startup ecosystem.

Key Initiatives:

**Strong Start**
Connects member companies with universities to provide real-world projects to students during freshman and sophomore introductory computer science classes.

**Tech Pass**
App-based solution that provides students from underrepresented backgrounds a guided roadmap into Chicago tech companies to help diversify the tech workforce.

**The State of Chicago Tech Talent Report**
Report that identifies tech employers’ hiring needs and strategizes ways to equitably meet this demand.

**TechReady Illinois**
Program launched in response to Covid-19 in partnership with the Discovery Partners Institute to provide courses in data and analytics, cloud computing, cybersecurity, and software development to Illinois residents for a 50-75% discount.

Source: P33

Chicagoland Chamber of Commerce & HR&A Advisors

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Strengthening Chicago’s Tech Ecosystem for the Future

Opportunities for Equity

Talent Retention & Attraction

Policy Considerations
TALENT RETENTION IN A REMOTE WORLD

Migration patterns have shifted during the COVID-19 pandemic. Most notably, movement to San Francisco has declined.

Despite a strong production of tech talent from top-tier academic institutions, prior to COVID-19, many graduates chose to leave Chicago after school to work in other tech hubs. San Francisco, Denver, and Los Angeles were among the top three cities that Chicago lost workers to in 2019.

COVID-19 and remote work has changed where tech workers are choosing to live and work. Since the pandemic, migration patterns have shifted. Graduates are now choosing to move to more southern cities like Phoenix, Dallas, and Austin while traditional tech hubs like San Francisco and Seattle have seen a decline in talent migration from Chicago.

Source: LinkedIn Workforce Report, Chicago 2020

Chicagoland Chamber of Commerce & HR&A Advisors
TALENT RETENTION IN A REMOTE WORLD

The shift to remote work due to the pandemic has profound implications for how Chicago-based companies recruit and retain talent.

The implications of today’s “work from anywhere” culture remain unclear.

While companies now have access to a national talent pool, the benefits of national hiring may not be equally felt across different companies. Smaller, lesser-known companies may have difficulty attracting this national talent.

In addition, local workers can pursue job opportunities on the national market, but also face increased competition given the widened talent pool.

There is still great uncertainty in terms of how remote work will affect job or business growth and retention in the long run.

A survey conducted by P33 of its coalition companies revealed:

- Of companies say they no longer care whether a hire lives in Chicago or intends to move to Chicago.
  
  Nearly 100% of startups say this vs. 30% of more established companies

- 46% of the companies who are agnostic to location estimated that more than half of their digital workforce hires in 2021 are located outside of the Chicago area.

Source: P33, HR&A stakeholder interviews.

Chicagoland Chamber of Commerce & HR&A Advisors
TALENT ATTRACTION IN A REMOTE WORK WORLD

Chicago saw higher move-in rates in the last year, outperforming more established tech hubs like San Francisco and New York City. Chicago should continue to position itself as an attractive place to live and work.

Chicago is well-situated to attract tech talent in an increasingly remote work environment. Chicago has several key advantages when it comes to attracting tech companies and talent in the era of remote work, especially its lower cost of living. Chicago’s cost of living is 78% lower than San Francisco and 28% lower than New York City.

A 2021 study from TaskRabbit showed a strong correlation between move-in activity and cost of living – cities with a lower cost of living saw a higher percentage of move-ins in 2021. In 2021, Chicago had significantly more move-in activity than more expensive tech hubs like San Francisco, Los Angeles, and D.C. However, a low cost of living alone isn’t enough to attract and retain talent, as cities with slightly higher costs like Austin and Denver outperformed Chicago. Chicago needs to increase awareness around the size and strength of its tech ecosystem, as well as city amenities like the lakefront, museums, and sports teams to compete with tech hubs that are attracting more talent despite having fewer opportunities in tech.

Source: TaskRabbit, Advisor Smith. TaskRabbit is an online platform that connects people with freelance service providers. The company tracked the number of move-in and move-out tasks across major cities to estimate the net flow of people into or out of a city. Advisor Smith calculated the cost of living in 509 metropolitan areas across the U.S. based on the cost of food, housing, utilities, transportation, healthcare, and consumer discretionary spending. Each category was weighted based on Consumer Expenditure Surveys, and the weighted values were summed to get a value normalized to 100.
Strengthening Chicago’s Tech Ecosystem for the Future

Opportunities for Equity
Talent Retention
Policy Considerations
POLICY CONSIDERATIONS

There is consensus among Chicago's tech ecosystem actors that more needs to be done to boost Chicago’s image as a thriving tech hub that will continue to attract, grow, and retain tech talent and businesses.

1. **Lean into Chicago's assets and create marketing avenues to sell Chicago's strengths and successes.** Chicago companies are revolutionizing tech in various ways, but these successes aren't publicized at a national or global scale. The city needs to build upon the work that P33, World Business Chicago, and others are heralding to identify avenues to market Chicago's tech innovations. Moreover, Chicago needs to tout its core strengths – talent, diversity, affordability, connectivity, and its strong startup and corporate presence – to remain competitive with other markets.

2. **Advocate for policies and initiatives that will advance high-tech and deep-tech innovation in Chicago and not hinder the tech ecosystem’s momentum.** Building off its strengths in manufacturing, transportation, and logistics, the State can leverage federal tax credits to offer additional incentives to spur innovation and development in the future of auto. Quantum is another high-tech area where, if supported by effective policy, could be a differentiating factor for Chicago and lead to new jobs and more economic output. Currently, researchers at Chicago universities are national leaders in studying quantum. In general, city and state government needs to be careful about creating prohibitive regulatory laws that would limit growth and momentum for tech in the region.

3. **Develop policies to address current gaps in Chicago's tech talent pipeline.** While there are many top-tier universities in Chicago, more can be done to strengthen the tech talent pipeline at the K-12 level with better proficiency standards and programs to develop computer science teachers. There is also room to improve talent retention by creating more apprenticeship and mentorship programs to connect students with employers. Scholarships and loan forgiveness can incentivize students to stay in Chicago after program completion.

4. **Bring greater awareness to all tech opportunities across Chicago's economy by changing how tech is discussed.** Despite the strength of the tech ecosystem, many students in Chicago are unaware of the career opportunities available to them after graduation. This is partly due to the fact that roughly half of Chicago tech jobs are in non-tech industries. By expanding the definition of tech, Chicago can promote the true scale of the tech ecosystem and improve talent retention. Chicago can also expand the number of academic institutions and students who are included in the tech conversation. Colleges with large numbers of Black and Latinx students in tech have historically been overlooked by employers looking for tech talent. By increasing awareness around these schools and students, employers will have access to a larger pool of talent and more tech degree graduates will find careers in tech.

5. **Lead with equity.** Chicago's diverse workforce puts the city in a unique position to build the most equitable tech ecosystem in the country. Not only will this differentiate Chicago from other tech hubs, but it will also leverage the existing talent in the city to grow the tech ecosystem from within. The ecosystem should continue to invest in efforts and initiatives to increase Black, Latinx, and female participation in tech. City and state governments can also increase pathways to tech by closing the digital gap and expanding broadband adoption across the region.
POLICY CONSIDERATIONS

Lean into Chicago’s assets and create marketing avenues to sell Chicago’s strengths and successes.

Chicago companies are revolutionizing tech in various ways, but these successes aren’t publicized at a national or global scale. The city needs to build upon the work that P33, World Business Chicago, and others are heralding to identify avenues to market Chicago’s tech innovations, because Chicago has much to offer:

World Class Universities and Talent
Of the five largest cities in the U.S., Chicago has the 2nd most college graduates and the number of tech degrees awarded has risen 50% in the last five years. Retaining this talent will be key to fueling the growth of Chicago’s tech ecosystem.

Diverse, multi-sectoral economy
No single industry makes up more than 13% of Chicago’s workforce. Tech can serve as a blanket industry to tie together the diverse Chicago economy.

Strong Corporate Presence
Chicago is home to 27 Fortune 500 Companies, creating opportunities for startups to partner with large corporations and providing a large, local customer base for B2B tech companies.

Connectivity
With two international airports and the second largest public transit system in the U.S. (after New York City), Chicago is uniquely connected locally, regionally, and globally. In 2020, Governor Pritzker passed the $45B ReBuild Illinois capital funding initiative to improve infrastructure in communities across the state over the next 6 years, ensuring that Chicago will infrastructure will remain a strong asset for years to come.

Low Cost of Living
Chicago’s cost of living is 78% lower than San Francisco and 28% lower than NYC, making it much more affordable to start and operate a tech company in Chicago than other tech hubs.

Source: P33

In May 2021, P33 and World Business Chicago launched the Come Back to Move Forward campaign targeting 100K tech workers around the country with the goal of bringing 10K to Chicago. Chicago’s tech ecosystem actors need to rally around these efforts to promote Chicago as a tech hub.
POLICY CONSIDERATIONS

Advocate for policies and initiatives that will advance high-tech and deep-tech innovation in Chicago and not hinder the tech ecosystem’s momentum.

Angel Investment Tax Credit
There is currently a $10M cap on tax credits awarded through this program, which provides investors of qualified early-stage companies a 25% tax credit. Increasing that cap will improve the ability of startups to raise capital and will spur growth in the tech ecosystem. Moreover, the program needs to be “right-sized” to target tax credits to Series B and earlier companies.

AV/EV Framework
Chicago’s strengths in the automobile, manufacturing, and transportation industries make it an ideal city for autonomous vehicle and electric vehicle innovation. Chicago can support AV development and research by passing an AV framework or enact legislation modeled off states like Michigan. Chicago can build upon state and federal electric vehicle tax incentives and support the buildout of infrastructure and supply chains to help transform the auto industry.

Quantum
Chicago universities are national leaders in quantum research and innovation. Chicago can work to commercialize these innovations to create high-paying jobs and boost economic output. Extending and modernizing the R&D tax credit will also enable even more innovation in this field.

Incubators
Between 1871, mHUB, MATTER, and many more, Chicago has a strong startup incubation ecosystem. The city can work with these incubators to help scale innovative products and bring them to market.

Revolving Loan Funds and Early-Stage Capital Investment Funds
Despite the city’s robust incubator network, early-stage startups still have difficult access to capital. Chicago can create or expand revolving loan programs, such as the State’s Advantage Illinois program, to close the risk gap for small businesses seeking loans from banks. The state of Illinois is set to receive over $300 million for its SSBCI program and can utilize those dollars as discretionary funds for programs supporting small businesses. Additionally, the State and City can establish early-stage capital investment funds to support start-ups with up-front capital to spur their projects.

BIPA Reform
The Biometric Information Privacy Act heavily burdens small businesses and limits the growth of the tech ecosystem in Chicago.
POLICY CONSIDERATIONS

Develop policies to address current gaps in Chicago’s tech talent pipeline, such as:

**Strengthen Math Proficiency Standards**
Create upper-level math graduation requirements and dedicate additional resources to help students from underserved schools qualify for CS courses.

**Develop Quality K-12 Computer Science Teachers**
Provide affordable and accessible teacher training for all levels of CS Curriculum similar to DPI’s Teacher Training Program.

**Incentivize Local Talent Retention & Retain Foreign Talent**
Establish a fund for scholarships or loan forgiveness to graduates from local institutions who are employed in-state. Advocate for policy that provides pathways to citizenship for immigrant scholars & entrepreneurs who are trained and work in-state.

**Create Subsidized and Seamless Pathways with Wraparound Services**
Greater collaboration between community colleges, universities, and other training providers can help individuals maximize training opportunities by allowing full credit transfers, offering scholarships, and providing wraparound support services, particularly to non-traditional students.

**Tech Apprenticeships**
Build off the Chicago Apprenticeship Network and prioritize apprenticeship programs in the tech sector and partner with institutions like the City Colleges. Increase the cap on the $5M Apprenticeship Tax Credit which provides enhanced credits for students from underserved communities.

**Develop Collaborative Programs Between Employers and Educational Institutions**
Build upon the work being done by IBHE and fund new and existing programs that encourage private sector and academic collaboration to influence curriculum that responds to rapidly evolving business needs.

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**Spotlight: DeVry University’s Transfer Advantage60 and Care Engine Program**
DeVry University has developed targeted programs to address gaps experienced by students, particularly those pursuing nontraditional educational pathways, by streamlining processes and providing wraparound supports to help individuals advance their careers and find opportunities in growing fields such as tech.

**Devry’s Transfer Advantage60** allows associate degree students from partner community colleges to transfer up to 60 credit hours, saving students both time and money to complete their degrees, including in tech. Students are also automatically qualified for DeVry’s Future-Ready Transfer Scholarship program.

Through its **Digital Care Engine Program**, DeVry also provides students with holistic resources – access to child support services, tutoring, career guidance, counseling - so that they can effectively focus on their studies.

Source: DeVry University
POLICY CONSIDERATIONS

Bring greater awareness to all tech opportunities across Chicago’s economy by changing how tech is discussed.

Promote greater cross-industry collaboration & partnerships to market tech opportunities.

Tech opportunities permeate all industries across Chicago’s economy – in fact, some of Chicago’s fastest growing tech jobs are primarily in non-tech industries – however, they are often not well known. Despite being home to one of the largest student populations, the city continues to lose talent to other tech hubs. Most notably, CS majors who are women of color are less likely to pursue a job in tech after graduation. Chicago’s educational institutions can partner with employers and businesses to conduct outreach and better market tech job opportunities, especially in non-tech industries. United, for example, employs a high volume of software developers and data scientists. This broader understanding of tech needs to be more widespread.

Expand the number of academic institutions and students who are included in the tech conversation. Colleges with large numbers of Black and Latinx students in tech have historically been overlooked by employers looking for tech talent. By increasing awareness around these schools and students, employers will have access to a larger pool of talent and more students receiving tech degrees will find careers in tech.

### Top Fastest Growing & Largest Tech in Non-Tech Jobs in Chicago

<table>
<thead>
<tr>
<th>Position</th>
<th>Job Title</th>
<th>Current Number</th>
<th>Growth 2011-2021</th>
<th>Share of All Tech Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Computer Network Support Specialists</td>
<td>5.9K</td>
<td>+125%</td>
<td>62%</td>
</tr>
<tr>
<td>2</td>
<td>Web Developers and Digital Interface Designers</td>
<td>3.3K</td>
<td>+107%</td>
<td>61%</td>
</tr>
<tr>
<td>3</td>
<td>Computer and Information Systems Managers</td>
<td>11.3K</td>
<td>+54%</td>
<td>66%</td>
</tr>
<tr>
<td>4</td>
<td>Industrial Engineers</td>
<td>6.5K</td>
<td>+47%</td>
<td>84%</td>
</tr>
<tr>
<td>5</td>
<td>Computer Network Architects</td>
<td>2.6K</td>
<td>+44%</td>
<td>56%</td>
</tr>
<tr>
<td>6</td>
<td>Software Developers</td>
<td>21K</td>
<td>+38%</td>
<td>47%</td>
</tr>
<tr>
<td>7</td>
<td>Computer Systems Analysts</td>
<td>12.6K</td>
<td>+34%</td>
<td>62%</td>
</tr>
<tr>
<td>8</td>
<td>Clinical Laboratory Technologists and Technicians</td>
<td>10.6K</td>
<td>+33%</td>
<td>98%</td>
</tr>
<tr>
<td>9</td>
<td>Database Administrators and Architects</td>
<td>3.4K</td>
<td>+24%</td>
<td>74%</td>
</tr>
<tr>
<td>10</td>
<td>Electrical Engineers</td>
<td>2.3K</td>
<td>+14%</td>
<td>77%</td>
</tr>
</tbody>
</table>

Source: HR&A analysis of EMSI data.
POSITIONING CHICAGO NATIONALLY & GLOBALLY

Lead with Equity.

Chicago must lean into the opportunity to improve diversity and equity in tech by leveraging and doubling down on existing initiatives and resources that break barriers to entry and close the digital gap. Chicago should aim to become the most equitable tech ecosystem in the world.

Advocate for strengthening tech equity in public spending, including in education, broadband, workforce development and entrepreneurship.

Encourage industry commitments to diversity, equity, and inclusion, and push for progress to be measured and published regularly.

Lift up and increase funding to incubators and accelerators that support diverse, local founders, including BLK-TECH, the Latinx Accelerator, Wi-Stem and more.

Close the digital gap by expanding access to affordable broadband region-wide, especially to areas that have been historically underrepresented and excluded.

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SPOTLIGHT ON DEI INITIATIVES AND INVESTMENTS

**United Airlines:** United Airlines has partnered with tech training providers such as Year Up and I.C. Stars to recruit and train individuals particularly those from underrepresented backgrounds. United has also built strategic partnerships with P33, the Hispanic IT Executive Council, and Black Women in Science and Engineering to create greater awareness of the vast tech opportunities within United.

**Google:** In 2020, Google announced plans to hire 10,000 new employees across Chicago and a few other U.S. cities with a special focus on hiring black talent to diversify its workforce. The tech giant also admitted 4Degrees, a Chicago startup, into its inaugural accelerator for Black founders and support diverse entrepreneurs through grants such as its $5 million U.S. Black Founders Fund.

**Comcast:** Comcast has dedicated work to closing the digital equity gap. Its Lift Zone initiative provides free Wi-Fi service at 20 community centers in the Chicago area, and access to digital training labs at 11 Chicago Public Library branches. In 2020, Comcast also announced a $1 million commitment to national tech training nonprofit Per Scholas to help close the tech opportunity gap for residents from underserved backgrounds. In Chicago, this commitment would enable Per Scholas to provide 80 individuals with access to tech careers.

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Source: HR&A Advisors Stakeholder Interviews, Chicago Tribune, Built in Chicago, Comcast, CSRwire
At a Glance
Chicago’s Tech Ecosystem Today
Strengthening Chicago’s Tech Ecosystem for the Future

Technical Appendix
Technical Appendix
Methodology
Stakeholder Interview List
From the invention of the vacuum in 1869, to the wireless remote control in 1950, and later the first smartphone in 1999, Chicago has a long history and culture of innovation. This rich history, paired with significant public and private investments in the last decade, have been instrumental in shaping Chicago's tech ecosystem to the scale it is today. However, Chicago has not been widely recognized as major tech hub nationally or globally. This report aims to demonstrate the size and impact of the Chicago tech ecosystem, understand its interconnectedness with the broader Chicago and regional economy, and identify opportunities for all Chicago residents to benefit from the tech ecosystem.

**About The Chicagoland Chamber of Commerce**

The Chicagoland Chamber of Commerce is a nonprofit organization representing over 1,000 businesses across major industries in the Chicago metropolitan area. The Chamber combines the power of people with a legacy of leadership and business advocacy to drive a dynamic economy by curating events and programming, facilitating networking among Chicago’s businesses and civic leaders, and creating and advocating pro-business policies.

**About HR&A Advisors**

HR&A has over 40 years of experience advising on complex economic development and real estate projects in cities across the world. HR&A's Urban Tech & Innovation Practice works with governments, technology companies, institutions, advocates, and developers to leverage the technology and innovation economy to increase economic competitiveness, improve quality of life, and broaden economic opportunity in cities. The firm’s urban tech clients include Google, Sidewalk Labs, Airbnb, WeWork, Audible, and the Cities of New York and Washington DC, as well as innovation districts and research parks across the U.S.
TECH STUDY GEOGRAPHIES
While this study focuses on the City of Chicago's tech ecosystem, it also examines Chicagoland and Illinois.

**Chicago**: HR&A used a set of 84 zip codes in within the city of Chicago to study city-level data.

**Chicagoland**: Cook, DuPage, Kane, Lake, McHenry, and Will County

**Illinois**: State-level data
DEFINING CHICAGO’S TECH ECOSYSTEM

HR&A developed an analytical methodology to capture the entirety of Chicago’s tech ecosystem in both tech and non-tech industries.

Unlike most industries that are neatly defined by the North American Industrial Classification System (NAICS), tech jobs are embedded in industries throughout the economy, requiring a careful methodology for accurate measurement.

A guiding principle of HR&A’s definitional process is that the tech ecosystem should be defined based on both industry and occupational data. There are tech jobs present in industries that should not be wholly classified as “tech,” such as finance or healthcare. Accounting for these tech jobs requires a definition that captures tech jobs using occupational data. Similarly, there are non-tech jobs at tech industry firms, such as a sales associate working at a software company. Although such jobs are not “tech” jobs themselves, they provide necessary support to tech employers, and thus are directly enabled by tech. Accounting for these jobs requires a definition that captures tech-enabled jobs using industry data.

HR&A developed and refined a list of tech industries and tech occupations in conjunction with industry experts. HR&A first held a methodological discussion with a working group composed of experts in labor and economic data analysis. HR&A subsequently convened thought leaders drawn from firms and organizations in the tech ecosystem to test the working definition. These discussions allowed HR&A to develop the final definitions used in the report.

**Industries** are based on the 2017 NAICS codes as defined by the U.S. Census Bureau. Industries were selected based on whether the industry 1) is enabled by tech, or 2) primarily produces tech.

**Occupations** are based on the Standard Occupational Classification (SOC) codes as defined by the Bureau of Labor Statistics and the Occupational Information Network (O*NET), a comprehensive database of occupational attributes and characteristics which uses questionnaires to collect data on the educational levels and skills required to effectively perform a job. Tech occupations are selected based on whether the occupation 1) directly produces tech, 2) facilitates the use of tech by others, 3) would cease to exist without the presence of tech.

The following two pages detail the tech industries and occupations included in this study.
**TECH ECOSYSTEM DEFINITIONS**

Tech industries span Information, Professional Services, Manufacturing, and Retail Trade.

### Tech Industries

<table>
<thead>
<tr>
<th>NAICS</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3364</td>
<td>Aerospace Products and Parts Manufacturing</td>
</tr>
<tr>
<td>3342</td>
<td>Communications Equipment Manufacturing</td>
</tr>
<tr>
<td>3341</td>
<td>Computer and Peripheral Equipment Manufacturing</td>
</tr>
<tr>
<td>5415</td>
<td>Computer Systems Design and Related Services</td>
</tr>
<tr>
<td>5182</td>
<td>Data Processing, Hosting, and Related Services</td>
</tr>
<tr>
<td>4541</td>
<td>Electronic Shopping and Mail-Order Houses</td>
</tr>
<tr>
<td>3345</td>
<td>Navigational, Measuring, Electromedical, and Control Instruments Manufacturing</td>
</tr>
<tr>
<td>5191</td>
<td>Other Information Services</td>
</tr>
<tr>
<td>5179</td>
<td>Other Telecommunications</td>
</tr>
<tr>
<td>5174</td>
<td>Satellite Telecommunications</td>
</tr>
<tr>
<td>5417</td>
<td>Scientific Research and Development Services</td>
</tr>
<tr>
<td>3344</td>
<td>Semiconductor and Other Electronic Component Manufacturing</td>
</tr>
<tr>
<td>5112</td>
<td>Software Publishers</td>
</tr>
<tr>
<td>5173</td>
<td>Wired and Wireless Telecommunications</td>
</tr>
</tbody>
</table>
TECH ECOSYSTEM DEFINITIONS

High Tech occupations are a subset of tech jobs which directly create or manage digital products, systems, and services.

<table>
<thead>
<tr>
<th>High Tech Occupations</th>
<th>Other Tech Occupations</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-1111 Computer and Information Research Scientists</td>
<td>17-1021 Cartographers and Photogrammetrists</td>
</tr>
<tr>
<td>17-2061 Computer Hardware Engineers</td>
<td>17-2041 Chemical Engineers</td>
</tr>
<tr>
<td>15-1143 Computer Network Architects</td>
<td>29-2018 Clinical Laboratory Technologists and Technicians</td>
</tr>
<tr>
<td>15-1199 Computer Occupations, All Other</td>
<td>29-2032 Diagnostic Medical Sonographers</td>
</tr>
<tr>
<td>15-1131 Computer Programmers</td>
<td>17-3012 Electrical and Electronics Drafters</td>
</tr>
<tr>
<td>15-1151 Computer User Support Specialists</td>
<td>17-3023 Electrical and Electronics Engineering Technicians</td>
</tr>
<tr>
<td>15-1141 Database Administrators</td>
<td>49-2093 Electrical and Electronics Installers and Repairers, Transportation Equipment</td>
</tr>
<tr>
<td>15-1122 Information Security Analysts</td>
<td>49-2094 Electrical and Electronics Repairers, Commercial and Industrial Equipment</td>
</tr>
<tr>
<td>15-1142 Network and Computer Systems Administrators</td>
<td>49-2095 Electrical and Electronics Repairers, Powerhouse, Substation, and Relay</td>
</tr>
<tr>
<td>41-9031 Sales Engineers</td>
<td>17-2071 Electrical Engineers</td>
</tr>
<tr>
<td>15-1132 Software Developers, Applications</td>
<td>49-2096 Electronic Equipment Installers and Repairers, Motor Vehicles</td>
</tr>
<tr>
<td>15-1133 Software Developers, Systems Software</td>
<td>49-2097 Electronic Home Entertainment Equipment Installers and Repairers</td>
</tr>
<tr>
<td>15-1134 Web Developers</td>
<td>17-2072 Electronics Engineers, Except Computer</td>
</tr>
<tr>
<td>17-3021 Aerospace Engineering and Operations Technicians</td>
<td>27-4032 Film and Video Editors</td>
</tr>
<tr>
<td>17-2011 Aerospace Engineers</td>
<td>17-3026 Industrial Engineering Technicians</td>
</tr>
<tr>
<td>27-4011 Audio and Video Equipment Technicians</td>
<td>17-2112 Industrial Engineers</td>
</tr>
<tr>
<td>49-2091 Avionics Technicians</td>
<td>29-2035 Magnetic Resonance Imaging Technologists</td>
</tr>
<tr>
<td>17-2031 Biomedical Engineers</td>
<td>29-2033 Nuclear Medicine Technologists</td>
</tr>
<tr>
<td>27-4012 Broadcast Technicians</td>
<td>15-2031 Operations Research Analysts</td>
</tr>
<tr>
<td>29-2031 Cardiovascular Technologists and Technicians</td>
<td>29-2034 Radiologic Technologists</td>
</tr>
<tr>
<td></td>
<td>27-4014 Sound Engineering Technicians</td>
</tr>
<tr>
<td></td>
<td>15-2041 Statisticians</td>
</tr>
<tr>
<td></td>
<td>29-2055 Surgical Technologists</td>
</tr>
<tr>
<td></td>
<td>49-2022 Telecommunications Equipment Installers and Repairers, Except Line Installers</td>
</tr>
</tbody>
</table>
LABOR DATA

In analyzing the characteristics of the tech ecosystem, HR&A relied on employment data provided by Economic Modeling Specialists Intl. (EMSI).

A CareerBuilder company, EMSI is a leading national provider of employment data and economic impact analysis. EMSI clients include the New York State Department of Labor, North Carolina Department of Commerce, and Oklahoma Department of Commerce. HR&A utilized EMSI’s Analyst tool in estimating the size of the Chicago tech ecosystem and its associated wages, educational requirements, and demographics.

EMSI gathers and integrates labor market data from a wide array of sources, including the U.S. Bureau of Labor Statistics Quarterly Census of Employment and Wages (QCEW) and Occupational Employment Statistics (OES), U.S. Bureau of Economic Analysis, O*NET, U.S. Census Bureau American Community Survey (ACS) and County Business Patterns (CBP), and state departments of labor.

Integrating data from multiple sources allows EMSI to provide a broad accounting of employment that is unavailable from any one traditional source. To fully account for the Chicago tech ecosystem, HR&A relied on EMSI data pertaining to three classes of workers:

1. **QCEW/UI employees**: All jobs covered by federal/state unemployment insurance.
2. **Non-QCEW employees**: Jobs except from unemployment insurance coverage including the military, railroads, and small non-profits.
3. **Self-Employed**: Jobs held by people who consider self-employment a significant part of their income.

EMSI’s proprietary estimation process enables it to accurately report detailed data for every county in the United States, and even employment data which is undisclosed by government sources due to confidentiality issues. EMSI reports industry level data to the six-digit NAICS code, and occupational data to the five-digit SOC code. Moreover, EMSI provides a “cross-walk” between industry and employment data (staffing patterns and reverse staffing patterns) that enabled HR&A to account for tech jobs in tech industries, tech jobs in non-tech industries, and non-tech jobs in tech industries. EMSI also reports the most common educational or training requirements for each of the 800+ SOC codes based upon data from the U.S. Bureau of Labor Statistics.
ECONOMIC IMPACT ANALYSIS

HR&A’s economic impact analysis estimates the multiplier effects of the tech ecosystem in the economy in terms of jobs, earnings, and economic output.

**Direct Impacts**

The **direct impact** is the employment, compensation, and output in the tech occupations or tech industries that collectively comprise the Chicago tech ecosystem.

**Indirect Impacts**

The **indirect impact** is the employment, compensation, or output associated with businesses that supply the industries comprising the Chicago tech ecosystem.

**Induced Impacts**

The **induced impact** represents the employment, compensation, or output associated with household spending of employees who work in industries directly and indirectly affected by the Chicago tech ecosystem.
ECONOMIC IMPACT ANALYSIS

HR&A used the EMSI input-output model to estimate the economic impacts of the tech ecosystem in Chicago, Chicagoland, and Illinois.

The EMSI Input-Output (I-O) model represents the flow of money in an economy, primarily along industries. The I-O model is based on the premise that interactions among industries within an economy can be quantified, with a portion of the output of one industry appearing as the input of other industries.

EMSI's I-O model uses Industry Economic Accounts produced by the Bureau of Economic Analysis (BEA) as the primary source of data. The data provides a summary of how industries produce and consume commodities and is customized for smaller regions of the country, using each region's unique industry mix and spending patterns. The model uses this data to produce direct, indirect, and induced multipliers for employment, earnings, and sales. The model also outputs jobs to sales and earnings to sales ratios which allowed HR&A to use tech jobs as a singular input to generate total economic impact across jobs, earnings, and economic output (sales).

HR&A utilized the 2020 EMSI I-O model which is the most recent year available. HR&A conducted this analysis three times using three different study areas: Chicago, Chicagoland, and Illinois, and got the following results:

**Chicago:** 106K direct jobs created 253K total jobs, $23.5B in earnings, and $73.8B in economic output.

**Chicagoland:** 310K direct jobs created 851K total jobs, $72.7B in earnings, and $202.5B in economic output.

**Illinois:** 430K direct jobs created 838K total jobs, $74.4B in earnings, and $224.4B in economic output.

To prevent double-counting of tech employment, HR&A subtracted multiplier impacts reported in tech industries, as 100% of tech employment was already accounted for by direct impacts of the tech ecosystem. This subtraction prevented approximately 2.5K jobs in tech industries from being double-counted as both direct and multiplier jobs.
ECONOMIC IMPACT: CITY OF CHICAGO

The **106K direct jobs** in the tech ecosystem creates **253K jobs**, **$23.5B** in earnings, and **$73.8B** in economic output.

<table>
<thead>
<tr>
<th>DIRECT</th>
<th>INDIRECT</th>
<th>INDUCED</th>
</tr>
</thead>
<tbody>
<tr>
<td>106,000 Jobs</td>
<td>68,000 Jobs</td>
<td>79,000 Jobs</td>
</tr>
<tr>
<td>$13.5B Earnings</td>
<td>$4.8B Earnings</td>
<td>$5.2B Earnings</td>
</tr>
<tr>
<td>$41.6B Economic Output</td>
<td>$14.6B Economic Output</td>
<td>$17.6B Economic Output</td>
</tr>
</tbody>
</table>

**= 253K JOBS**

**= $23.5B EARNINGS**

**= $73.8B ECONOMIC OUTPUT**

Source: HR&A analysis of EMSI data.

Chicagoland Chamber of Commerce & HR&A Advisors
ECONOMIC IMPACT: CHICAGOLAND
The **310K direct jobs** in the tech ecosystem creates **851K jobs**, **$72.7B** in earnings, and **$202.5B** in economic output.

<table>
<thead>
<tr>
<th>DIRECT</th>
<th>INDIRECT</th>
<th>INDUCED</th>
<th>=</th>
</tr>
</thead>
<tbody>
<tr>
<td>310,000 Jobs</td>
<td>186,000 Jobs</td>
<td>355,000 Jobs</td>
<td>851K JOBS</td>
</tr>
<tr>
<td>$36.5B Earnings</td>
<td>$13.0B Earnings</td>
<td>$23.1B Earnings</td>
<td>$72.7B EARNINGS</td>
</tr>
<tr>
<td>$109.0B Economic Output</td>
<td>$31.6B Economic Output</td>
<td>$61.9B Economic Output</td>
<td>$202.5B ECONOMIC OUTPUT</td>
</tr>
</tbody>
</table>

Source: HR&A analysis of EMSI data.
Chicagoland Chamber of Commerce & HR&A Advisors
ECONOMIC IMPACT: STATE OF ILLINOIS

The **430K direct jobs** in the tech ecosystem creates **838K jobs**, **$74.4B in earnings**, and **$224.4B in economic output**.

- **DIRECT**: 430,000 Jobs
- **INDIRECT**: 125,000 Jobs
- **INDUCED**: 283,000 Jobs

\[ 430,000 + 125,000 + 283,000 = 838,000 \text{ jobs} \]

\[ 47.9B + 9.0B + 17.5B = 74.4B \text{ earnings} \]

\[ 148.5B + 24.8B + 51.1B = 224.4B \text{ economic output} \]

*Source: HR&A analysis of EMSI data.*

Chicagoland Chamber of Commerce & HR&A Advisors
FISCAL IMPACT ANALYSIS

HR&A looked at Income Tax and Sales Tax generated by the tech ecosystem to determine the overall fiscal impact.

Income Tax
Because Chicago has no Local or County income tax, HR&A calculated the income tax generated at the state level, based on a tax rate of 4.95%. HR&A calculated the total number of workers in the tech ecosystem and the average salary per worker to determine the total annual income within the ecosystem. This value was multiplied by the state income tax rate to get total income tax generated by the tech ecosystem. This analysis concluded that the total income tax generated by the Chicago tech ecosystem was $377M in 2021, which represented roughly 2% of the state total.

Sales Tax
HR&A used the Consumer Expenditure Survey from the U.S. Bureau of Labor Statistics to determine the proportion of income spent on taxable goods. Income was broken into 5 quintiles to get more specified spending data across the population. The number of tech workers and average income within each quintile were multiplied together to get the total income, which was multiplied by the proportion of income spent per category to get total spending on taxable goods. This value was multiplied by the Chicago, Cook County, Illinois, and Regional Transit Authority (RTA) sales tax rates of 1.25%, 1.75%, 6.25%, and 1.00% respectively to find the total sales tax generated by workers in the tech ecosystem. The analysis concluded that the Chicago tech ecosystem generates $274M in annual sales tax with $33M going to the city, $47M to the county, $167M to the state, and $27M to the RTA. The total sales tax generated represented roughly 2% of the state total.
Appendix
Methodology
Stakeholder Interview List
HR&A engaged 19 stakeholders and the Chicagoland Chamber’s Tech Council that represent different facets of Chicago’s tech ecosystem.

Tech Ecosystem Stakeholders

• Chicagoland Chamber of Commerce, Tech Council
• Abin Kuriakose, Executive Vice President of Innovation and Venture Strategy, World Business Chicago
• Alya Woods, Vice President of Business Development in Chicago, Cooley LLP
• Austin Green, Data & Policy Intern, Illinois Science and Technology Coalition
• Brad Henderson, CEO, P33
• Colleen Daley, Director, State Government Affairs, Midwest Region, Internet Association
• Colleen Egan, President & CEO, Illinois Science and Technology Coalition
• Elle Ramel, Director, GET Cities
• Ginger Ostro, Executive Director, Illinois Board of Higher Education
• Joey Mak, Executive Director, Chicago:Blend
• John Conrad, President and CEO, Illinois Biotechnology Innovation Organization
• Kristi Dula, Deputy Director, Office of Entrepreneurship, Innovation & Technology, Illinois Department of Commerce & Economic Opportunity
• Mandy Yoh, Vice President of Community, 1871
• Mark Harris, Director of Community Education, Discovery Partner Institute-University of Illinois
• Matthew Summy, Vice President of Strategic Planning for Impact & Inclusion, Comcast
• Michelle Brown, Vice President of Digital Products and Analytics, United Airlines
• Patrick Devanney, Market Development Leader, Tech Elevator
• Scarlett Howery, Vice President of Campus & University Partnerships, DeVry University
• Steven Galanis, CEO, Cameo
• Tyler Diers, Executive Director, TechNet's Illinois and the Midwest Region
Chicagoland Chamber of Commerce’s Tech Council
The Chicagoland Chamber’s Tech Council consists of a diverse group of industry leaders that were engaged in the process of this study.

<table>
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<th>Companies</th>
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