

Illinois **Innovation Index**

Annual Report 2011–2012



The Illinois Innovation Index is an information resource that provides analysis and insights on business development and economic activity in our state.

The purpose of the Innovation Index is to engage and educate a broad community of businesses, investors, researchers, policymakers, and educators through the analysis, benchmarking, and promotion of innovation and entrepreneurial activity metrics throughout metropolitan Chicago and Illinois. The Innovation Index is a highly visual tool that provides immediate perspective on regional and statewide economic conditions and an ongoing data archive for public use. The Index regularly features related innovation metrics along with news and statistical insights.

The Illinois Innovation Index is brought to you by:



Chicagoland
Chamber
of Commerce



Illinois Science
& Technology
Coalition



Chicago
Metropolitan Agency
for Planning



World Business
Chicago

In partnership with:



Illinois
Innovation
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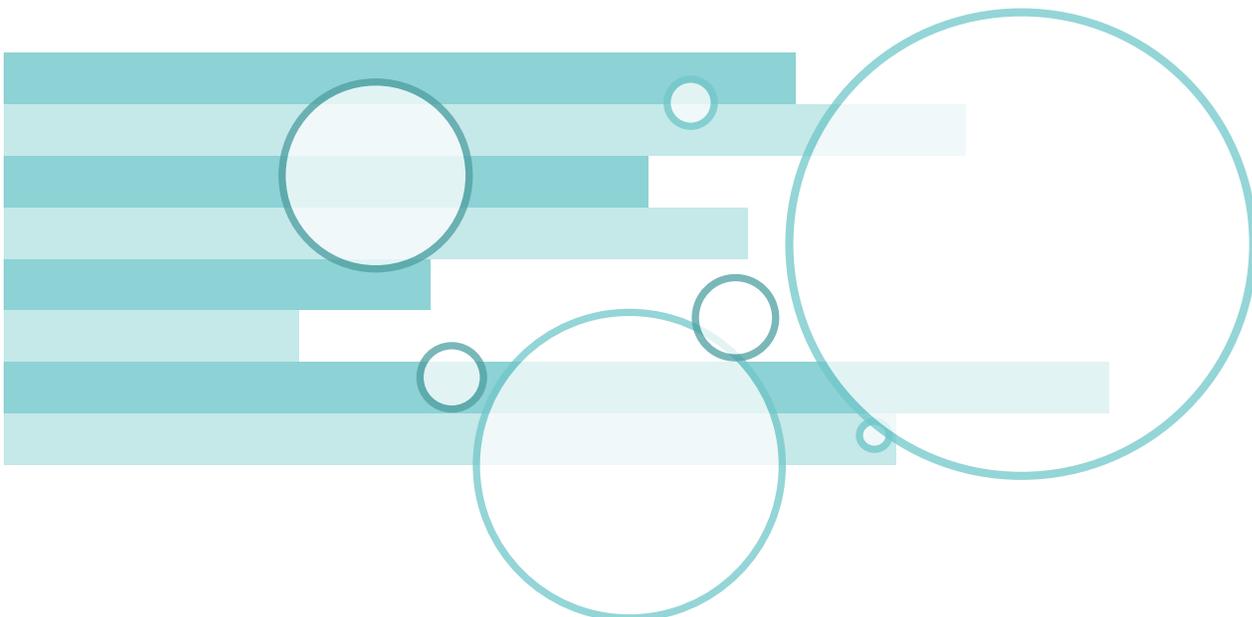


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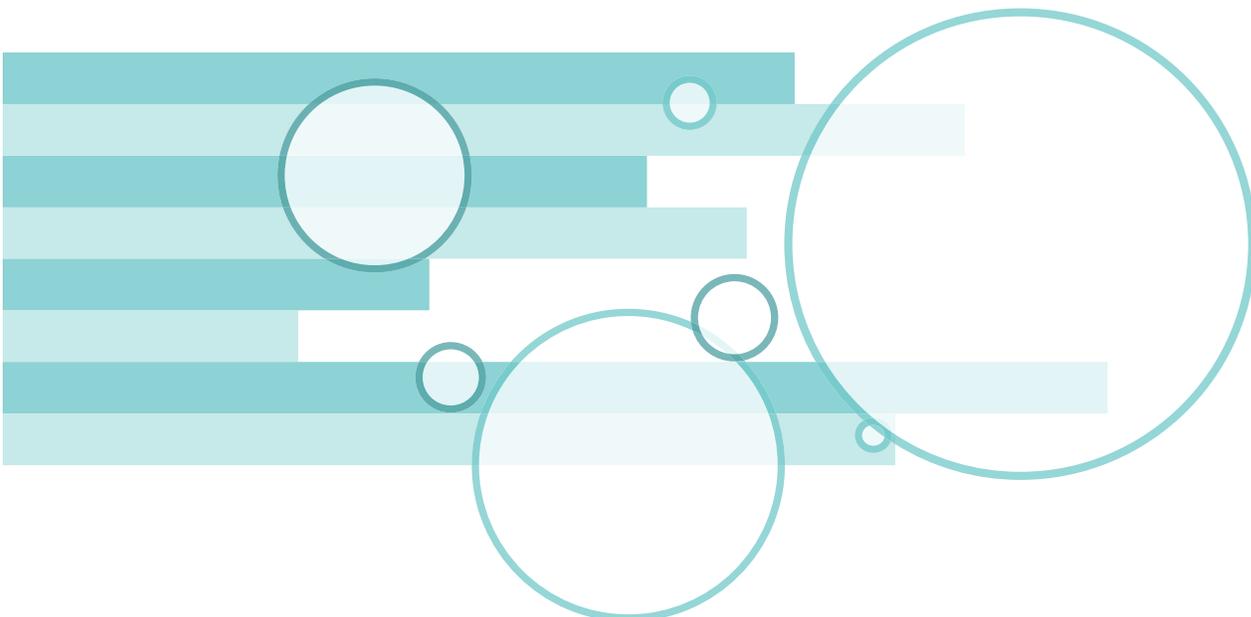
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Dear Colleagues,

Nearly every state is focused on promoting innovation. With such a far-reaching concept, however, progress can be a noble if somewhat amorphous goal. To be successful, leaders must have a strong vision, rally numerous stakeholders to their cause, and be able to demonstrate progress. Accomplishing all three is a difficult challenge.

When Governor Pat Quinn convened the Illinois Innovation Council in February 2011, it signaled a new approach. The council, which is made up of business executives and entrepreneurs as well as leaders from science, technology, and academia, was formed to connect the dots between these sectors and to create a more welcoming environment for entrepreneurs and start-ups. A critical component of this effort was to gain a better understanding of where Illinois is excelling and where it can improve. At the same time, our organizations began meeting to discuss collaborative approaches that could achieve shared goals: to measure and communicate the status of innovation in metropolitan Chicago and Illinois more effectively and to provide better access to data for analysis by policymakers and the public. These two paths converged, and the Illinois Innovation Index was born.

Although our respective organizations—the Chicagoland Chamber of Commerce, Chicago Metropolitan Agency for Planning (CMAP), Illinois Science & Technology Coalition (ISTC), and World Business Chicago (WBC)—are experienced in working with entities to promote economic development and steer companies toward resources and programs, we hadn't been accustomed to working with one another on this type of project. In that regard, the Index represents an unprecedented collaboration among our agencies.

Over the past twelve months, we've established a set of benchmarks to measure the progress of Chicago, the region, and the state. Going forward, the Index will move to a quarterly publication schedule and revisit metrics on economic development, human capital, knowledge transfer, and the dynamism of the state's industries. We are also developing a new data dashboard as part of MetroPulse (metropulsechicago.org) that will provide users with easy access to the data featured in the Index.

As you read through our annual report, know that our work to date is just the beginning—the foundation for more expansive conversations about how we can work together to maintain and enhance the reputation of Chicago and Illinois as U.S. leaders in innovation.

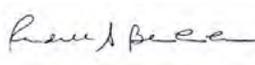
Thanks for your support of the Illinois Innovation Index.

Sincerely,



Gerald J. Roper
President and CEO

Chicagoland Chamber
of Commerce



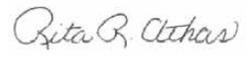
Randall Blankenhorn
Executive Director

Chicago Metropolitan
Agency for Planning



Mark Harris
President and CEO

Illinois Science
& Technology Coalition



Rita Athas
President

World Business
Chicago

The state of innovation in Illinois

Howard Tullman

The state of innovation in the State of Illinois is great. And here's the thing: because Governor Quinn convened the Illinois Innovation Council, because four organizations came together to develop and publish the Illinois Innovation Index (a longtime pet project of Lance Pressl), and because of the terrific private-sector work by Matt Moog and the Built in Chicago team, we actually *know* what we're talking about. We're not asking fairy-tale questions or relying on the kind of made-up metrics that have in the past been the traditional fare for politicians, government agencies, and other community boosters. Hopefully, those unhappy days are behind us.

And the best news is that, as the Index has demonstrated, we've actually got the goods right here in metropolitan Chicago and Illinois: real growth, real innovation, tremendous expansion in new businesses, and real results—all concretely documented for the first time. I'm especially sensitive to this situation because I've recently returned from an "innovation" conference in another state where one of the featured speakers baldly asserted that his community was the nation's leader in start-ups and innovation. Then he smiled and said that if all the folks there just kept repeating his factoid with a straight face, one of these days it might be true. And pigs might also fly. Now, there's nothing wrong with aiming high and shooting for the stars, but you need actual results to back up the stories you're telling. You actually lose credibility (and your most important audiences) if you try to manufacture movement and momentum where neither exists.

What's so exciting to me about the documented progress we're making in Chicago and Illinois is that—in some very smart ways—we're using technology and new digital media to help us keep score. I've always said that, in every business, what gets measured is what gets done, and absolutely everything can be measured. By creating some standard reporting formats in the Index and encouraging the unprecedented collaboration of a number of the state's crucial business, planning, and economic development organizations, we have created an important new tool to raise awareness and promote innovation. We're seeing this innovation spread beyond the obvious high-tech sectors to enhance critical infrastructure assets and address other needs regarding our roads, rail, airports, and broadband—all critical elements to keep Illinois on the cutting edge.

Now, I'm not pretending that the Index automatically makes everything clear and obvious. There will still be plenty of false starts and unfocused efforts. Until September of last year, when the Index was first published, I'd say that we didn't know much about what we *didn't* know. In addition, while we'll never be big boasters or blowhards (it's just not the Midwestern way), we are getting a little more comfortable about telling our stories and tooting our own horns. Even more important, we have finally started to believe that anything that's worth doing is worth failing at as long as you give it the old college try. I don't think we'll ever be celebrating failure around these parts, but we're getting smarter and smarter about failing fast and that—along with ferocious persistence—is the essential component for eventual start-up success.

Now that we have a clearer, much-improved view of where we're headed, we have to understand that there's a great deal of work still ahead of us—as individual businesses, as a community, and as a state. We must all work together to build a sustainable, supportive, and vibrant entrepreneurial environment that fosters continued growth and critical job creation.

In addition, we have to be sure that we don't get entirely lost in the numbers. Measuring more is pretty easy; measuring better is much harder because it requires value judgments. And better, in the end, is all that really matters. People perform best when they know what is expected of them and are told honestly how they are doing. We need to be certain that we continue to recognize, acknowledge, and praise the people and companies that are making a difference in our state and in our economy. The Index is one of the ways we can “keep score” and make sure that we keep moving forward and demonstrating our progress to the broader public.

We need to give everyone a real stake and a sense of ownership in this journey because, without the help and encouragement of the public, we can't really accomplish our larger goals, which will ultimately benefit everyone. You never know where your next idea or inspiration may come from: it's almost certainly not exclusively from within the four walls of your own business. Therefore, it's critical to broaden the reach and scope of all the networks we're creating. True innovation is change that creates a new and higher level of performance and productivity. As we seek to accomplish far more with far less, continued innovation is clearly the key.

I want to close my comments with two final suggestions for the path ahead.

First, we need to concentrate on doing what we do better than anyone else. We can't chase too many rabbits or we'll end up hungry with none. So it's critically important that we avoid the wild pursuit of too many different ideas, since trying to be all things to all people is a formula for certain failure. We want to be known as the “go-to” people, the “go-to” city and the “go-to” state for a few, important, sustainable and long-term industries where we can optimize the competitive advantages that we already have. What's the right number? No fewer than we can handle and no more than we can afford.

Second, what are these areas? Transportation/logistics, finance (such as Chicago Board Options Exchange/Chicago Mercantile Exchange), management consulting, advanced manufacturing, digital media, health care, pure science (Argonne), data centers, energy storage, and education. Let's focus on our history, strengths, and the amazing combination of industry, schools, and talent to build the best and most successful businesses and institutions in these spaces.

Let's have the courage and the discipline to avoid spreading ourselves too thin and competing in areas where we will never make a material difference. I know it's hard to say, but if you're interested in fashion, advertising, or journalism, you need to get to New York. Wanna build rockets and space shuttles? Get yourself to Denver, the new center of gravity for our entire space program. Wanna make a difference in Chicago and Illinois? Go with what we already do so well and commit to making it better. ■

Howard Tullman is the president and chief executive officer of the Tribeca Flashpoint Media Arts Academy and a member of the Illinois Innovation Council.

A year of the Illinois Innovation Index

September 2011–August 2012



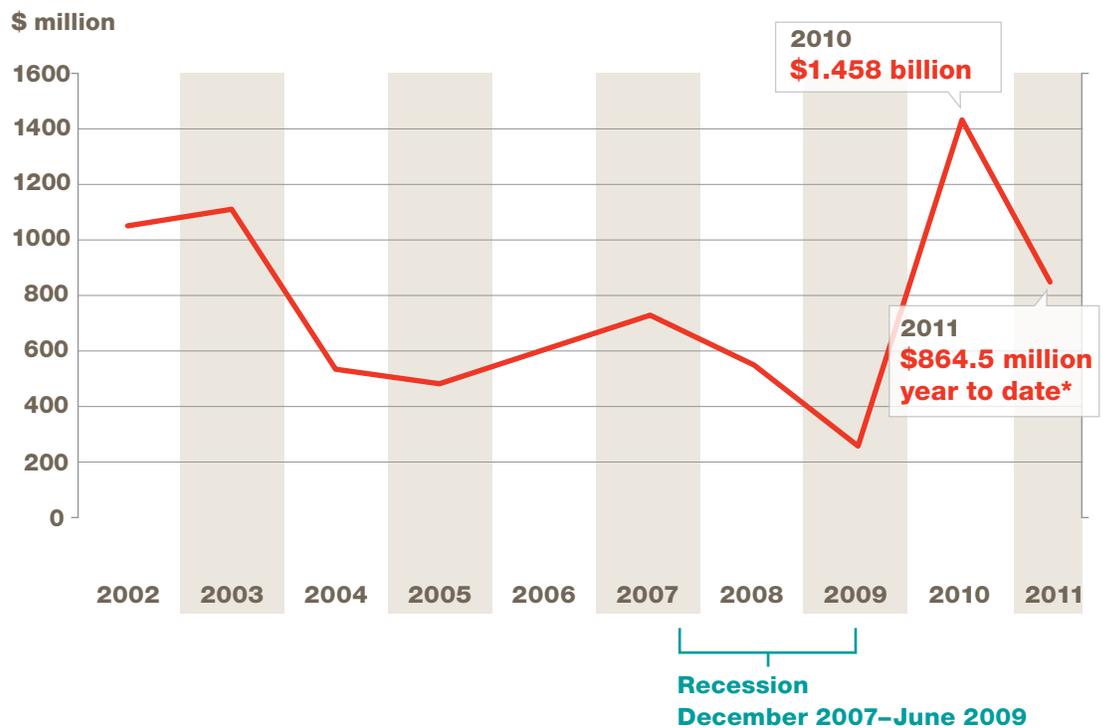
In the numbers

Venture capital investment in Illinois businesses hits record levels

Since June 2009, venture capital has been flowing into Illinois at record levels. In 2010, venture capital firms invested more than \$1.4 billion in Illinois businesses, eclipsing the previous record of 2003 by more than \$325 million. The first

two quarters of 2011 have continued this trend, with nearly \$865 million invested so far. The Chicago metropolitan statistical area accounted for nearly all of the investment.

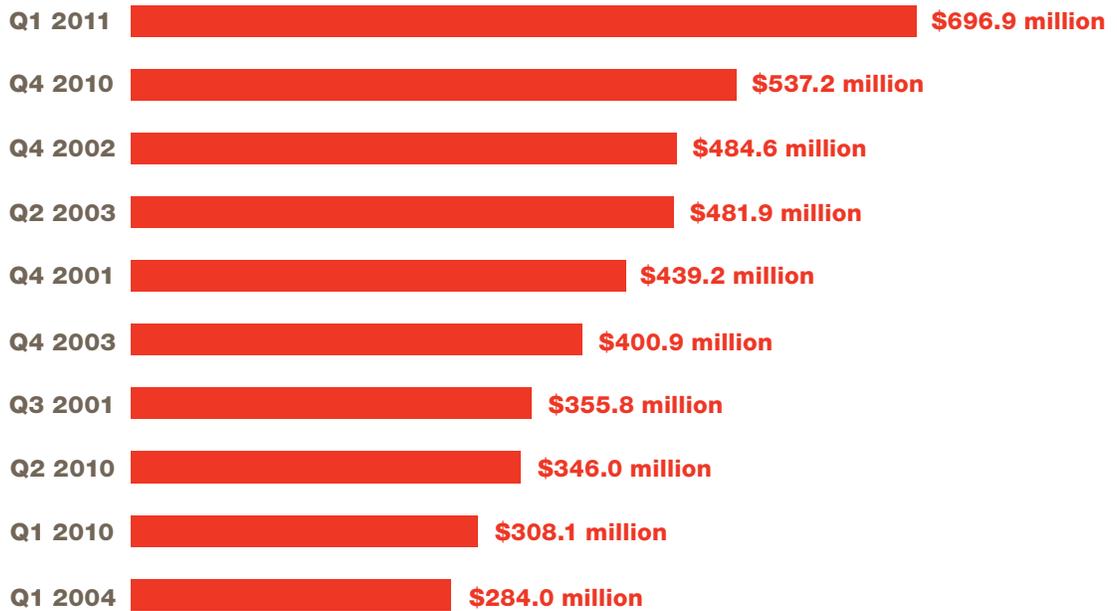
Venture capital: Total equity invested in Illinois,
yearly totals 2002–2011, inflation adjusted



*2011 includes total investment for first two quarters only.

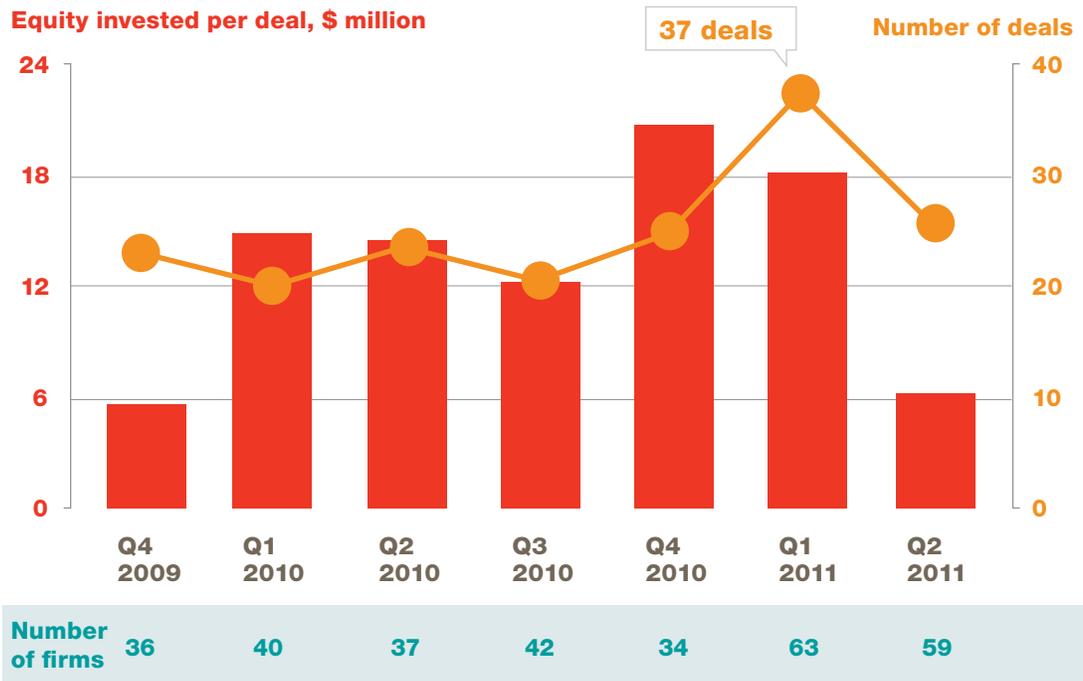
Source: Data generously provided by the Illinois Venture Capital Association.

Venture capital: Top 10 quarters of total equity invested in Illinois, 2001–2011, \$ millions, inflation adjusted



Source: Data generously provided by the Illinois Venture Capital Association.

Venture capital: Past seven quarters by total equity invested per deal and by number of deals in Illinois, inflation adjusted



Source: Data generously provided by the Illinois Venture Capital Association.

While investment in Q1 2011 far exceeded previous quarters, a prolonged decline during the recent recession shows the vulnerability of venture capital investment to larger economic cycles; it also underscores the importance of counteracting these external factors.

There were a record 37 deals in the first quarter of this year, an encouraging indication of the level of innovation and investment activity in the state. Over the past seven quarters, there have been more than 20 VC deals per quarter, and the average equity per deal has increased significantly compared with previous years.

As rising uncertainty in global markets clouds the long-term economic outlook for the United States, Illinois should continue to create a welcoming environment for innovation. ■

Spotlight

Transferring Telecoms

Neutral Tandem is a premier independent telecommunications tandem company delivering more affordable services to consumers. Neutral Tandem provides the switches, or tandems, that transfer calls from one carrier to another—a service previously provided only by existing telecom companies.

Today, from its Chicago headquarters, Neutral Tandem provides services to nine of the top ten U.S. wireless carriers, which account for 95 percent of the country's total wireless subscribers.

Neutral Tandem began with one innovator working from a kitchen table and is now posting annual revenues of nearly \$200 million. But before raising more than \$90 million in an initial public offering, Neutral Tandem relied on three rounds of VC funding to expand its network, enhance its technology, and create national marketing initiatives.

neutraltandem.com

In the numbers

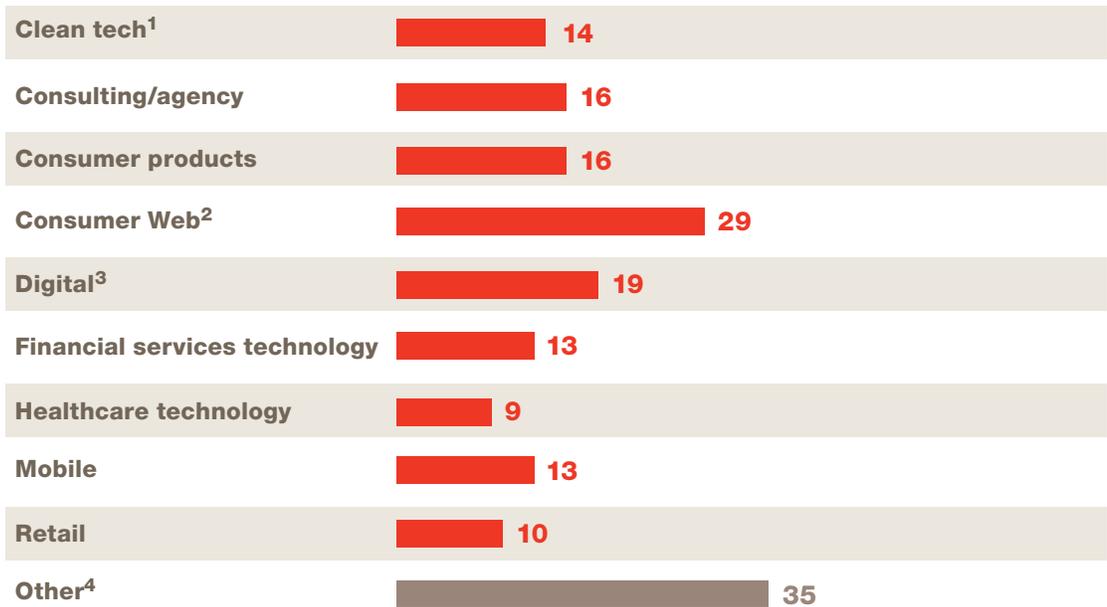
Recent statewide survey reveals optimism among emerging entrepreneurs and highlights growth opportunities

Results from the 2011 Illinois Entrepreneurial Survey show a sense of optimism among Chicago’s emerging innovation ecosystem as entrepreneurs seek to develop and expand their businesses. Built in Chicago, the Chicago-land Entrepreneurial Center, the Chicago Innovation Awards, the Illinois Science & Technology Coalition, the Illinois Technology Association, Startup Illinois, and World Business Chicago joined forces on the survey, which was developed to gauge the entrepreneurial landscape in Chicago and Illinois.

Drawing on a cross-section of perspectives

The survey targeted leaders of active entrepreneurial ventures and was conducted from June to August of this year. In all, it drew responses from 136 business leaders across a diverse range of industries, from software to education and healthcare. Notably, nearly 80 percent of survey respondents founded their business in the past five years, highlighting the growing community of talent and leadership in Illinois.

Survey question: Please describe your industry (check all that apply)
number of responses = 174



¹ Includes recycling, renewable energy, and other environmentally friendly technologies.

² Online technologies and products, such as apps, that are designed and marketed to consumers.

³ Such as software, digital media and advertising, and e-commerce.

⁴ Includes industries such as education, business technology, IT services, life sciences, telecom, and transportation.

Survey question: What year was your company founded?

number of responses = 136

1970–1989	1990–1999	2000–2005	2006–2010	2011	N/A
2	9	12	77	30	6

Poised for growth

Despite the uncertainty of the global economy, many survey respondents expect to expand their business, with nearly 65 percent indicating they would add employees in 2011. In addition, 85 percent of jobs created by start-ups this year are based in Chicago. Revenue forecasts were also encouraging: while just 9 businesses in the sample generated more than \$1 million in revenue in 2010, the number of companies in this category is forecast to jump to 21 this year. Nearly 10 percent of businesses founded in the past two years anticipate revenues of more than \$500,000 for 2011.

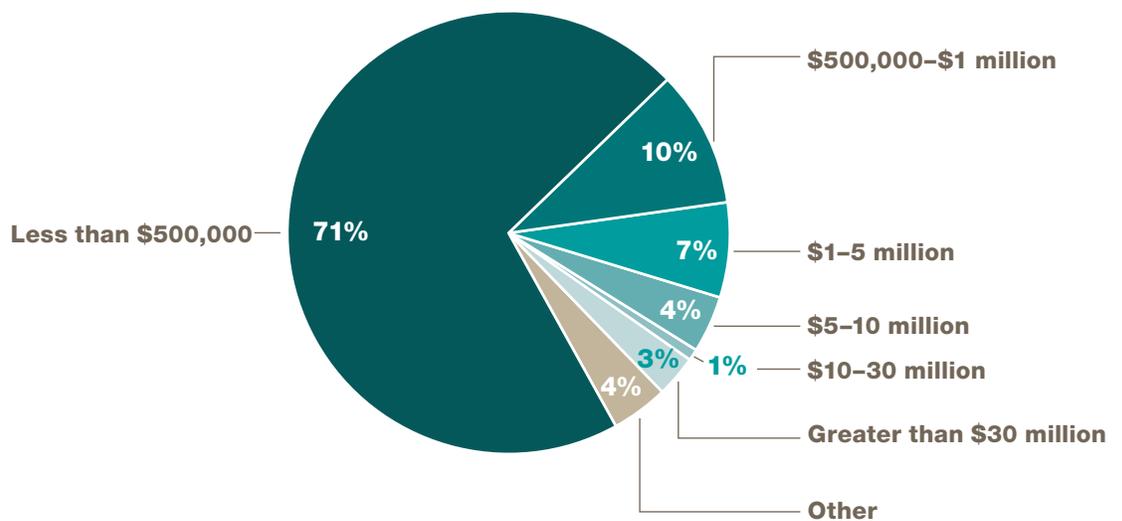
Securing financing for growth

A number of respondents indicated that they were actively seeking funding to develop their businesses. Of the 92 respondents looking to secure capital, more than three-quarters are in the pre-seed, seed, or early stages of business development.

The most sought-after sources of funding are angel investors and venture capital firms. Among the companies that actually secured financing, however, 45 did so through friends and family. Relatively few businesses pursued bank financing, and even fewer were successful—banks supplied funding for just 10 ventures.

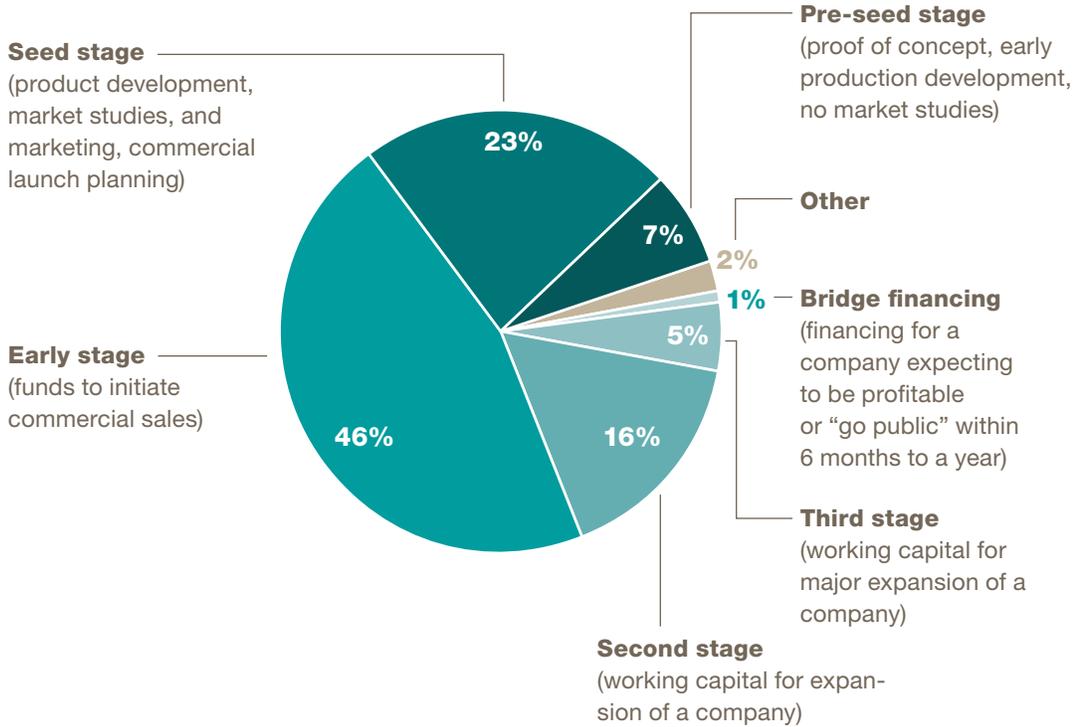
Survey question: What are your company's projected 2011 annual revenues?

number of responses = 136



Survey question: If you are currently looking for funding, which of the following best describes the round of funding you are seeking?

number of responses = 92



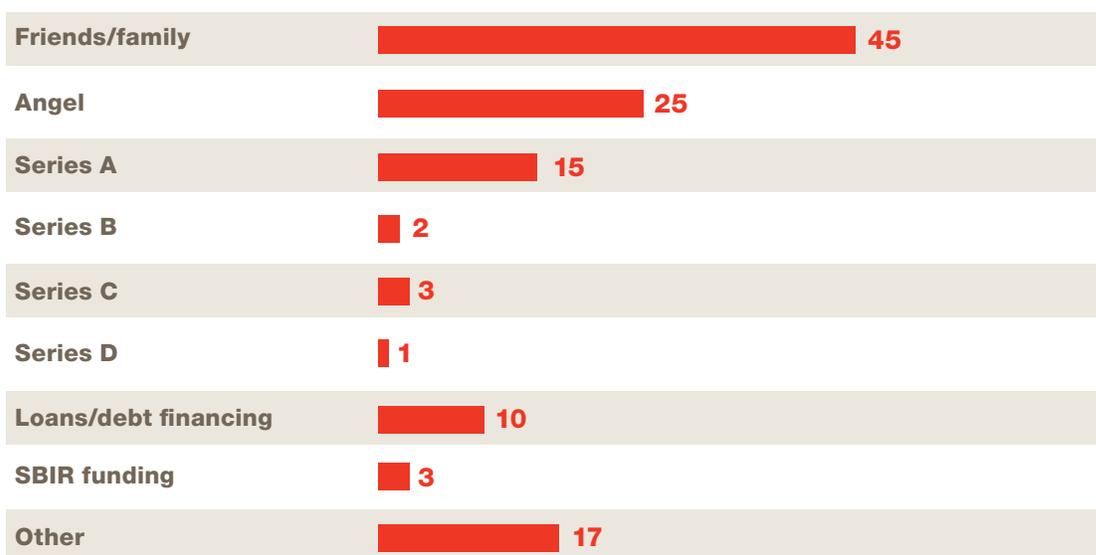
Survey question: Are you currently seeking investment capital? (check all that apply)

number of responses = 261



Survey question: If you secured financing in the past three years, please identify your funding (check all that apply)

number of responses = 121



Seeking expertise and direction

The survey showed that Illinois entrepreneurs have taken advantage of available support to secure mentors and learning opportunities. The majority (95 of 107) of businesses founded in the past five years indicated that they have

tapped services and support from numerous resources, including entrepreneurial organizations, colleges and universities, and innovation competitions sponsored by universities and other parties.

Local entrepreneurial resources and organizations utilized

- Built in Chicago
- Chicago Fashion Incubator
- Chicagoland Entrepreneurial Center
- Clean Energy Trust
- DePaul University Coleman Center for Entrepreneurship
- iBIO
- IIT Knapp Center
- IIT University Technology Park
- Illinois Technology Association
- Illinois Venture Capital Association
- New Equity Business
- Northwestern University Levy Institute for Entrepreneurial Practice
- SCORE
- State of Illinois Small Business Development Centers
- TiE Midwest
- UIUC EnterpriseWorks
- University of Chicago Polsky Center for Entrepreneurship
- University of Illinois at Chicago
- World Business Chicago
- 26 other organizations

Nurturing innovation in Illinois

The entrepreneurial and innovation community should take several important actions to build on the current momentum. Respondents are seeking better access to experienced entrepreneurial advice and guidance, including ways to connect with local Fortune 500 leaders. In addition, survey participants expressed a

need for office space and professional services. Similarly, tools that connect ideas and entrepreneurs to capital more effectively could help increase the volume of start-ups. ■

Source: All data are from the 2011 Illinois Entrepreneurial Survey.

Spotlight

Power2Switch

Power2Switch is an online platform that allows businesses and individuals to compare prices from electricity suppliers in Illinois. The site provides tools to compare price and contract terms from numerous suppliers, allowing customers to make an educated decision about their supplier. Its free, user-friendly, Web-based service has helped businesses to track savings as well as energy and carbon usage. Since suppliers compete for business, customers can reduce their rates by up to 30 percent. Through Power2Switch, one McDonald's franchisee is saving \$127,000 across his locations.

Power2Switch was launched in Chicago in 2010 by University of Chicago Booth School of Business alumni Seyi Fabode and Phil Nevels. The company has worked with the Chicagoland Entrepreneurial Center for the past year to connect to mentors and resources, resulting in significant revenue growth and market traction. Power2Switch was also one of ten companies selected for a highly competitive Excelerate 2011 program.

power2switch.com

In the numbers

National cluster mapping reveals Illinois' economic strengths as well as opportunities

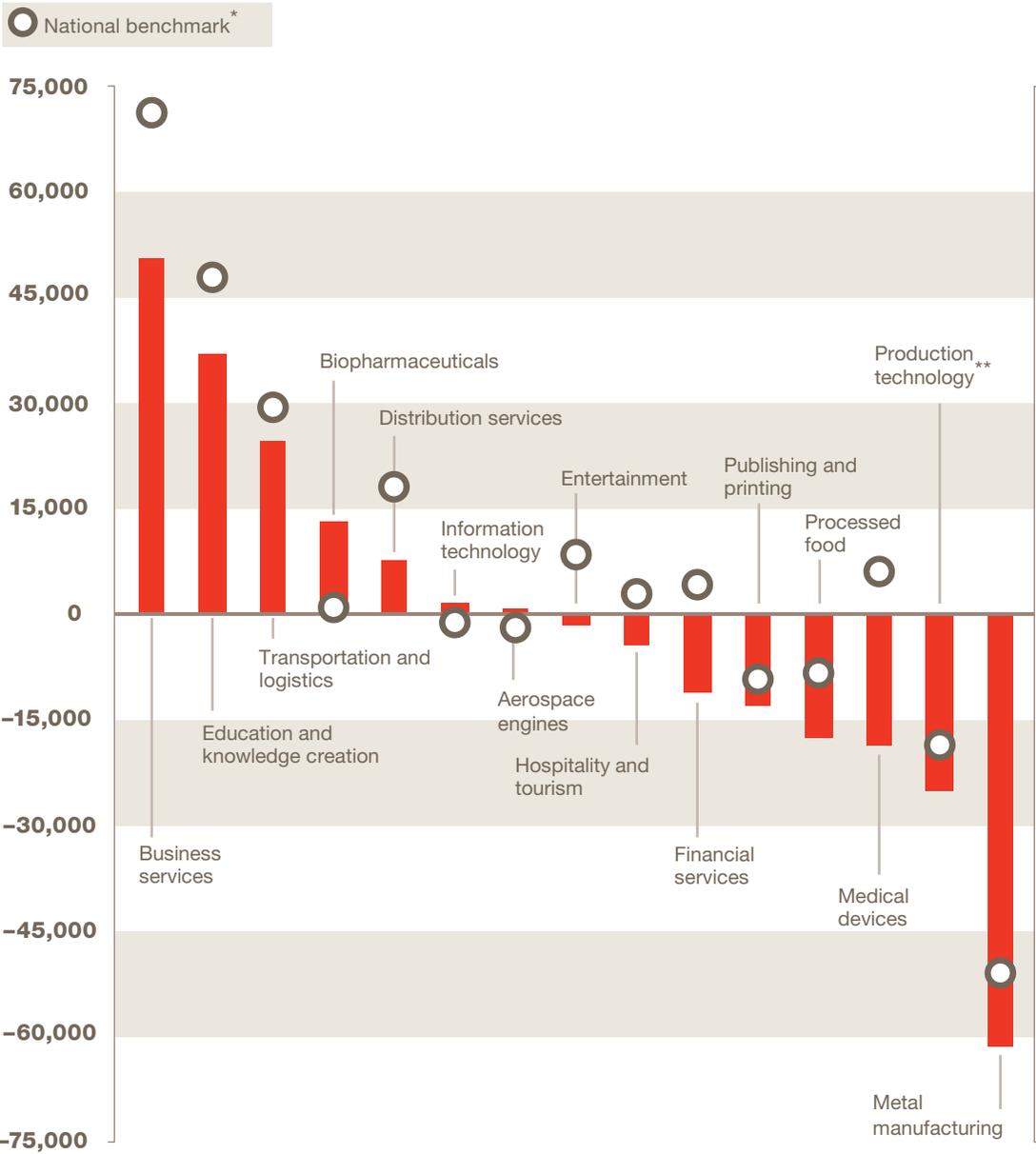
With the fifth-largest GDP in the United States, Illinois remains an economic powerhouse: in 2009, its nonagricultural employment stood at more than 5.1 million, accounting for nearly 4.5 percent of the nation's total employment. However, total employment didn't grow from 1998 to 2009. As businesses become interconnected across regions, stakeholders need a more detailed picture to determine where energy should be focused to achieve economic development and job creation.

This dynamic speaks to why clusters have emerged as a new and more revealing measure of economic performance and a way to focus resources. According to Harvard Business School's Cluster Mapping Project (clustermapping.us/index.html), a cluster is composed of "a geographically proximate group of interconnected companies and associated institutions in a particular field, including product producers, service providers, suppliers, universities, and trade associations." Firms in industry clusters can gain a competitive advantage from their close geographic proximity, which can promote cooperation, competition, and innovation.

Performance by cluster in Illinois

To understand Illinois' performance, we selected 15 diverse clusters and compared their growth with the national benchmark. A look at the state's employment growth by cluster reveals mixed news. The majority of clusters that experienced growth, including high-wage clusters such as business services, information technology, and distribution services, still lagged behind the national averages. In the clusters that suffered job losses, these numbers outpaced the benchmark.

Job creation by traded cluster in Illinois, net change in employment, 1998–2009



* The national benchmark is a hypothetical projection based on each industry's average national growth rate and represents the change in employment Illinois would have achieved if it had followed national trends.

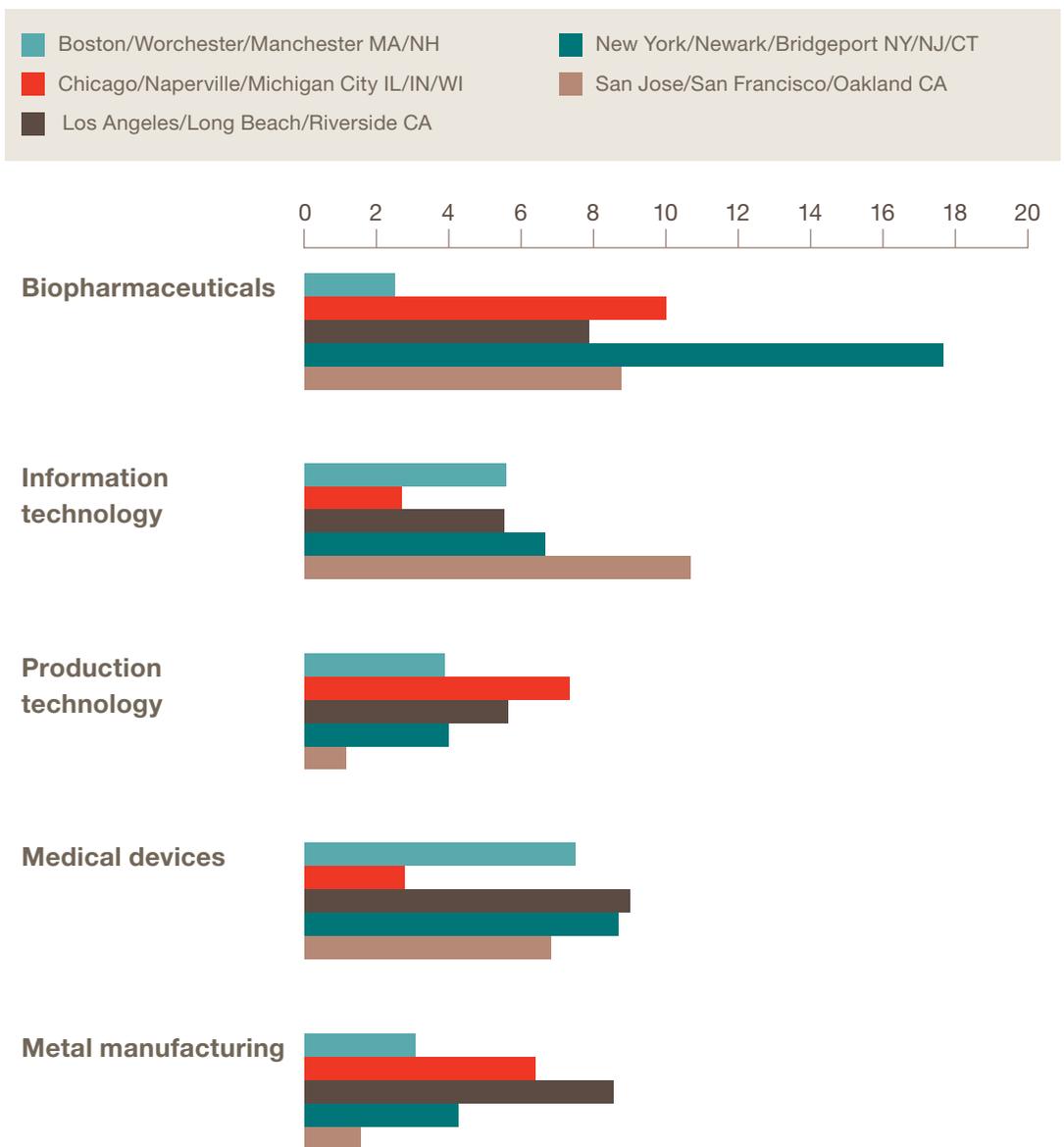
**Technology applied to the manufacturing and fabrication process.

How the Chicago Economic Area stacks up with other regions

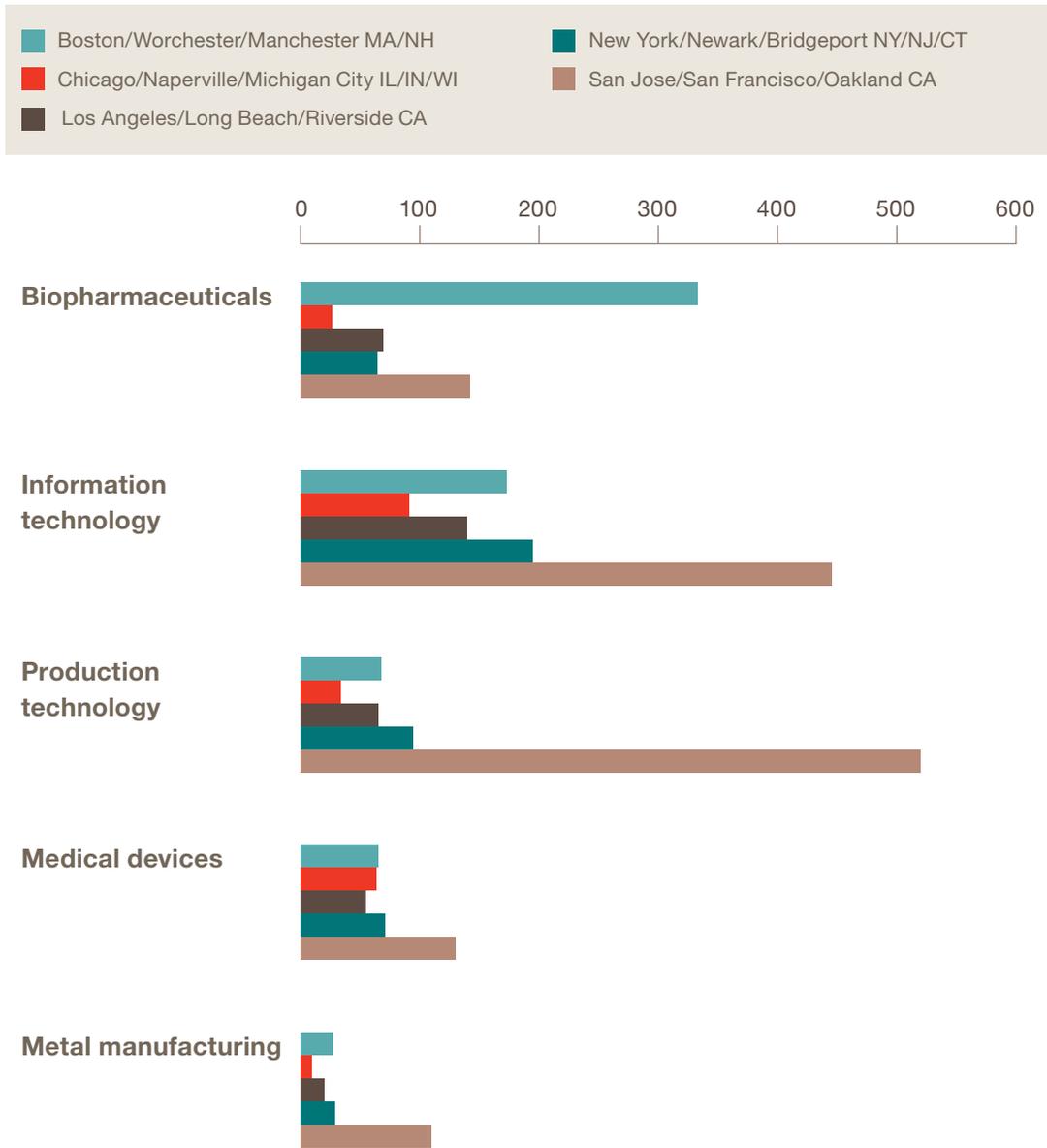
As the Chicago Economic Area¹ represents 75 percent of the state's population and nearly 80 percent of its economic activity, comparing the Chicago Economic Area with other regions highlights strengths and weaknesses. A review of selected clusters by share of national employment and the number of patents produced can indicate the concentration of certain

types of high-skilled, high-wage positions. For instance, the Chicago region has captured a significant share of national employment in selected clusters, but it has a disproportionately low number of patents per 10,000 people compared with other regions. These data provide a snapshot of existing concentrations and point to several sectors that could be cultivated for accelerated growth.

Share of national employment, 2009



Number of patents per 10,000 employees, 2009

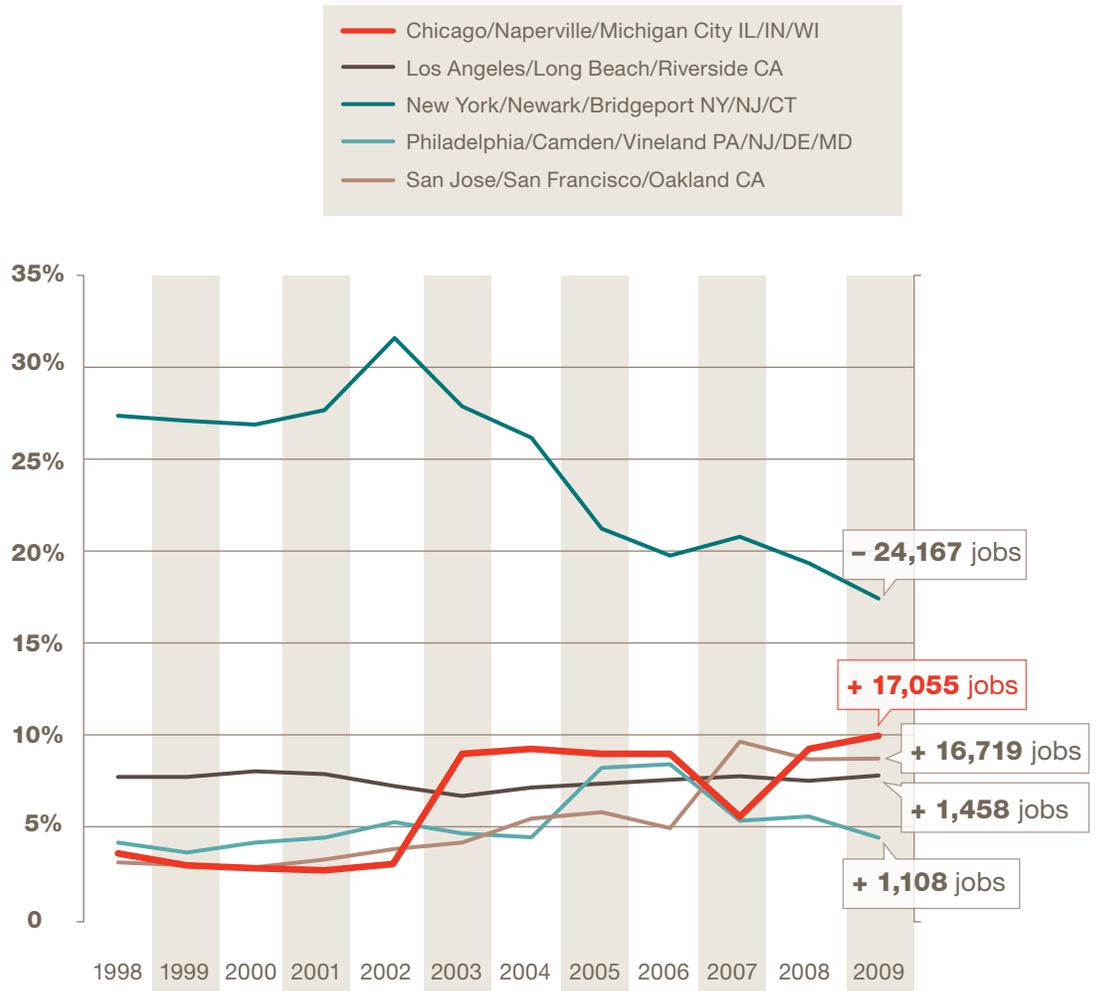


What we can learn from one cluster

In the biopharmaceutical cluster, for example, the Chicago region has experienced significant growth over the past decade. While total national employment grew by just 7,000 jobs from 1998 to 2009, the region added 17,000 jobs

during this period. Its strong network of educational institutions, research facilities, advocacy organizations, and global corporations act as a magnet to attract other businesses and investment.

Share of national employment, biopharmaceuticals, 1998–2009, percent



Pursuing a coordinated strategy to spur growth and innovation

Given our regional advancement in fostering selected clusters, academic, corporate, and public sector organizations should continue to work collaboratively to identify and support the needs of each cluster by applying the successful strategies deployed to nurture biopharmaceuticals. With thoughtful, deliberate, and sustained support for self-perpetuating ecosystems, leaders can ensure that research connects with market opportunity and is supported by capital and talent. Industry stakeholders and policy makers could harness Illinois' demonstrated advantages—agriculture, an educated workforce, and a diversified economy—by implementing measures to develop related industry clusters. Organizations that promote research technology and its applications can work to position the state for future growth in clusters that will benefit disproportionately from targeted support. ■

¹ The geography used in this analysis is the Chicago Economic Area, which is defined by the U.S. Bureau of Economic Analysis as 21 counties in Illinois, 5 counties in Indiana, and 1 county in Wisconsin.

Source: Prof. Michael E. Porter, Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School; Richard Bryden, Project Director. Copyright 2011 by the President and Fellows of Harvard College. All rights reserved.

Spotlight

Horizon Pharma



Horizon Pharma, Inc., headquartered in Deerfield, Ill., is a biopharmaceutical company developing and commercializing innovative medicines to target unmet therapeutic needs in arthritis, pain, and inflammatory diseases.

Horizon Pharma relocated to the Chicagoland area from Palo Alto, CA, in July 2008. With the help of the Illinois Department of Commerce and Economic Opportunity and the Illinois Science Technology Park Incubator, the company began operations at the Illinois Science and Technology Park in Skokie, Ill.

In July 2011, Horizon raised \$49.5 million through an IPO and began trading on the Nasdaq Global Market under the symbol “HZNP.” In less than four months, the company has grown to 160 global employees, from 50.

The company will soon launch its first product in the United States, DUEXIS®, a single-tablet combination of ibuprofen and famotidine approved to relieve the signs and symptoms of rheumatoid arthritis and osteoarthritis and to decrease the risk of developing upper gastrointestinal ulcers.

The company’s second product candidate, LODOTRA®, a modified-release formulation of low-dose prednisone for treating active rheumatoid arthritis, is marketed in 16 European countries and is currently under review by the U.S. FDA.

horizonpharma.com

In the numbers

R&D funding for Illinois universities and research institutions drives innovation

Throughout Illinois' rich history of innovation, private and public organizations have conducted groundbreaking research and introduced technologies that have enhanced quality of life around the world. With more than 440 corporate R&D facilities and more than 200 academic, government, and not-for-profit research institutions, Illinois has one of the strongest concentrations of research institutions in the United States.

The amount of funding Illinois captures has a direct and indirect impact on economic development. According to multipliers developed under the auspices of the U.S. Department of

Commerce's Bureau of Economic Analysis, every \$1 million in academic R&D spending supports 36 direct/indirect jobs on average across the United States.¹ In 2009, academic R&D expenditures totaled \$2.1 billion for the state. Total R&D performance² for Illinois in 2007,³ including public and private sector expenditures, was \$14.3 billion.

As the November edition of the Index illustrated, creating a nurturing environment for innovation requires a sustained and coordinated effort among industry, government, nonprofits, and higher education. Federal labs conduct critical basic and applied research and generate extensive additional economic opportunity in the region, while universities play a similar role and serve as a magnet for innovation: they attract not only the world's top minds but also companies looking for a deep pool of qualified workers.

In 2009, Argonne National Laboratory and Fermilab captured nearly \$875 million in federal funding and millions more in industry-sponsored research. A report by the Anderson Economic Group revealed that in 2010, the two labs generated economic output totaling \$1.34 billion and household earnings of \$410.3 million while supporting the employment of 9,481 people in Illinois.

Illinois' R&D institutions set the pace in the Midwest

R&D expenditures by FFRDC by institution, top 15, 2009

1. Los Alamos National Laboratory, NM	\$2,172 billion
9. Brookhaven National Laboratory, NY	\$569 million
10. Argonne National Laboratory, IL	\$543 million
11. Idaho National Laboratory, ID	\$388 million
12. National Cancer Institute at Frederick, MD	\$378 million
13. Fermi National Accelerator Laboratory, IL	\$377 million
14. SLAC National Accelerator Laboratory, CA	\$294 million
15. National Renewable Energy Research Laboratory, CO	\$274 million

Beyond their economic impact these facilities have achieved important scientific breakthroughs. Over the past several years, scientists at Argonne, for instance, invented a new nanotechnology technique critical to the development of the battery system that is now powering the Chevrolet Volt.

Research institutions rely on a range of funding sources to fulfill their mission. The National Science Foundation's Survey of Research and Development Expenditures for colleges and universities highlights the multiple stakeholders that must work together to support innovation.

How Illinois compares with other leading states

In 2009, the nation's colleges and universities captured a total of nearly \$55 billion in funding for research and development. Overall, federal funding accounts for approximately 60 percent of the total, with institutional

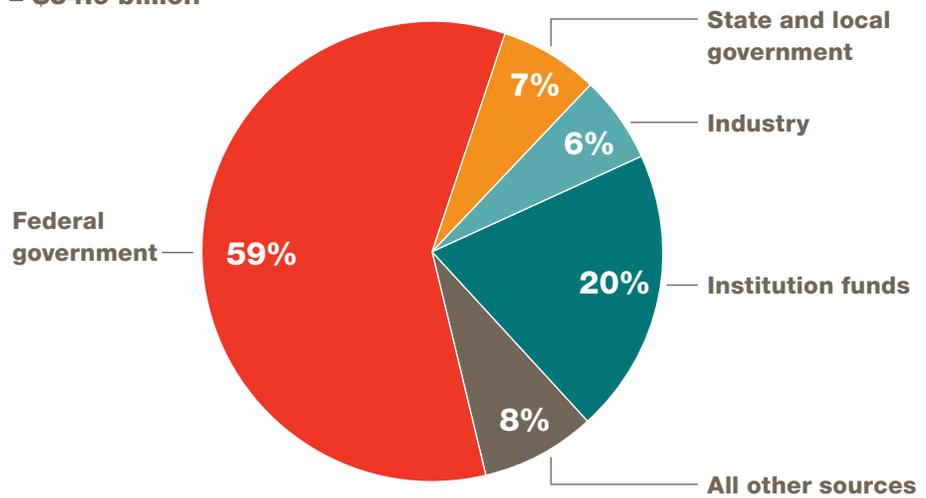
sources contributing roughly 20 percent; state and local government, private industry, and other funding sources make up the remainder.

The proportion of funding by source differs markedly by state and reveal the diversity and balance of funding.

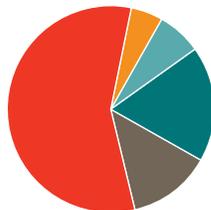
A mix of funding sources

Total U.S. R&D expenditures at universities and colleges, control institution, and by source of funds, 2009

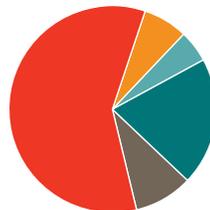
100% = \$54.9 billion



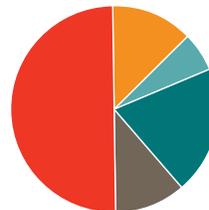
Distribution of research funding sources for top 8 states*



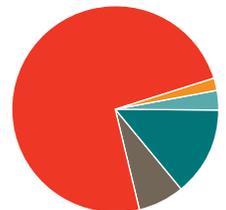
California
100% = \$7.4 billion



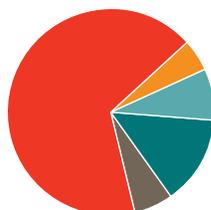
New York
100% = \$4.2 billion



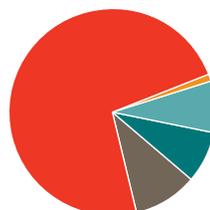
Texas
100% = \$4.0 billion



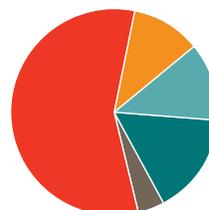
Maryland
100% = \$3.0 billion



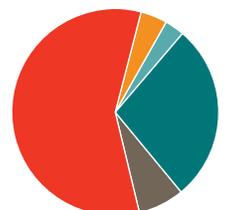
Pennsylvania
100% = \$2.7 billion



Massachusetts
100% = \$2.5 billion



North Carolina
100% = \$2.2 billion



Illinois
100% = \$2.1 billion

* Totals reflect onetime influx of American Recovery and Reinvestment Act (ARRA) funds.

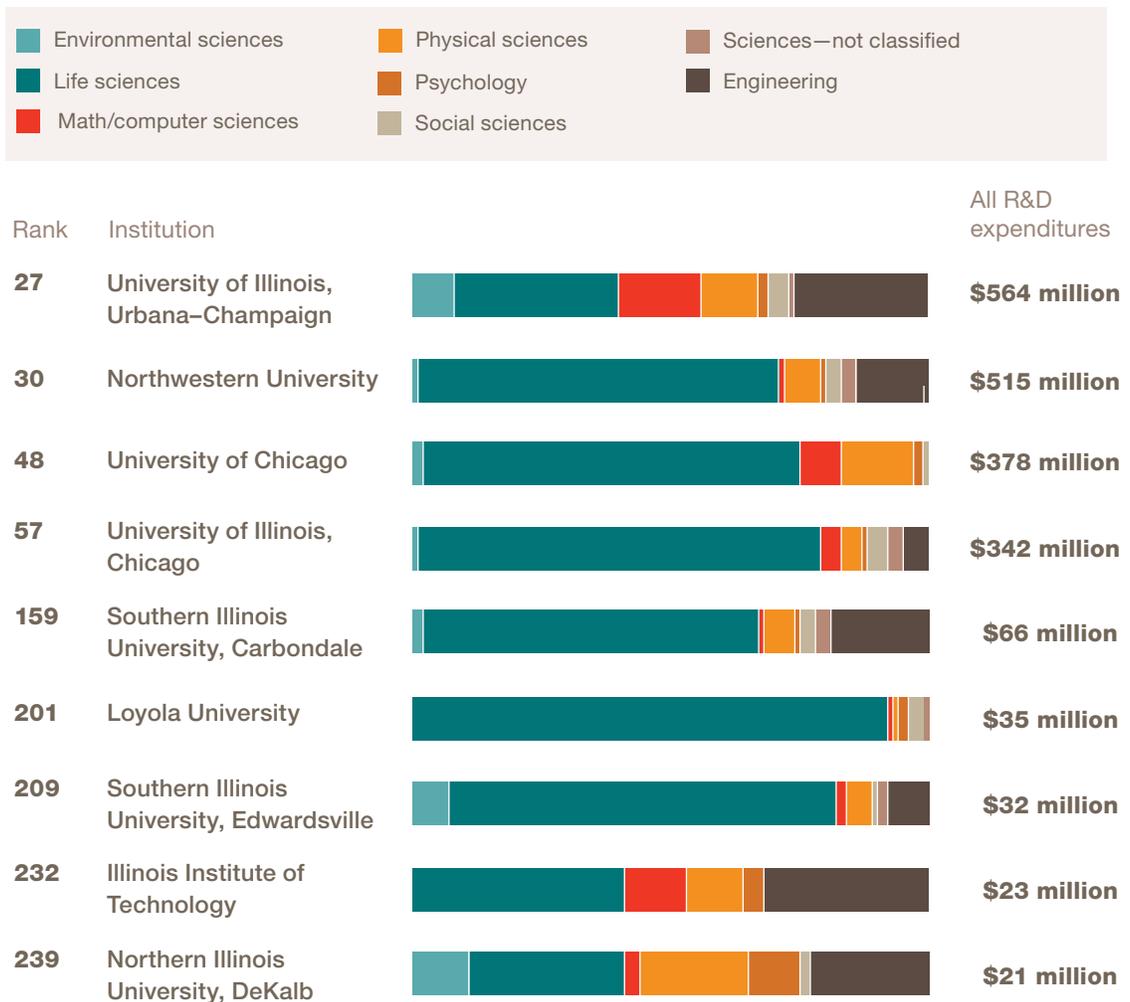
Funding distribution by educational institution

Among the 696 institutions listed in the NSF sample, Illinois has four colleges and universities in the top decile and nine in the top third. A closer look at how these institutions allocate their resources reveals where the state's R&D activity is concentrated. Life sciences (such as biology, physiology, and biochemistry), math

and computer sciences, and engineering are all well represented. In addition, the top Illinois institutions have received more than \$60 million in funding for environmental sciences programs. The concentration in fields with great applied potential speaks to the practical nature of the research conducted in Illinois.

Fueling the next generation of innovation

R&D expenditures at Illinois universities and colleges, ranked by science and engineering field, 2009, percent



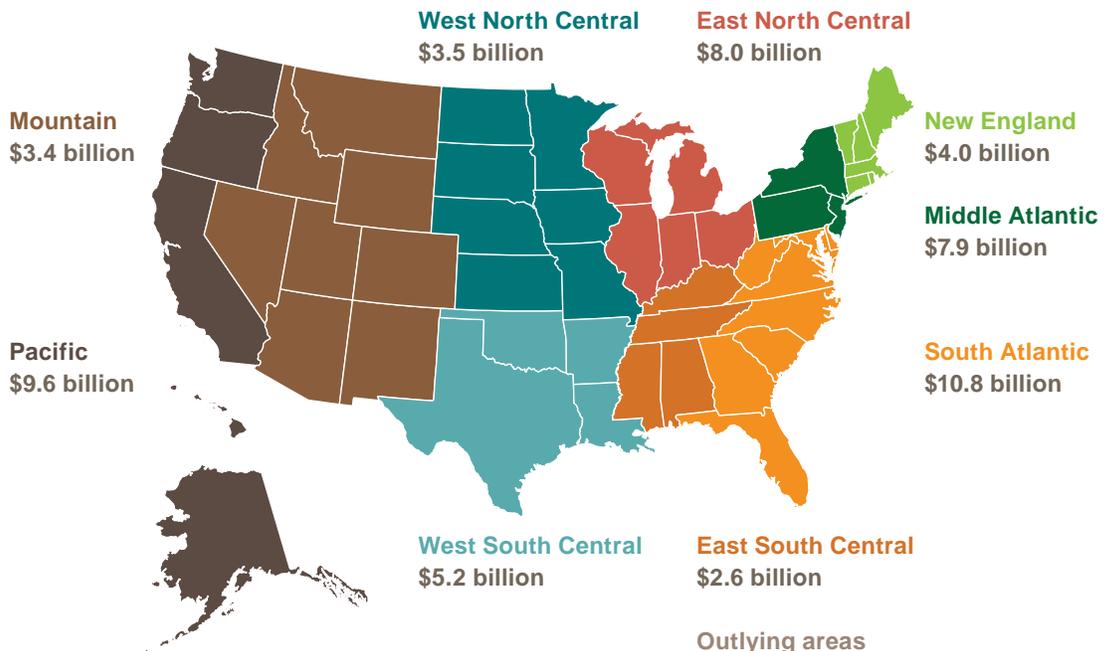
A strong regional anchor for research and innovation

Illinois leads the Midwest in R&D funding, and its East North Central region, also comprising Indiana, Michigan, Ohio, and Wisconsin, ranks third out of ten regions nationally, with nearly \$8 billion in funding. Each of these states benefits not only from strong federal support but also robust institutional resources.

The lack of forward-facing federal science and technology investment is already eroding U.S. primacy in this area, and more talent is now concentrated in Asia and Europe, where this type of investment remains a priority. The effect is clear in Illinois, where Tevatron, Fermilab's particle accelerator, was shut down in September, and the long-term federal funding picture is unclear.

Strong regional commitment to R&D

Total R&D expenditures at universities and colleges, by geographic division, state, and source of funds, 2009



East North Central states	All university/college R&D	State and local government funding
Illinois	\$2.1 billion	\$77.4 million
Indiana	\$1.0 billion	\$56.5 million
Michigan	\$1.7 billion	\$59.2 million
Ohio	\$1.9 billion	\$209.4 million
Wisconsin	\$1.2 billion	\$46.7 million

Other competing states have taken measures to bolster funding sources. For instance, Ohio leads the region by a wide margin in funds from state and local governments to support innovation as a result of its Third Frontier program, which was reapproved by voters in May 2010 in spite of the economic recession.⁴

A recent Illinois public opinion survey found that 92 percent of respondents believe it's important for Illinois to be a leader in health R&D,⁵ a cluster in which the state has excelled over the past decade. Leaders from business, industry, and education could work together to identify other opportunities that could benefit from greater support. ■

¹ The Association of American Universities developed this economic multiplier using methods established by the Bureau of Economic Analysis (BEA) at the U.S. Department of Commerce. In the 1970s, BEA developed the Regional Input-Output Modeling System (RIMS), which updated to RIMS II in 1997. For more information see www.bea.gov/regional/rims/brfdesc.cfm.

² The sum of R&D funding from industry, government, and nonprofits.

³ The most recent year tracked by NSF data, according to www.nsf.gov/statistics/states/show.cfm?stateID=53,14&year=0

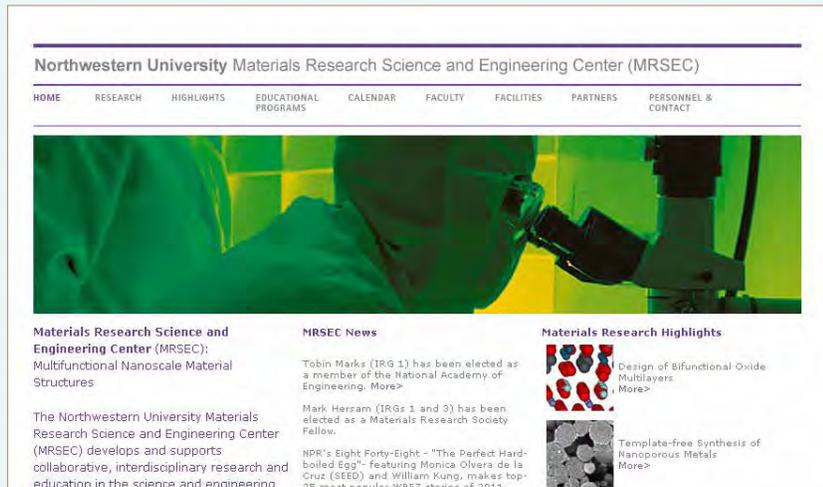
⁴ According to SRI International, the firm hired by the Third Frontier to conduct an economic impact study, from 2003 through 2008, the Third Frontier and Ohio universities invested \$681 million in research, development, and commercialization projects at academic, research, and development institutions and companies, entrepreneur-development organizations, and venture capital funds.

⁵ Illinois Global Health poll, November 2010.

Source: National Science Foundation's Survey of Research and Development Expenditures for colleges and universities

Spotlight

Collaborative Science and Engineering



Northwestern University Materials Research Science and Engineering Center (MRSEC)

HOME RESEARCH HIGHLIGHTS EDUCATIONAL PROGRAMS CALENDAR FACULTY FACILITIES PARTNERS PERSONNEL & CONTACT

Materials Research Science and Engineering Center (MRSEC): Multifunctional Nanoscale Material Structures

The Northwestern University Materials Research Science and Engineering Center (MRSEC) develops and supports collaborative, interdisciplinary research and education in the science and engineering

MRSEC News

Tobin Marks (IRG 1) has been elected as a member of the National Academy of Engineering. [More>](#)

Mark Hersam (IRGs 1 and 3) has been elected as a Materials Research Society Fellow.

NPR's Eight Forty-Eight - "The Perfect Hard-boiled Egg" - Featuring Monica Olvera de la Cruz (SEED) and William Kung, makes top-25 most popular WBEZ stories of 2011.

Materials Research Highlights

[Design of Bifunctional Oxide Multilayers](#) [More>](#)

[Template-free Synthesis of Nanoporous Metals](#) [More>](#)

This fall, the National Science Foundation awarded Northwestern University a six-year, \$16.2 million grant to support its Materials Research Science and Engineering Center (MRSEC), one of the oldest interdisciplinary research centers in the nation.

The Northwestern center, headed by Professor Monica Olvera de la Cruz, integrates educational activities with a scientific research program. It is one of six materials research science and engineering centers in the nation to renew support from the NSF this fiscal year.

Founded in 1960, the center provides Northwestern scientists and engineers with the infrastructure and environment for designing, synthesizing, and characterizing transformative new nanoscale materials and exploring new device concepts. Faculty from eight departments and more than 500 students use the shared facilities each year.

mrsec.northwestern.edu

NIU-Rockford collaborative wins \$2.4 million to accelerate aerospace cluster

Higher-education and economic development leaders are working together to accelerate the growth of the aerospace cluster in Rockford after winning a \$2.4 million federal Jobs and Innovation Accelerator Challenge grant. Rockford is one of only 20 cities in the country to be awarded one of these highly competitive grants, which receive funding from the Department of Commerce's Economic Development Administration (EDA), Department of Labor's Employment Training Administration (ETA), and the Small Business Administration (SBA). Northern

Illinois University is the lead partner in a group that includes Rock Valley College, the Rockford Area Economic Development Council, the Rockford Area WIB, and EIGERlab.

The project's primary goals are to enhance innovation and technical knowledge to accelerate the advancement of local SMEs, increase the market for the Rockford-area aerospace cluster, and expand the development of the regional aerospace workforce. Special emphasis is being placed on the inclusion of disadvantaged populations in the workforce through STEM education, training, and internships. Through this innovative partnership, new products and practices will be developed to strengthen the cluster's global competitiveness, an environment of knowledge-sharing will be built in the region, and the region's skilled manufacturing capacity will be expanded.

www.niutoday.info/2011/09/23/higher-education-economic-development-team-wins-2-4-million-for-local-aerospace-industry/

In the numbers

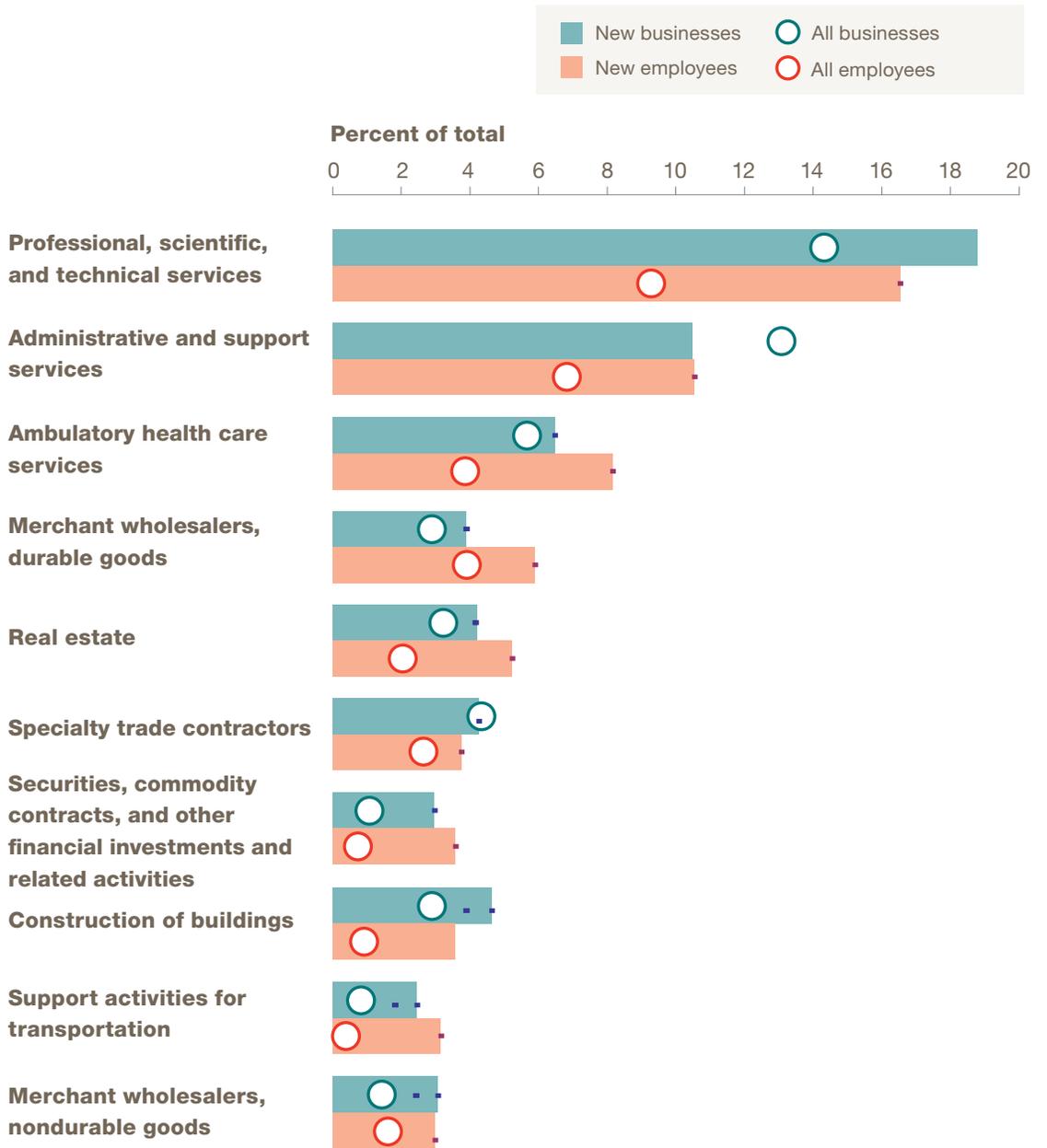
Illinois gaining momentum in new business establishments and high-growth sectors

Many factors contribute to a state's capacity to create a positive business climate, and recent data on the establishment of new businesses, company growth, and business relocations to and from the state show positive momentum and provide a snapshot of opportunities for improvement. These metrics provide important perspective on efforts to support economic development and innovation. As the data illustrate, job creation from the establishment and expansion of companies outweighs the number gained or lost as a result of companies moving to and from the state. Nonetheless, a diverse business support ecosystem requires a cross-section of emerging and mature businesses for stability.

A launch pad for entrepreneurs

In 2011, more than 13,000 new businesses were established in the seven-county Chicago metropolitan region, generating almost 23,000 jobs. The two largest industries—professional, scientific, and technical services and administrative and support services—accounted for nearly 30 percent of all new businesses and more than a quarter of new employees. The distribution of new business starts across industries generally followed the pattern of all businesses, with a few notable differences. For instance, professional, technical, and scientific services accounted for 18.6 percent of new business starts, well above the 14.3 percent of established businesses in this industry. This weighting points to the burgeoning strength of Illinois' technology-driven entrepreneurial ecosystem, which is benefiting from the sustained support of public leaders.

Share of new business starts and jobs by industry* compared with total established businesses and jobs, northeastern Illinois, 2011**



* North American Industry Classification System (NAICS) categories

**Data are for seven-county Chicago metropolitan area.

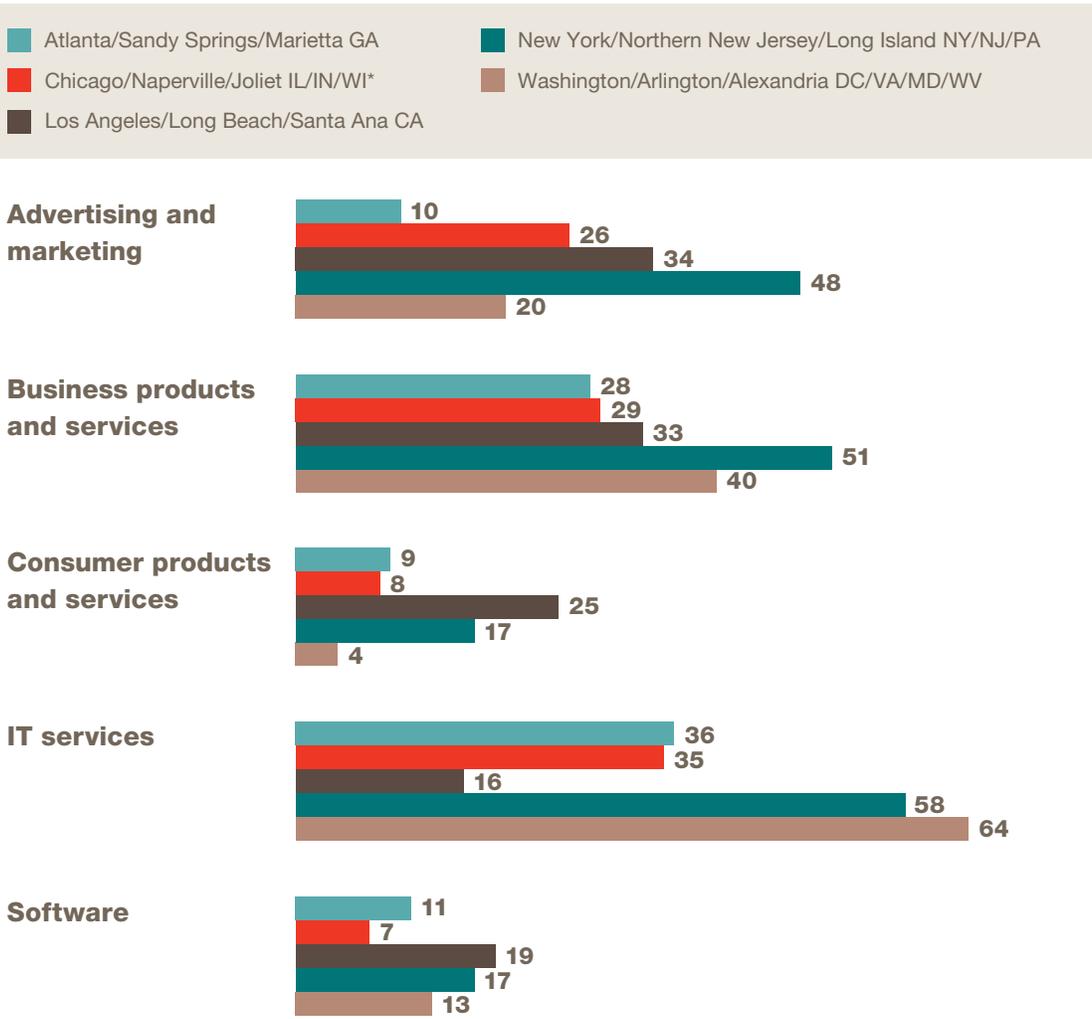
Source: Dun & Bradstreet

Supporting business growth to create jobs

The Chicago metropolitan region placed a total of 157 companies in *Inc. Magazine's* 2011 list of "Top 5000 Fastest Growing Companies."¹ Chicago ranked in the top ten in skilled, higher-wage fields such as IT services, business services, and marketing and advertising. In

total, the region's fast-growing businesses accounted for more than 80,000 jobs, placing Chicago fourth among metro areas on the list behind Philadelphia, New York, and Los Angeles. The diversity and specialized nature of Chicago's growth industries also compare favorably to other metro areas.

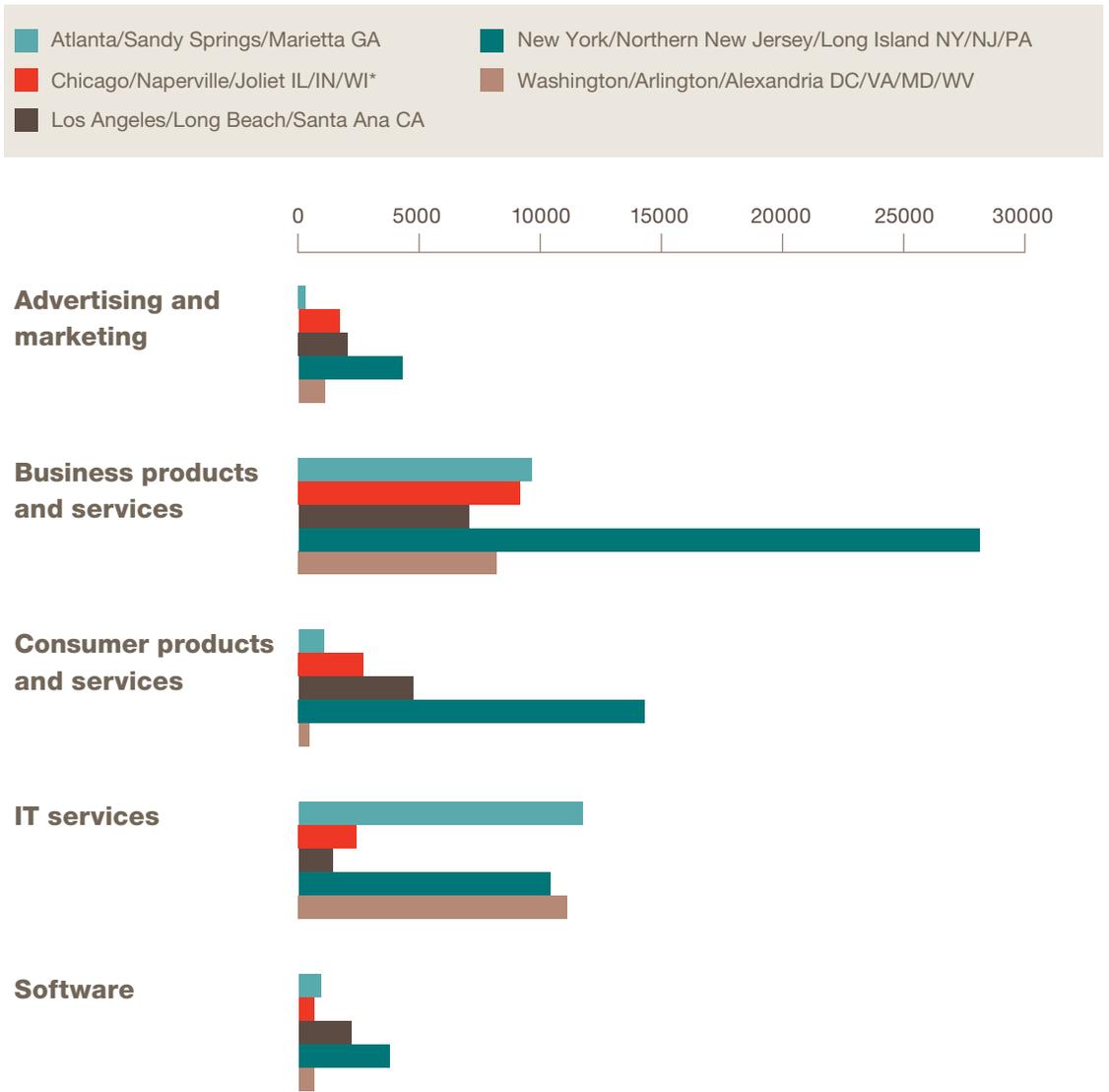
Number of companies in *Inc Magazine's* 5000 list, top 5 industries, 2011



* Data cover the 14-county Chicago metropolitan statistical area.

Source: *Inc. Magazine*

Employment at fastest growing companies, 2011



* Data cover the 14-county Chicago metropolitan statistical area.

Source: *Inc. Magazine*

Growing competition among states for companies and jobs

States have intensified their efforts to retain and attract companies in recent years. Since Illinois has an employment base of nearly six million jobs, the net loss of two dozen companies and

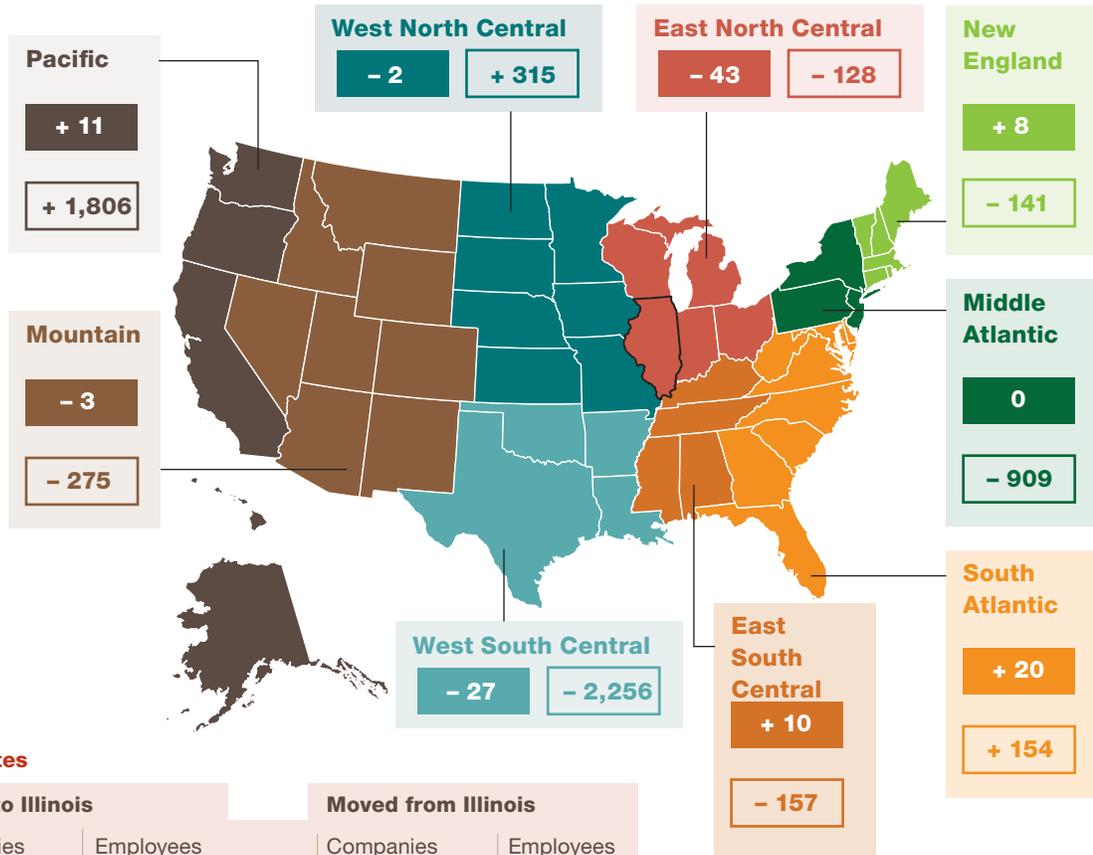
2,000 jobs was negligible. A deeper look at the numbers reveals some interesting trends. The majority of new jobs came from businesses that originated in the Pacific region, while the largest deficit resulted from positions that shifted to the West South Central region.

Business moved to and from Illinois (January–September 2011), percent of establishments and employees

+/- XX Number of businesses, gain/loss
+/- XX Number of employees, gain/loss

Moved to Illinois:
 Total businesses: **244**
 Total number of employees: **6,883**

Moved from Illinois:
 Total businesses: **269**
 Total number of employees: **8,894**



East North Central states

	Moved to Illinois		Moved from Illinois	
	Companies	Employees	Companies	Employees
Indiana	22	337	27	719
Michigan	15	83	16	158
Ohio	8	35	7	83
Wisconsin	20	506	22	129
Total	65	961	72	1,089

Source: Dun & Bradstreet

The numbers within the East North Central region reveal that the aggressive campaigns by Illinois' neighbors to lure companies failed to make a significant impact on employment. The defection of jobs to Indiana was largely mitigated by new positions crossing the border from Wisconsin. Further, nearly as many businesses moved from Indiana to Illinois as vice versa. ■

¹ *Inc. Magazine* assesses companies based on revenue growth over a three-year period. To be eligible for the list, applicants must have had revenues of at least \$100,000 in 2007 and more than \$2 million in 2010.

Spotlight

Entrepreneurial start-ups in Illinois

A look inside the *Inc. Magazine* 5000 list illustrates the rapid growth of Chicago-area companies—and the impact of new businesses on job creation. The growth of these start-ups could help to draw more entrepreneurial talent, energy, and resources to Illinois.

SingleHop	Braintree	Avondale Consulting	Signal
Inc 5000 rank 5	Inc 5000 rank 47	Inc 5000 rank 95	Inc 5000 rank 108
Rank in Chicago 1	Rank in Chicago 2	Rank in Chicago 4	Rank in Chicago 5
Industry IT Services	Industry Financial Services	Industry Business Products and Services	Industry Software
Rank in IT Services 2	Rank in Financial Services 6	Rank in Business Products and Services 6	Rank in Software 11
Employees 43	Employees 27	Employees 10	Employees 14
2010 revenue \$12.6 million	2010 revenue \$4.6 million	2010 revenue \$3.4 million	2010 revenue \$2.7 million
2007 revenue \$170,000	2007 revenue \$107,239	2007 revenue \$121,994	2007 revenue \$103,000
Year start 2006	Year start 2007	Year start 2005	Year start 2006

In the numbers

Building on Illinois' strengths in private R&D spending

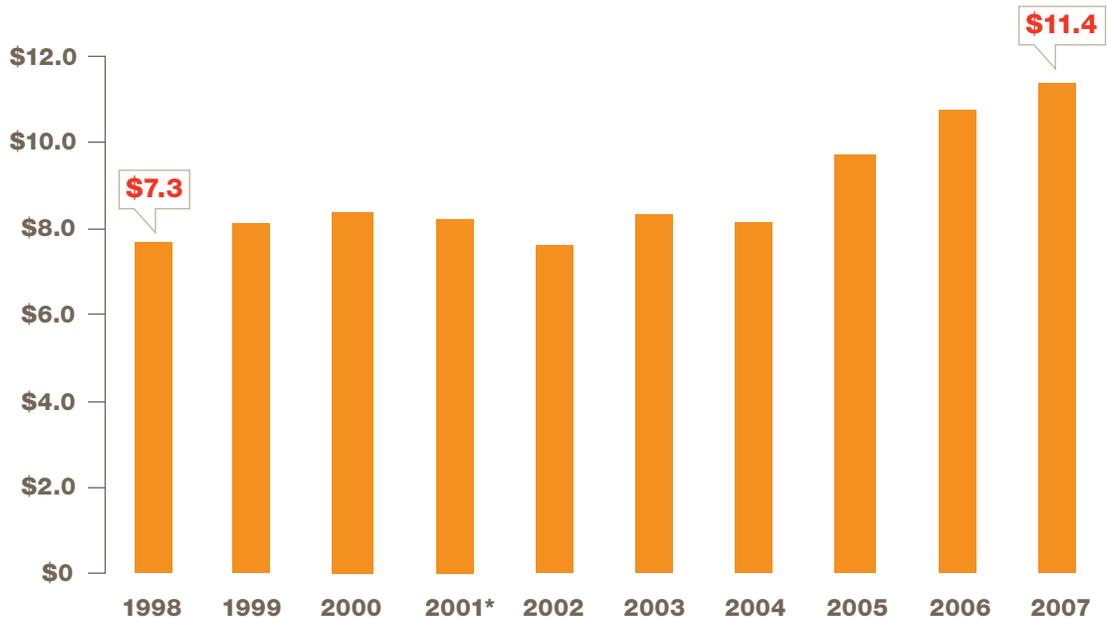
Research and development is an essential component in bringing promising ideas from concept to market. Although the public sector in the United States provides critical R&D funding to a range of organizations,¹ private sources account for an increasing proportion of total R&D spending. Since the 1980s, private R&D has comprised at least 50 percent of all R&D outlays, rising to \$247.4 billion—62 percent of the U.S. total in 2009.

Private sector plays a leading role in R&D

Illinois is a top performer in private R&D spending. According to a National Science Foundation (NSF) survey conducted in 2007,² the state ranked seventh in the United States, with \$11.4 billion (up from \$7.3 billion in 1998). The same survey showed 2,691 businesses conducted private R&D in Illinois, an average of \$4.2 million per company. Two categories—computer/electronic products and chemical manufacturing—made up nearly 60 percent of Illinois private R&D spending.

While Illinois companies contributed 4 percent of all U.S. private R&D spending in 2006,³ the state accounted for a greater share of national spending in a number of industries, including machinery (13 percent), food research (11 percent), and electrical equipment (8 percent).

Private R&D in Illinois, 1999–2007, \$ billions



* Beginning in 2001, excludes federally funded research and development centers.

Note: The R&D in this table is the industrial R&D performed within company facilities funded from all sources.

Source: Division of Science Resources Statistics, National Science Foundation, Survey of Industrial Research and Development

On December 16, 2011, Governor Quinn signed legislation (SB 397) that extends the Illinois R&D tax credit for five years, allowing eligible companies to earn credits on their state income taxes for spending increases on research and development. The bill also removes a provision that would have prevented R&D credit carryforwards from being used after the credit's expiration.

Chicago's R&D cluster

In 2010, more than 700 companies with R&D operations were based in Illinois. Of these companies, 431 (including 150 biotech establishments) were located in the Chicago metro-

politan statistical area (MSA). While other major MSAs experienced slow to moderate growth in R&D business establishments over the past decade, Chicago's numbers remained largely flat.

The region is an important research center for testing in food (such as Kraft and the Wrigley Global Innovation Center) and pharmaceuticals (Abbott and Takeda, for example). Private R&D employers in the Chicago region span a range of industries including technology (Alcatel-Lucent, 3,400 employees), oil and gas (BP Global Fuels Division, 1,600), product testing and certification (Underwriters Laboratories, 1,600), and chemicals (Nalco, 1,200).

Major R&D employers*

Facility	Number of employees
Alcatel-Lucent , Naperville	3,400
BP, Global Fuels Division , Naperville	1,600
Underwriters Laboratories, Inc. , Northbrook	1,600
Nalco Company , Naperville	1,200
Pepsi Beverages Company , Barrington	265
Continental Teves, Inc., Telematics Div. , Deer Park	250
Gas Technology Institute , Des Plaines	250
Global Innovation Center (Wrigley) , Chicago	250
Silliker, Inc. , Chicago Heights	120
Intertek Testing Service, NA, Inc. , Arlington Heights	100
APP Pharmaceutical, LLC , Skokie	100
Crown Packaging Technology, Inc. , Alsip	100
Nanosphere, Inc. , Northbrook	100
SGS Northview Laboratories , Northbrook	90

* Total employment at companies reporting "commercial physical research" as primary industry in Cook, DeKalb, DuPage, Grundy, Kane, Kendall, Lake, McHenry and Will counties in Illinois.

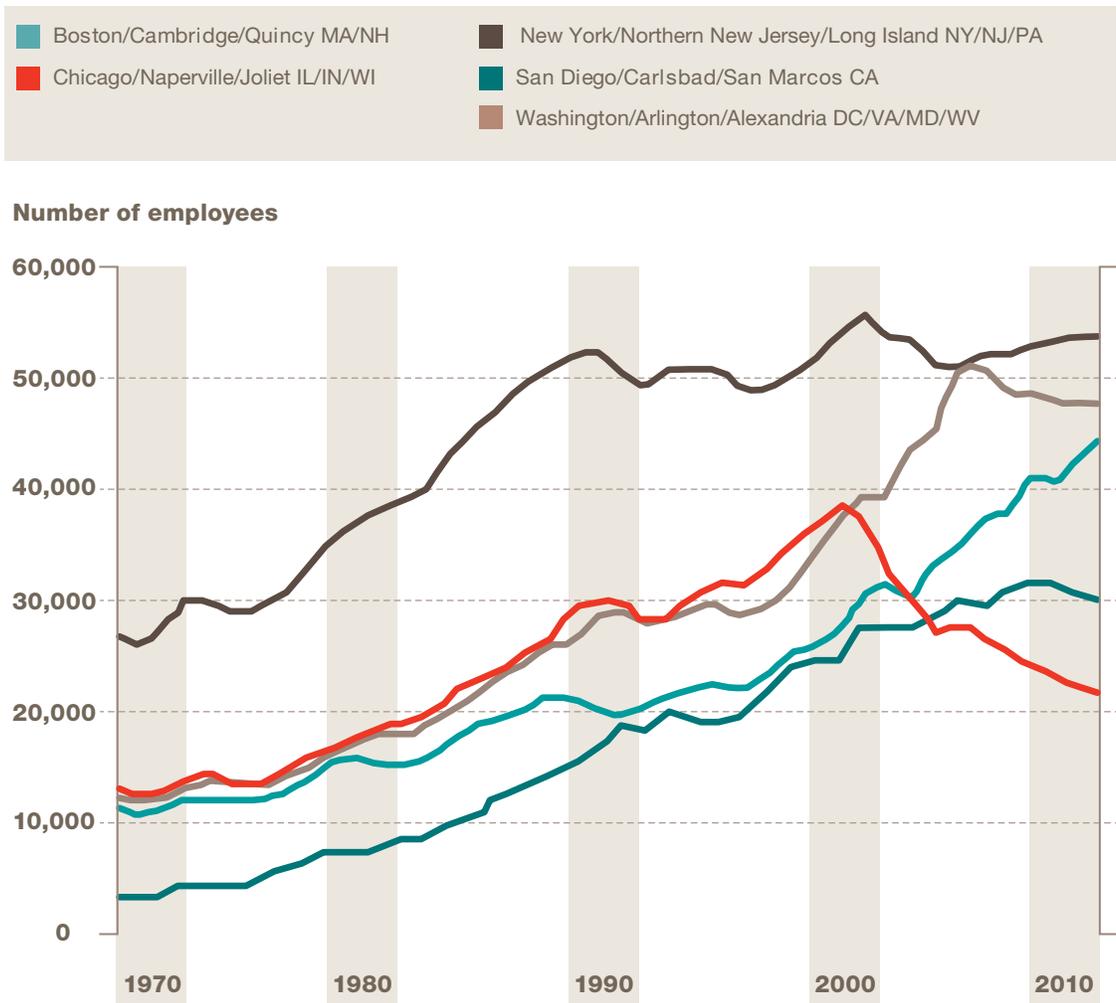
Source: Manufacturers' News, Inc.

R&D employment and output gains expected to temper recent losses

Private R&D employment for the Chicago MSA declined from a peak of 38,000 (7.4 percent of the U.S. total) in 2000 to 21,700 (3.5 percent) in 2010, dropping Chicago from second in the nation among all MSAs to eighth.⁴ In terms of inflation-adjusted R&D output by MSA, Chicago went from second to seventh. (For complete data, refer to MetroPulse at www.cmap.illinois.gov/metropulse.)

Several factors may have contributed to this trend. First, although Chicago's economy has diversified over the past 20 years, private R&D was still concentrated in manufacturing, which accounted for more than 82 percent of all Illinois private R&D in 2006. The industry experienced a significant decline from 1998 to 2003, which may have had a disproportionate impact on Chicago. Second, in the past ten years, companies have consolidated R&D functions and moved positions overseas.

R&D* employment by MSA, 1970–2010



* NAICS 5417 (Scientific R&D services). Top 5 MSAs by 2010 R&D employment. Source: Moody's Analytics

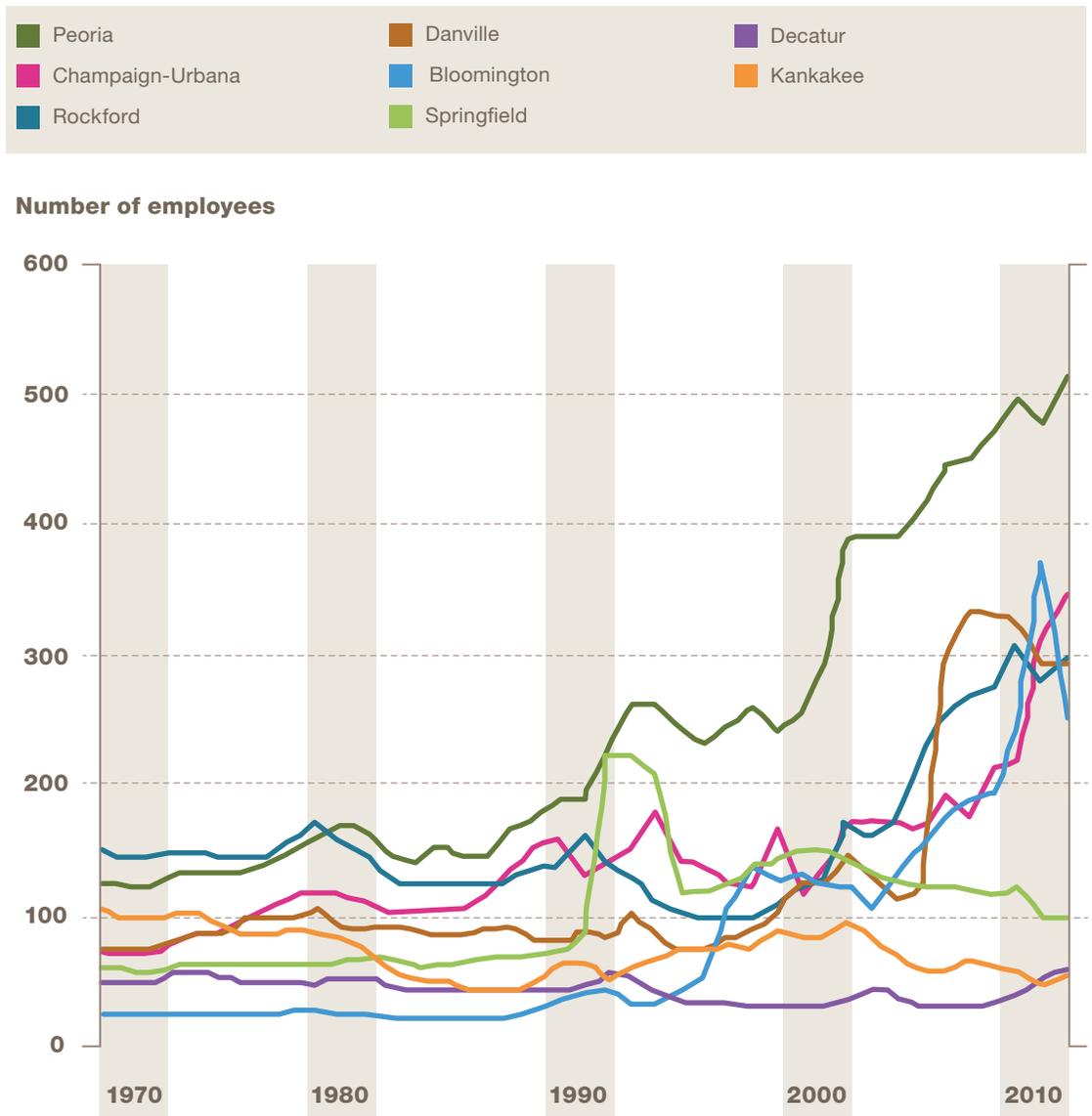
Last, R&D positions have shifted from urban to rural areas as companies sought to reduce costs. It's unclear how much these factors contributed to the drop in R&D employment for the Chicago MSA, and further research is required to identify the causes.

Based on data from Economic Modeling Specialists Inc. (EMSI), Manpower, a workforce solutions and services provider, projects the decline in R&D employees in Chicago has

leveled off and will surpass 25,000 employees by 2021.

While Chicago MSA R&D employment has declined since 2000, R&D employment in Peoria, Champaign, Rockford, and other Illinois metro areas has increased (although on a much smaller scale).

Illinois R&D employment by MSA, 1970–2010, number of employees



Source: Moody's Analytics

Illinois' private-sector R&D performance was mixed over the past decade. While R&D spending—especially among the state's top industries—is comparatively high and trending upward, employment fell off dramatically after 2000, mostly in the Chicago MSA. It is expected to rebound somewhat in the coming decade. R&D GDP also decreased after 2000, but at nearly half the rate of employment, suggesting that the state's private R&D economy has become significantly more efficient, if less robust. ■

¹ Refer to the December 2011 Innovation Index #4 for more information on funding at universities and research laboratories. (www.illinoisinnovation.com/wp-content/uploads/2012/01/IIC_Email_December-2011_VFINAL-2withlinks.pdf)

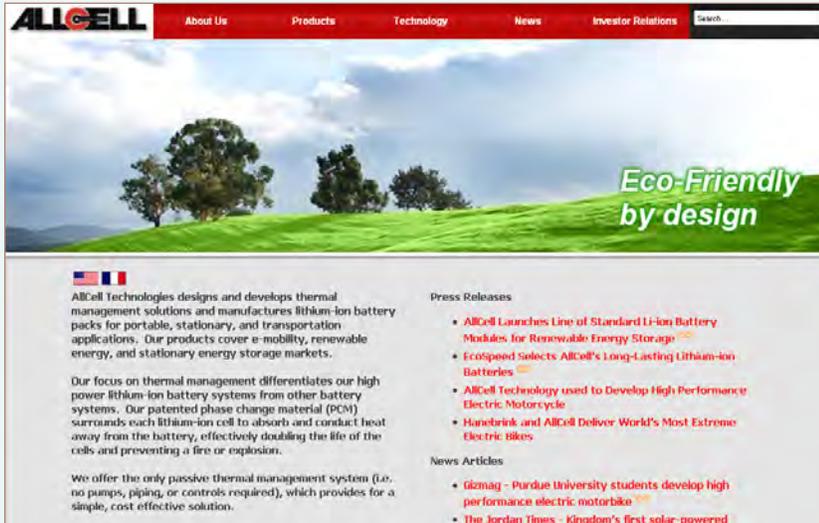
² The most recent year for which data are available.

³ The most recent year for which industry-specific data are available.

⁴ These figures refer to the North American Industry Classification System (NAICS) code 5417, Scientific R&D services. This industry group covers organizations engaged in conducting original investigation undertaken on a systematic basis to gain new knowledge and/or the application of research findings to or other scientific knowledge for the creation of new or significantly improved products or processes. The industries within this industry group are defined on the basis of the domain of research, that is, on the scientific expertise of the establishment.

Spotlight

AllCell Technologies, LLC



ALLCELL About Us Products Technology News Investor Relations Search

Eco-Friendly by design

ALLCELL Technologies designs and develops thermal management solutions and manufactures lithium-ion battery packs for portable, stationary, and transportation applications. Our products cover e-mobility, renewable energy, and stationary energy storage markets.

Our focus on thermal management differentiates our high power lithium-ion battery systems from other battery systems. Our patented phase change material (PCM) surrounds each lithium-ion cell to absorb and conduct heat away from the battery, effectively doubling the life of the cells and preventing a fire or explosion.

We offer the only passive thermal management system (i.e., no pumps, piping, or controls required), which provides for a simple, cost effective solution.

Press Releases

- [AllCell Launches Line of Standard Li-Ion Battery Modules for Renewable Energy Storage](#)
- [Ecospeed Selects AllCell's Long-Lasting Lithium-ion Batteries](#)
- [AllCell Technology used to Develop High Performance Electric Motorcycle](#)
- [Hanebrink and AllCell Deliver World's Most Extreme Electric Bikes](#)

News Articles

- [Gizmag - Purdue University students develop high performance electric motorbike](#)
- [The Jordan Times - Kingdom's first solar-powered](#)

AllCell Technologies is part of a growing Illinois ecosystem in energy storage. Founded in 2001, AllCell has developed high-power lithium-ion battery packs that can be used in hybrid and electric automobiles, light electric vehicles (including electric scooters and bikes), and for renewable energy storage.

AllCell's patented phase change material (PCM) surrounds each lithium-ion cell to absorb and conduct heat away from the battery and also effectively doubles the life of the cells while preventing fire or damage. The PCM technology is based on material developed at the Illinois Institute of Technology's (IIT) electrochemical engineering labs; AllCell was the first tenant in the state-funded incubator at University Technology Park at IIT.

The global market for electric-vehicle energy storage devices is expected to grow from \$7.7 billion in 2010 to \$14.5 billion in 2015, with batteries made for electric bikes and scooters accounting for \$10.9 billion of that figure.

In October 2011, Illinois Governor Pat Quinn visited AllCell's facility in Chicago to announce a \$460,000 grant, which was combined with private funds to support a \$1 million project to increase production capacity and install rooftop solar panels at the company's manufacturing facility. The project has already created new full- and part-time jobs, with more hiring planned for later this year.

allcelltech.com

In the numbers

Using patent output to gauge Illinois' innovation trajectory

Utility patent output¹ is one of the leading indicators of innovation, reflecting several factors: the concentration of companies in innovation-focused industries such as semiconductors or pharmaceuticals; the level of public and private sector R&D funding; and partnerships between the private sector and research institutions. As a product of these economic assets contributing to entrepreneurship and high-tech employment, patent output is a good comparative measure of the relative robustness and dynamism of specific innovation ecosystems. As this month's Index reveals, Illinois has consistently ranked among the top ten states for patent output, and targeted efforts to support innovation can help Illinois maintain its position.

A broad base of innovation

Over the past five years, 579 private and public organizations from Chicago have been granted patents, including 407 in 2010—more than any year since 2006. From 2006 to 2010, Chicago ranked seventh among metropolitan statistical areas (MSAs) by patent output, with 2,933 patents granted in 2010 alone.

Companies such as Motorola, Lucent Technologies, Abbott Laboratories, UOP, and Illinois Tool Works have led the region, generating steady levels of patent output since the mid-1990s. More recently, Caterpillar, University of Illinois, and Trading Technologies International have joined the list, emerging as significant contributors to Illinois' innovation ecosystem.

Chicago MSA total patent output, 2006–2010



Source: USPTO

Total patents per year at Illinois organizations, 2006–2010

Organization/ Industry	2006	2007	2008	2009	2010	Total
Motorola, Inc. Telecommunications	285	182	183	206	222	1,078
Caterpillar, Inc. Advanced manufacturing	123	148	158	145	194	768
UOP Chemicals	52	47	95	84	128	406
Lucent Technologies, Inc./Lucent-Alcatel USA, Inc.* Telecommunications	114	78	58	74	66	390
Illinois Tool Works, Inc. Advanced manufacturing	72	85	73	64	68	362
University of Illinois Scientific research/academic	47	41	44	58	75	265
Panduit Corporation Telecommunications	27	34	41	55	56	213
Abbott Laboratories Biopharmaceuticals	42	33	40	46	50	211
Honeywell International, Inc. Advanced manufacturing	44	38	32	33	31	178
Trading Technologies International, Inc. Data processing/IT	3	3	14	70	88	178

* Lucent Technologies and Alcatel merged in 2006. For purposes of the Index, the original USPTO distinction between Lucent and Lucent-Alcatel has been avoided and their patent output as reported by the USPTO is combined to remove ambiguities in the numbers resulting from the merger.
Source: USPTO

Staying competitive

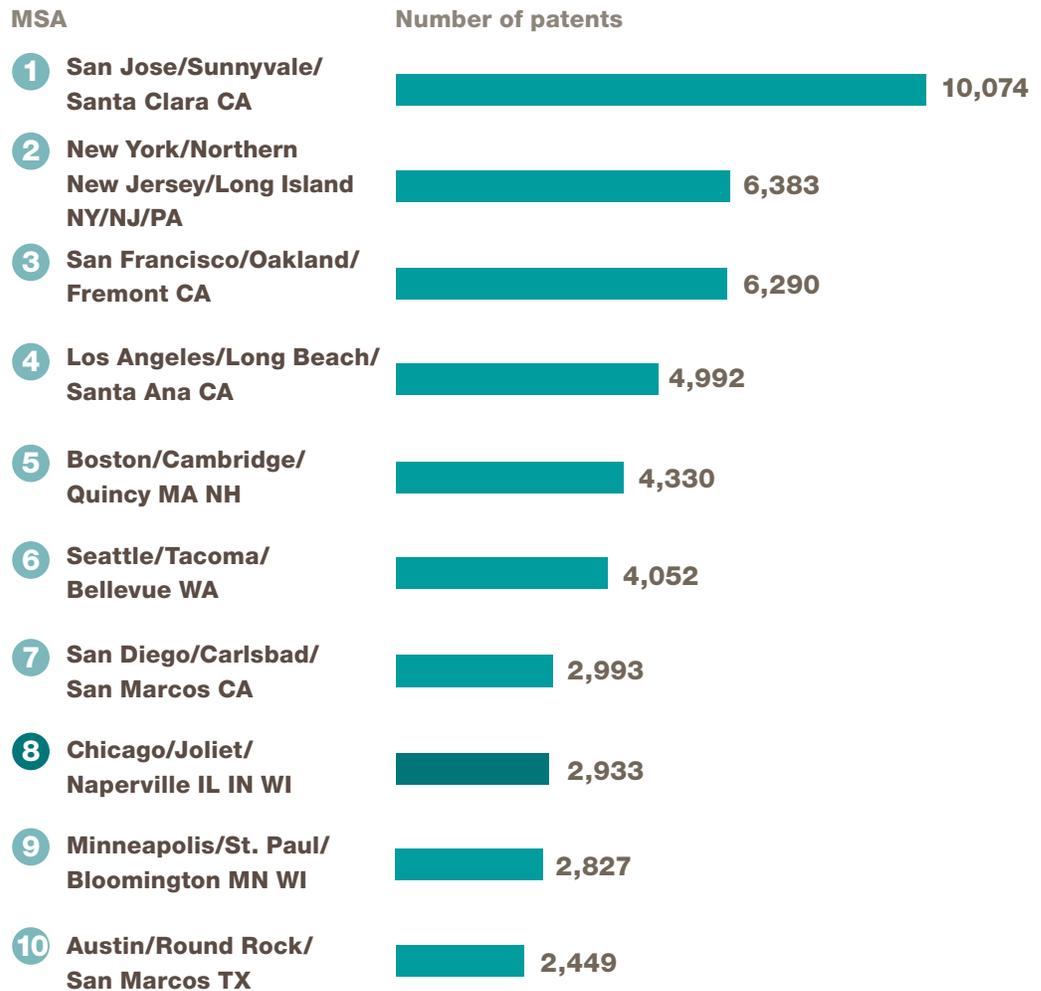
With a 9 percent growth in patent output from 2006 to 2010, Chicago is one of the top MSAs for innovation. However, when compared with MSAs such as Boston, New York, San Diego, and San Jose, which have surpassed their 2006, pre-recession level of patent output by 24 to 35 percent, Chicago's growth has been relatively flat. The rapid growth in patent output in other major MSAs is driven by large clusters of biopharmaceuticals and telecommunications companies. In smaller MSAs such as Austin and Minneapolis, semiconductor patenting has been particularly strong.

Communications is a major industry in Chicago despite a decrease in patenting output, especially in multiplex communications,² which dipped from 174 patents in 2006 to 117 in 2010. Meanwhile, Boston, Los Angeles, New York, and San Francisco have seen substantial growth in multiplex communications—the fastest growing subclass of communications technology by number of patents.

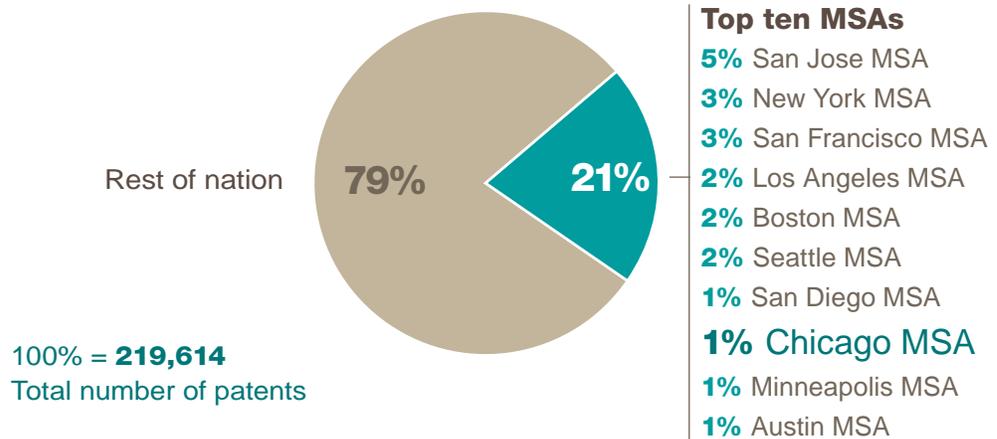
Growth in some Chicago industries has offset decreases in others. For example, financial and data processing expanded more rapidly than any other industry in the Chicago MSA, growing from 29 patents in 2006 to 199 by 2010. Similarly, MSAs such as New York and Los Angeles expanded rapidly in data processing patents focused on proprietary analytical technologies in the finance industry. This technological subclass of patents has become a major contributor to patent output in the most innovative MSAs.

Patent output by metropolitan statistical area (MSA)

Top ten MSAs by patent output, 2010



Top ten MSAs as percent of national total, 2010



Source: USPTO

Boosting the region's prospects

In an analysis of patent growth and diversity, McKinsey & Company categorized Chicago as a “silent lake”—an innovation stage characterized by low growth and dominated by very large established companies. In that study, Chicago scored low on momentum but demonstrated strong diversity in a handful of sectors, particularly communications and advanced manufacturing.

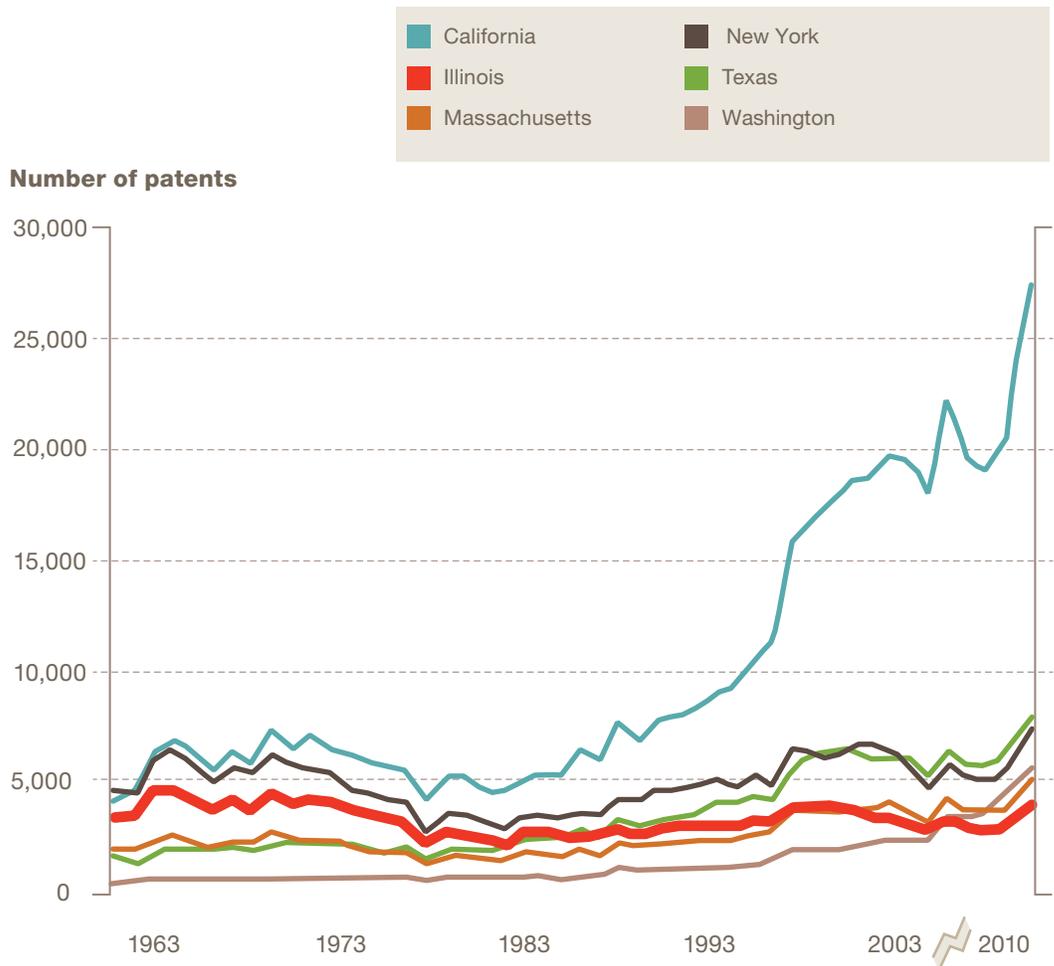
In some cases, a powerhouse innovator can boost a state’s output so significantly as to skew its place in the rankings, as Microsoft has in Washington, where it accounted for more than 3,000 patents, or two-thirds of the state’s total.³ Illinois’ patent landscape is not dependent on a single company or industry; the state has a broad base that can serve as a dynamic source of innovation—an integral component in continued growth.

Maintaining performance and catalyzing new growth

Similar to Chicago, Illinois has high total patent output but its growth is slowing. Since the early 1960s, Illinois has ranked in the top ten states by total patent output, and from 2006 to 2010 it ranked seventh by number of patents granted. In spite of this strong performance, Illinois’ position has slipped over the past decade. Illinois’ total patent output decreased 5.7 percent from 2000 to 2010, and the state has yet to exceed its high water mark for the decade of 3,832 patents in 2000.

Illinois’ patenting activity has expanded far beyond its base of manufacturing and agriculture to include business services, life sciences, education, and other industries. A few of Illinois’ tech-based clusters—biopharmaceuticals, information technology, and aerospace—also showed growth from 1998 to 2009.⁴ However, greater output in these and other high-growth industries would translate to greater overall patent activity. One initiative promoting growth in research, product development, and company acceleration is the Illinois Science and Energy Innovation Trust, which will provide \$22.5 million in capital and resources to support or utilize innovative technologies or other methods of modernizing the state’s electric grid.

Illinois in comparison to top five states by patent output, 1963–2010



Source: USPTO

World Business Chicago's recently released *Plan for Economic Growth and Jobs* includes strategies to support the region's entrepreneurial community and strengthen the connection between research institutions and private industry to boost innovation. The recent OECD report on the Chicago tri-state metropolitan area featured in this issue's News section, as well as CMAP's *GO TO 2040* plan, have also concluded that Chicago and Illinois need to do more to support cooperation between private industry and local research institutions. ■

¹ Patents can be classified as design, plant, or utility patents. Utility patent trends are commonly used as an indicator in innovation research. According to the U.S. Patent and Trademark Office (USPTO), a utility patent is "granted to anyone who invents or discovers any new, useful, and non-obvious process, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof." All mentions of patent output in this issue refer to utility patent output only.

² Technologies that allow for multiple sources of analog signals or digital data to be combined into one signal. This communication technology is essential to digitization.

³ Matthew Finnegan, "U.S. claims record number of patents in 2010, IBM leads," *Techcrunch.com*, January 10, 2011.

⁴ See the November edition of the Innovation Index for more information on Illinois' clusters.

Spotlight

Chicago Innovation Mentors

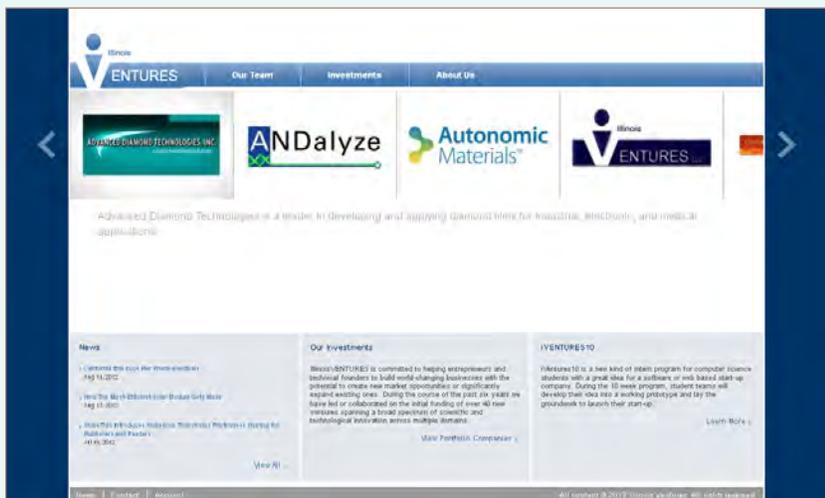


Chicago Innovation Mentors (CIM) connects the Chicago area's leading universities, innovative scientists, talented students, and research funds with the technology-driven needs of today's market. Founded by Northwestern University, the University of Chicago, the University of Illinois, and the iBIO® Institute, CIM helps to catalyze the commercialization of university technology in the Chicago area. CIM's ultimate goal is to help ventures obtain patents, license intellectual property, raise capital, form partnerships, and launch companies that offer viable products and services.

Launched in 2010 with an initial focus on biomedical and healthcare opportunities, CIM matches experienced and supportive mentorship teams with innovators at a wide range of stages, from earliest idea to company formation. Prospective mentees—a faculty member, graduate/post-graduate student, or business manager affiliated with one of the sponsoring universities—serve as lead project director. Mentors work on a voluntary basis and include founders, CEOs, chief technical officers, and directors of companies. CIM addresses a perceived gap in the ability of entrepreneurs to commercialize technologies from Chicago's universities on a consistent and wide-ranging basis. To date, CIM has matched 78 mentors with 33 active ventures. CIM will eventually add other institutions to build a more robust pipeline of translational research projects.

chicagoinnovationmentors.org

IllinoisVentures



IllinoisVentures is a seed and early-stage technology investment firm conceived and launched by the University of Illinois in 2006. Current investments reflect targeted practice areas in energy, device physics, advanced materials, biotechnology, medical devices and instrumentation, homeland security, and software. The firm brings together leading researchers and entrepreneurs to develop and articulate concepts, vision, and intellectual property including patents in dynamic companies with high growth potential. IllinoisVentures uses work conducted at Midwest universities and federal laboratories to start and build companies. Since being founded, the firm has led or collaborated on the initial funding for more than 40 new ventures focused on scientific and technological innovation across multiple domains.

illinoisventures.com

A year of the Illinois Innovation Index

September 2011–August 2012



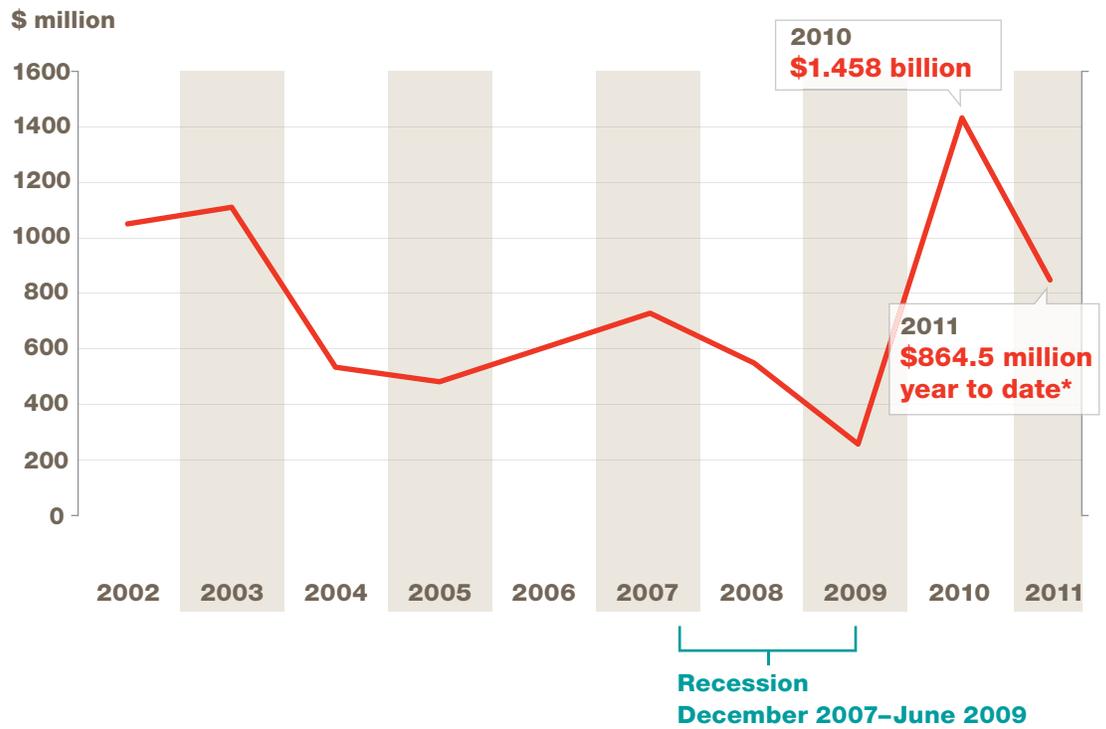
In the numbers

Venture capital investment in Illinois businesses hits record levels

Since June 2009, venture capital has been flowing into Illinois at record levels. In 2010, venture capital firms invested more than \$1.4 billion in Illinois businesses, eclipsing the previous record of 2003 by more than \$325 million. The first

two quarters of 2011 have continued this trend, with nearly \$865 million invested so far. The Chicago metropolitan statistical area accounted for nearly all of the investment.

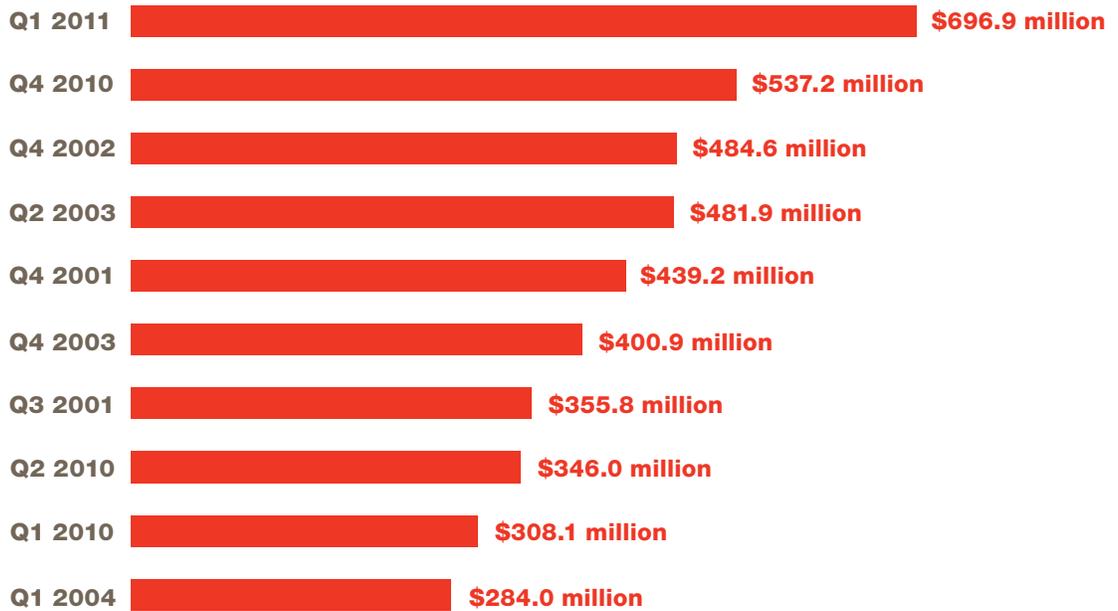
Venture capital: Total equity invested in Illinois,
yearly totals 2002–2011, inflation adjusted



*2011 includes total investment for first two quarters only.

Source: Data generously provided by the Illinois Venture Capital Association.

Venture capital: Top 10 quarters of total equity invested in Illinois, 2001–2011, \$ millions, inflation adjusted



Source: Data generously provided by the Illinois Venture Capital Association.

Venture capital: Past seven quarters by total equity invested per deal and by number of deals in Illinois, inflation adjusted



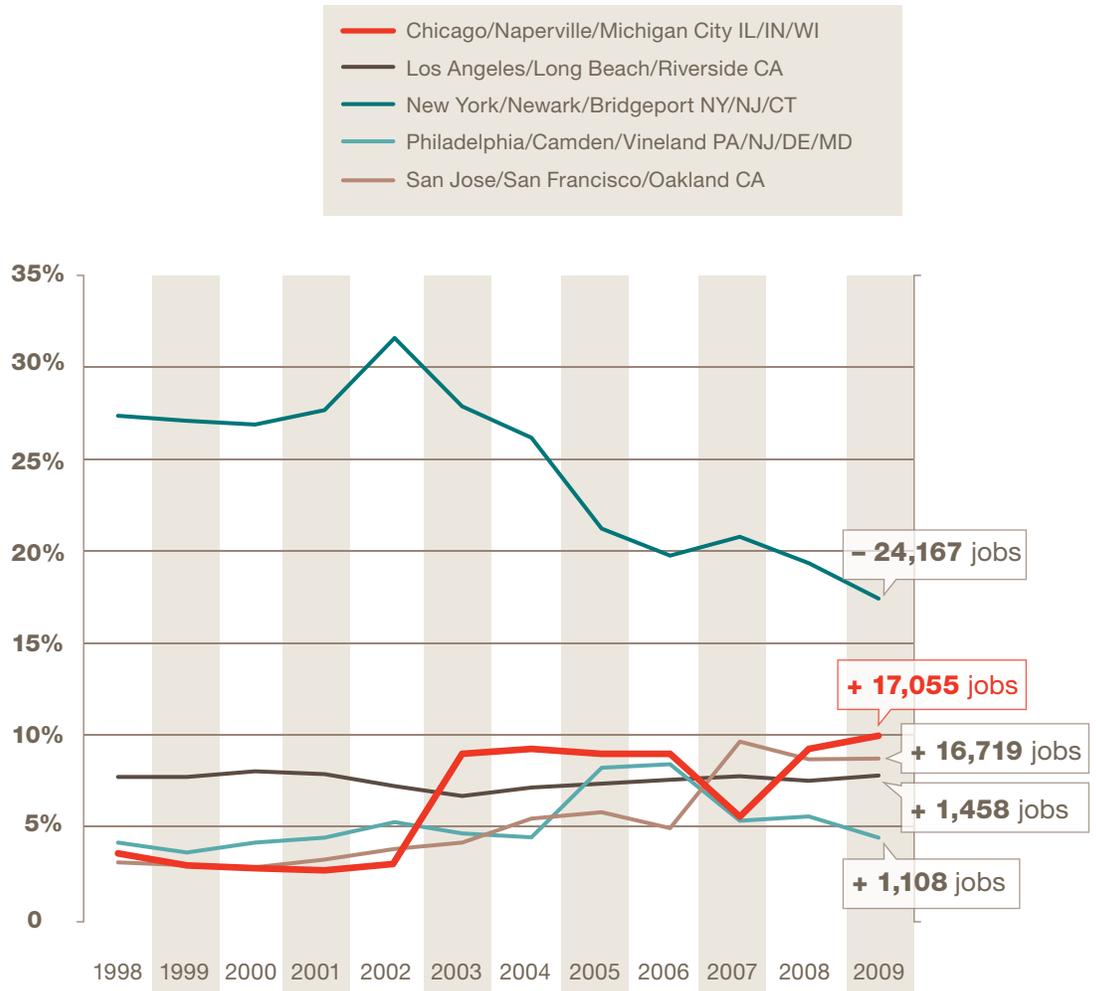
Source: Data generously provided by the Illinois Venture Capital Association.

What we can learn from one cluster

In the biopharmaceutical cluster, for example, the Chicago region has experienced significant growth over the past decade. While total national employment grew by just 7,000 jobs from 1998 to 2009, the region added 17,000 jobs

during this period. Its strong network of educational institutions, research facilities, advocacy organizations, and global corporations act as a magnet to attract other businesses and investment.

Share of national employment, biopharmaceuticals, 1998–2009, percent



In the numbers

Robust manufacturing puts Illinois among nation's export leaders

The globalization of commerce and economic growth in emerging countries create valuable opportunities for companies that can produce goods to meet the demand of international markets. From 2010 to 2011, exports generated more than 46 percent of the U.S. economy's total growth—their largest share since 1929. U.S. exports supported 10.7 million jobs in 2010, and wages at exporting companies are, on average, 11 percent higher than those of non-exporting companies.¹

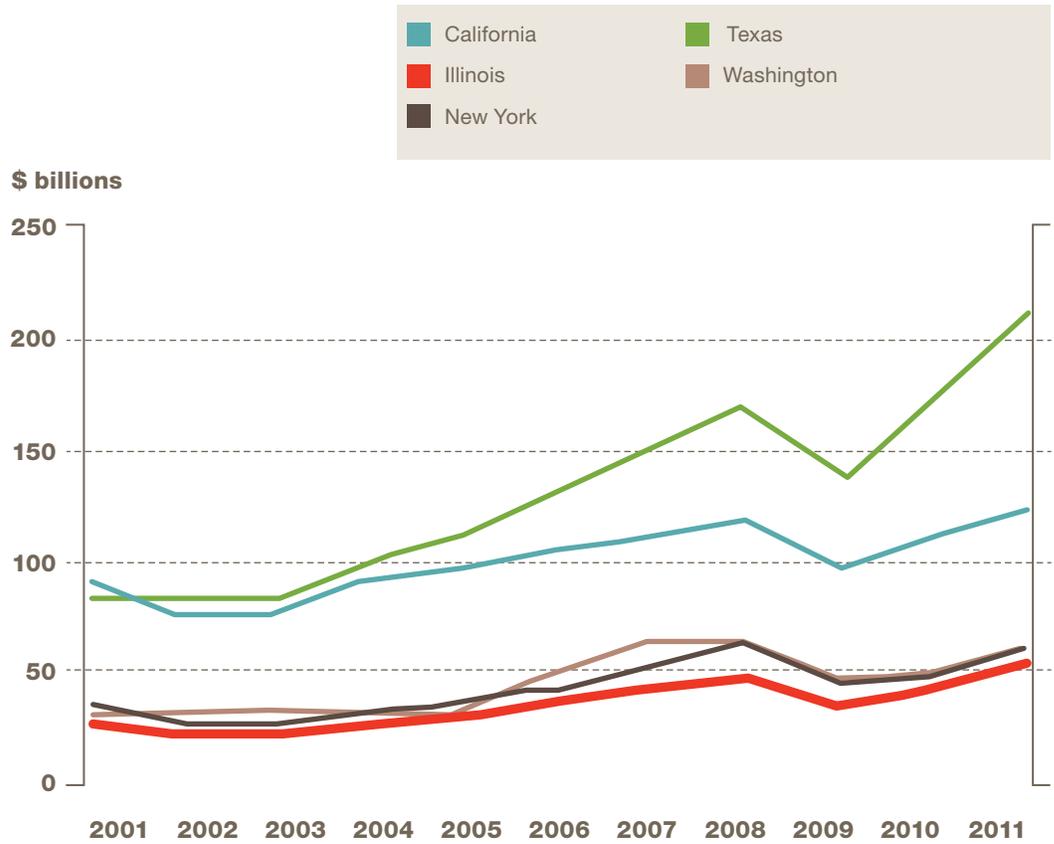
A number of factors—such as the levels of innovation, patenting, and clustering—affect a region's volume of exports, which fuel the jobs, infrastructure, and global profile that contribute to broader economic health. Exports make up a significant share of the Illinois economy—8.3 percent, ranking it 19th among all states. Illinois' strength as an exporter, driven by the Chicago metropolitan region, positions it well to serve emerging markets, while supporting job retention and creation in key exporting industries.

Illinois' strong export performance

In 2011, Illinois was among five states that generated nearly half the nation's total export value.² Over the past decade, the contribution of these states to the national total has remained remarkably consistent. Texas gained 4 percent of national exports from 2001 to 2011 (largely the result of petroleum exports, which grew by 143 percent from 2009 to 2011), while California lost nearly 4 percent during that period. Illinois' share grew slightly to 4.4 percent, from 4.2 percent. Although the share of national exports among the top five states shifted over the past decade, they experienced overall growth, as illustrated in the following graph.

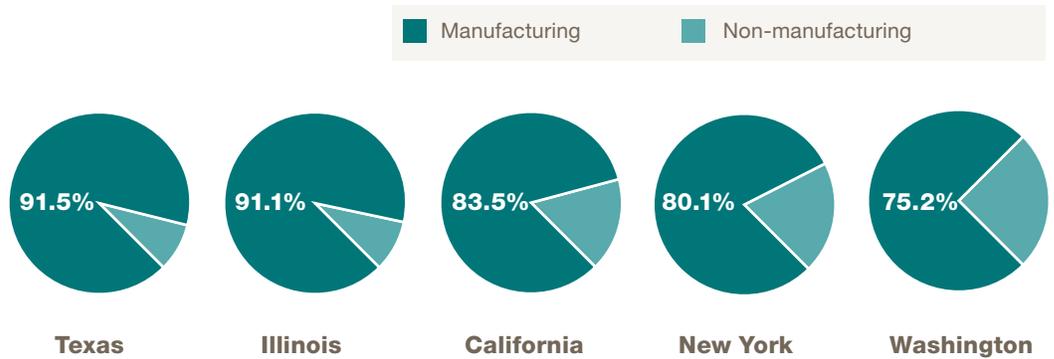
Illinois had the second-highest concentration of manufacturing exports of the top five exporting states in 2011. More than 90 percent of Illinois' goods export value was in manufacturing-related commodities such as dump trucks (6.4 percent of the state total), light petroleum-based oils (3.9 percent), natural uranium compounds, alloys and ceramics (1.8 percent), automotive parts (1.6 percent), and aircraft parts (1.4 percent).³

Total export value by state, top 5 states, 2001–2011



Source: U.S. Census Bureau, Foreign Trade Division

Manufactured goods' share of total state exports by export value, top 5 states, 2011, percent



Source: U.S. Census Bureau, Foreign Trade Division

Metro areas drive U.S. exports

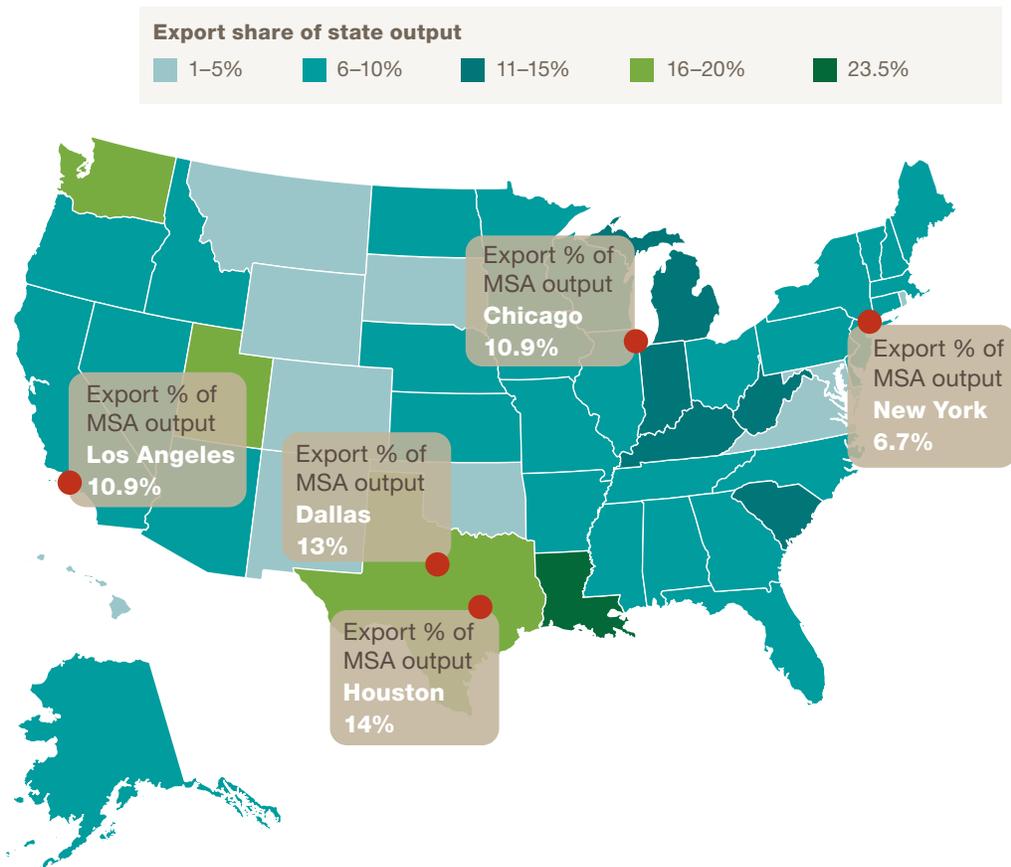
Metropolitan areas are especially critical to export production, generating 84 percent of U.S. export sales in 2010. The majority of this activity has occurred in large metros. The largest 100 metropolitan statistical areas (MSAs) by population produced more than 65 percent of the nation's exports of goods and services in 2010.

A 2012 Brookings Institution report⁴ examined the contributions to total national exports made by the largest 100 MSAs in 2010 (the latest

year examined by Brookings). Chicago ranked third in total export value with \$53.9 billion and total jobs supported by the region's exports (376,100), including 197,600 jobs in the industries producing the exported good or service.

From 2009 to 2010, the Chicago MSA's total export value rose by a greater percentage than that of Los Angeles and New York. As a result, Chicago improved its annualized growth rate ranking among the top 100 MSAs to 34, from 56.

Export share of output for states, 2011, and selected MSAs, 2010



Source: Brookings Institution; U.S. Census Foreign Trade Division; Moody's Economy.com

Top 5 metro areas by export value, 2010

	2010 exports, \$ billions	Number of direct jobs, 2010, thousands	Annual growth, 2009–10
Los Angeles	79.8	312.7	+ 9.0%
New York	78.0	329.0	+ 8.9%
Chicago	53.9	197.6	+ 11.8%
Houston	47.9	141.3	+ 12.1%
Dallas	41.1	147.2	+ 10.7%

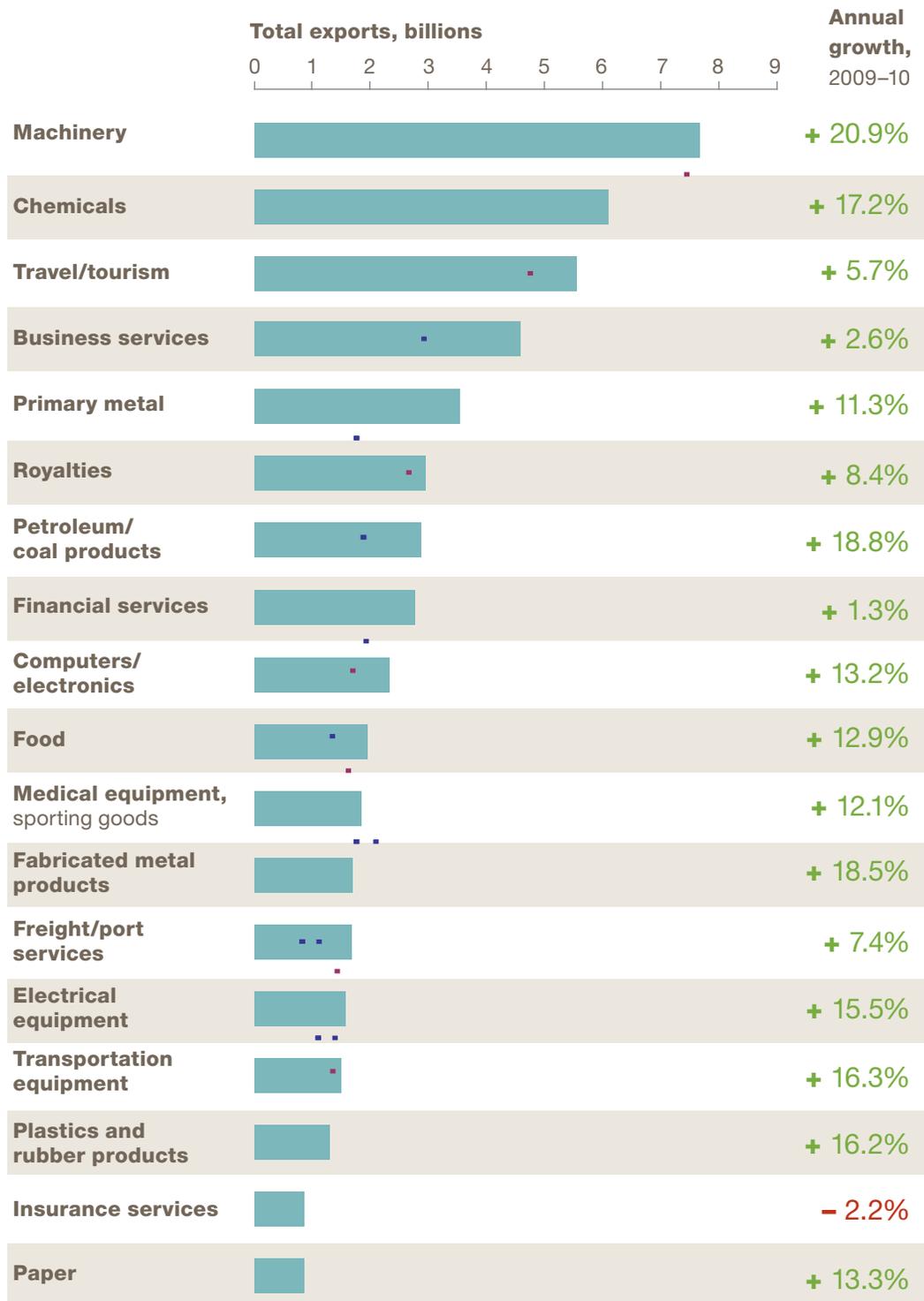
Source: Brookings Institution, *Export Nation 2012: How U.S. Metropolitan Areas Are Driving National Growth*

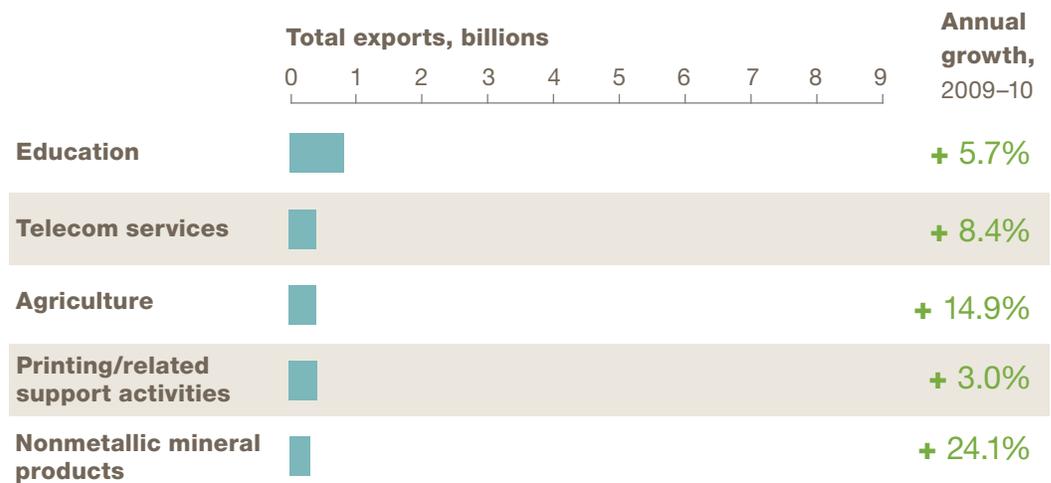
Impressive growth in Chicago's manufacturing exports

Another recent Brookings study⁵ examined the impact of exports on U.S. metropolitan areas. MSAs with higher manufacturing concentrations enjoy higher patenting rates per capita, and manufacturing tends to have a higher multiplier effect (the impact of wages and jobs on the larger economy) than other, less production-intensive industries. As a result, a dynamic manufacturing sector can make significant contributions to an MSA's economy.

Chicago's leading manufacturing industries also experienced some of the highest growth. Machinery and chemicals had the fifth and eighth highest growth rates from 2009 to 2010 out of 34 industries examined in the Brookings' study—20.9 percent and 17.2 percent, respectively. In addition, primary metals manufacturing is Chicago's fifth-largest export industry, with \$3.6 billion in exports in 2010 and growth of 11.3 percent. The Chicago MSA also saw large positive growth rates in fabricated metal products, transportation equipment, plastics and rubber products and electrical equipment.

Chicago MSA export totals, by industry, 2011





Source: BEA; BLS; Brookings Institution, *Export Nation 2012: How U.S. Metropolitan Areas Are Driving National Growth*; IRS; Moodys Analytics; NAFSA; USITC

The federal government is seeking to double U.S. exports by 2014 through the National Export Initiative, creating an opportunity for Illinois and Chicago.⁶ Since the state’s top export destinations—Canada (\$19.2 billion), Mexico (\$5.7 billion), China (\$3.9 billion), Australia (\$3.7 billion), and Brazil (\$2.6 billion)—include two rapidly growing BRIC7 nations, Illinois is well positioned to benefit from their continued expansion. ■

¹ Brookings Institution, *Export Nation: How U.S. Metros Lead National Export Growth and Boost Competitiveness*, (2010); and *Export Nation 2012: How U.S. Metropolitan Areas Are Driving National Growth* (2012).

² All export values in this report refer to “origin of movement” data—all commodities are counted by the location where they are produced, not by the location from which they are shipped. Further, “re-export” values, defined as exports that have previously entered the United States and undergone no change in form or condition at the time of exportation, have been excluded from all totals and analyses, with the exception of trade partner and specific commodity references.

³ “U.S. Census Bureau, Foreign Trade Division statistics reflect goods exports only. The other sources in this issue—the Brookings Institution’s reports from 2010 and 2012—reflect exports of goods and services. See *Export Nation* (2012) for a detailed explanation of the differences between the two sources.”

⁴ Brookings Institution, *Export Nation* (2012)

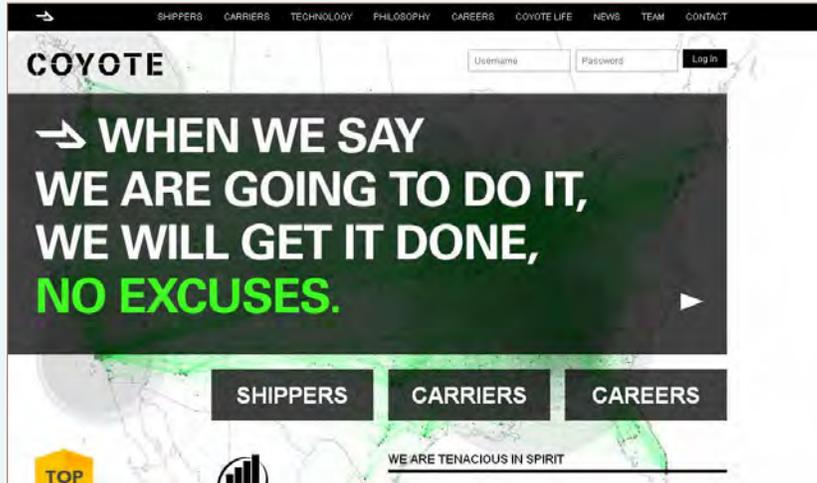
⁵ Brookings Institution, *Export Nation* (2010)

⁶ On April 13, Mayor Rahm Emanuel announced a Chicago Export Strategy that will double the exports of Chicago’s small and medium sized businesses in the next five years.

⁷ The BRIC countries are Brazil, Russia, India, and China.

Spotlight

Coyote Logistics



Chicago-based Coyote Logistics is one of North America's fastest growing logistics companies. In 2011, Coyote relocated its headquarters to Chicago's Green Exchange building, and this year it will be hiring an additional 400 employees, bringing the total number of jobs in Chicago to more than 1,000. Coyote leverages proprietary transportation technology tools and networks to create truckload, inter-modal, less than truckload, and total managed solutions for supply chains in virtually every industry including food and beverage, forest products, metals, plastics, consumer products, and government services.

In 2011, Coyote ranked among *Inc. Magazine's* 500 Fastest Growing Companies for the third consecutive year and received the Chicago Tribune Top Work Place award for midsize companies. CEO Jeff Silver was awarded Ernst & Young's Entrepreneur of the Year.

In addition to Coyote's expansion plans in the city, Mayor Emanuel recently announced that the company will be a private sector partner with the City Colleges of Chicago's (CCC) new "Career and Academic Pathways" initiative. Building on Chicago's strength as a national logistics industry hub, Coyote will help CCC develop a new transportation, distribution, and logistics curriculum for Olive Harvey College. Coyote employees will also mentor, guest lecture, recruit, and help prepare students for private sector job opportunities in Chicago's expanding logistics sector.

coyotelogistics.com

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Mi-Jack's newly created Applied Technologies division is responsible for incorporating configurable technology solutions that include GPS and RF for remote crane operation, equipment positioning, inventory management and auto guided steering. Recent innovations include the manufacture of the world's first electric hybrid intermodal crane and a hybrid retrofit system for port cranes.

mi-jack.com

In the numbers

How broadband deployment supports innovation in Illinois

Today's economy is driven by massive amounts of information being exchanged among businesses around the world. Companies from startups to major corporations rely on high-speed connections to support new technology, knowledge and data sharing, and collaboration—key components for innovation. For these reasons, the deployment of broadband Internet connections, which are faster and more dependable than dial-up access, has become an important indicator of a state's innovation climate.

Studies¹ have shown a strong link between broadband access and economic growth. Therefore, a state's ability to support these connections has a direct impact on its economic growth, business climate, and level of innovation. Illinois has steadily increased broadband access to businesses and residences, but further improvement is needed in both speed and availability.

How Illinois stacks up

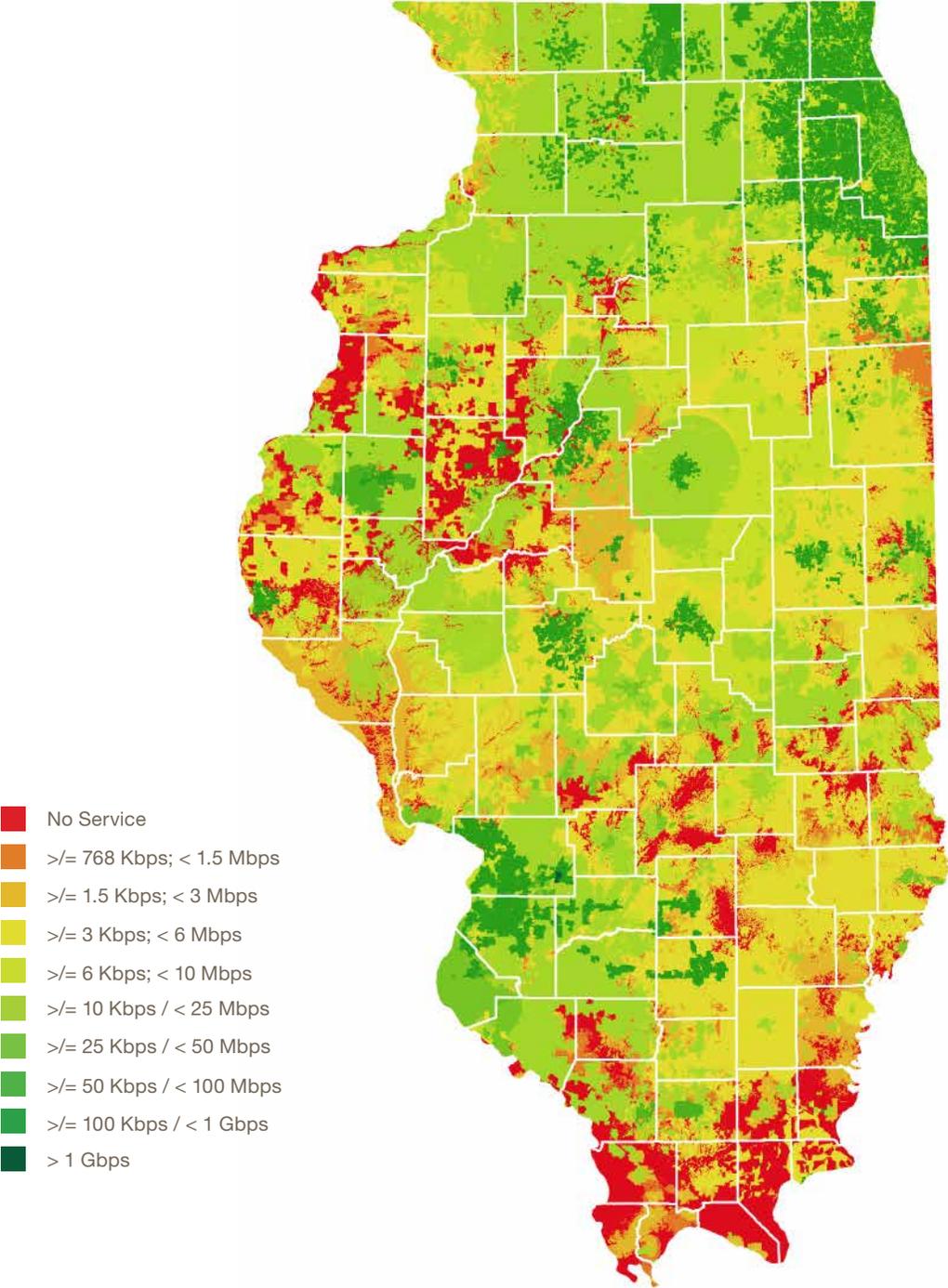
Broadband deployment (availability) and adoption (subscribers) vary considerably across the country. States with the highest access rates, such as Connecticut, Massachusetts, and New Hampshire, tend to have relatively small rural populations. Despite Illinois' large rural areas, broadband deployment and adoption among its households have kept pace with national levels.

The share of broadband subscribers in Illinois increased from 52 percent of total households in 2007 to 69 percent by 2010,² matching the median adoption rate for the country as a whole but still falling behind 23 states. Chicago's broadband levels are similar to statewide figures, with 68 percent of residents using broadband at home, up from 61 percent in 2009.³

Guest contributors:



State download speed map



Source: broadbandillinois.org

Broadband adoption by households, top 5 states and Illinois



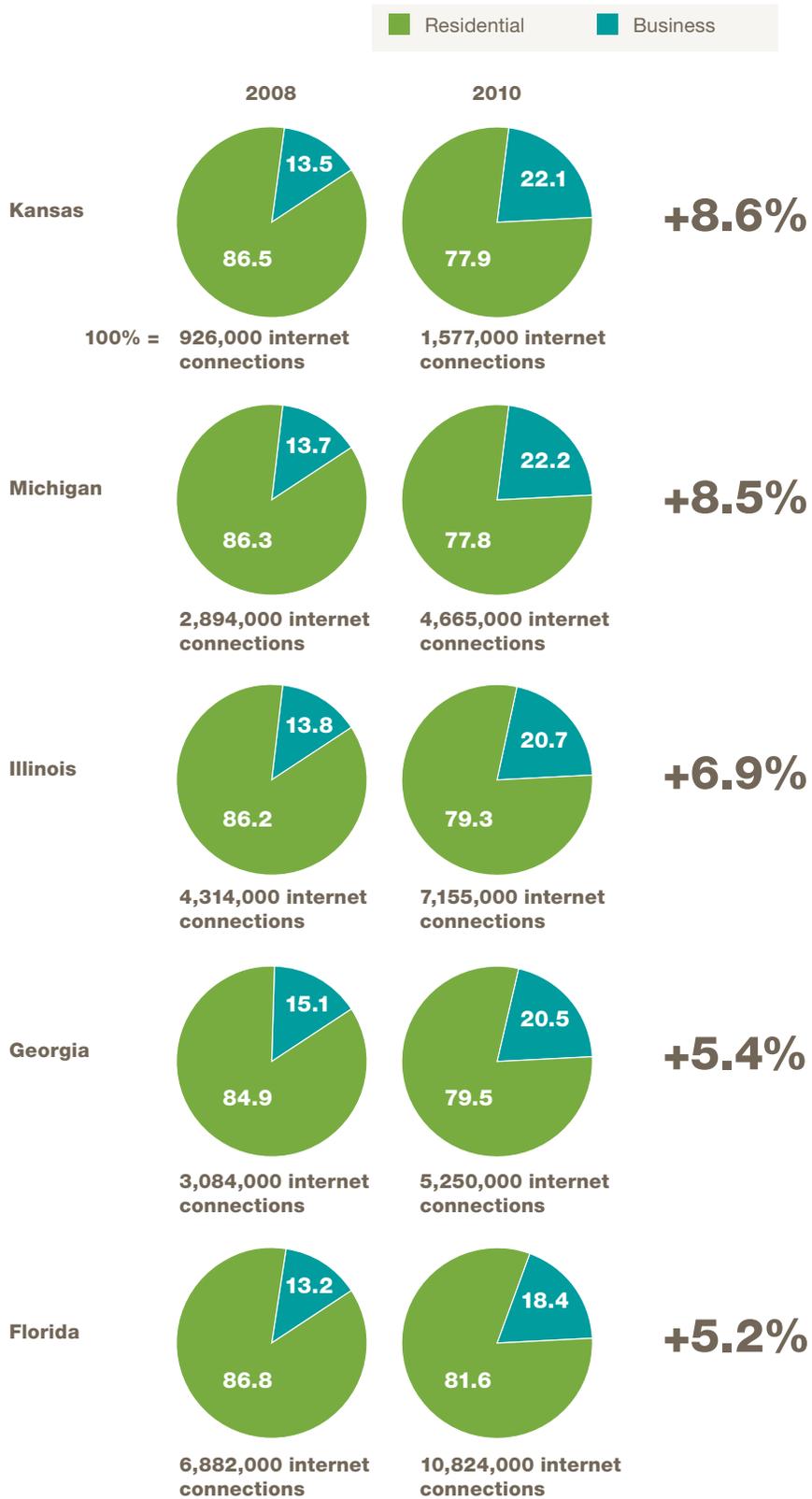
Source: Federal Communications Commission

Broadband adoption by Illinois businesses

In Illinois, commercial Internet subscribers as a share of total subscribers have risen from 14 percent in 2008 to 21 percent in 2010. This rapid growth in commercial connections—more than double the national median growth rate of 2.9 percent during this period—suggests that Illinois businesses are increasingly using the Internet to support commerce, research, and innovation.

The average speed for commercial connections in Illinois equaled the national median for both small and large businesses. However, the average connection speed for Illinois' small businesses is 3.8 mbps, falling short of the 5 mbps level needed to share large amounts of data. Enhancing commercial speed would enable more small companies to provide innovative services in growing fields such as education, energy efficiency, healthcare, and building control and management.⁴

Top five states by percentage increase in business subscriptions



Source: *Internet Access Services*, Federal Communications Commission (FCC)

Government support for broadband deployment

The American Recovery and Reinvestment Act (ARRA) allocated \$4.7 billion to the National Telecommunications and Information Administration to increase broadband access through the Broadband Technology Opportunities Program (BTOP) and Broadband Initiatives Program (BIP). In all, Illinois has received more than \$445 million from these programs to support its broadband deployment. Due to these efforts, broadband adoption in rural areas has increased considerably, from 35 percent in 2007 to 63 percent in 2010.⁵ At the end of 2010, Illinois ranked ninth in the nation

in the number of connections that met the national speed targets set by the Federal Communications Commission (FCC).⁶

While access to broadband has grown in Illinois, the subscribership ratio of connections meeting the FCC household speed target to households is 0.33, slightly below the national median of 0.35, putting Illinois 24th among all states. Since many small businesses are launched out of residences rather than formal offices, greater access to quality broadband connections could provide a boost to these entrepreneurs.

Federal investment in broadband for Illinois

BTOP state funding by type

Infrastructure	\$236,463,663
Sustainable adoption	\$55,313,950
Broadband data and development	\$6,554,641
Public computer centers	\$8,974,283
Total	\$307,306,537

BIP state funding

Total	\$138,305,280
-------	---------------

Source: NTIA, FCC National Broadband Map

The rise of mobile broadband

Based on current trends, mobile broadband networks, which are being enhanced to support smartphones and tablets, will likely replace fixed connections as the preferred mode of accessing the Internet. The Brookings Institution projects that mobile broadband will account for 80 percent of total broadband subscriptions within the next four years.⁷

The relatively low cost of mobile technologies has helped improve Internet access. A February 2012 Pew Research study found that nearly 46 percent of U.S. adults have smartphones compared with just 17 percent two years ago.⁸ Statistics on mobile broadband adoption in Chicago indicate a similar trend. In 2011, 40 percent of adults in Chicago used a cell phone to connect to the Internet, up from 26 percent in 2009.⁹ As mobile broadband adoption accelerates, it will create opportunities for entrepreneurs and start-ups to develop mobile commerce applications that could redefine industries such as financial services, education, and healthcare.

Looking ahead

In the coming years, Illinois will have to expand broadband networks across the state, assist businesses in securing access to high-speed broadband, and track mobile broadband adoption to ensure funds are being allocated to support emerging technologies. ■

¹ See, for example, Jed Kolko, *Does Broadband Boost Local Economic Development?* Public Policy Institute of California, January 2010; and Robert Crandall, William Lehr and Robert Litan, *The Effects of Broadband Deployment on Output and Employment: A Cross-sectional Analysis of U.S. Data*, the Brookings Institution, June 2007.

² *Digital Nation: Expanding Internet Usage*, National Telecommunications and Information Administration, February 17, 2011.

³ Mossberger, Tolbert and Redlawsk, 2011 Chicago City-Wide Broadband Survey.

⁴ *The State of New Hampshire Broadband Action Plan*, p. 36.

⁵ U.S. Census Bureau, *Current Population Survey*.

⁶ The FCC has set targets of 4 Mbps down/1 Mbps up (actual) speeds for broadband availability.

⁷ Testimony by Darrell West of the Brookings Institution to the U.S. House Subcommittee on Healthcare and Technology, February 15, 2012.

⁸ Pew Research Center's "Internet and American Life Project," April 26-May 22, 2011, and January 20-February 19, 2012 tracking surveys.

⁹ Mossberger, Tolbert and Redlawsk, 2011 Chicago City-Wide Broadband Survey.

Spotlight

StarLight

Chicago has become a center of next-generation communication services and facilities that support data-intensive science. One innovative project is the StarLight International/National Communications Exchange Facility, the world's premier hub for global advanced research networks, located at Northwestern University's downtown Chicago campus.



The StarLight facility uses paths of over 100 gigabits per second (Gbps) to link all major advanced global research networks. With funding from the National Science Foundation, StarLight was designed and developed by researchers for researchers. StarLight also supports multiple advanced national and international network experimental research testbeds. StarLight is home to StarWave, which is being designed as the world's first multi-100 Gbps exchange, with capacity for switching more terabits per second (Tbps) than any other communications facility.

startup.net/starlight

840 South Canal Street

Led by Server Farm Realty and slated to open in June 2012, 840 South Canal Street is a state-of-the-art data and trading center serving Chicago's 120 million square feet of downtown office space. By creating routes that are secure, resilient, and dependable, 840 South Canal will provide a robust infrastructure platform for the city's key industries such as financial and legal services, healthcare IT, media, technology, and trading.

840 South Canal represents a multibillion dollar investment in downtown Chicago that is forecast to create more than 1,000 construction jobs as well as many positions in the advanced fields of technology and data management. Aside from the jobs created to construct 840 South Canal, each additional 1 megawatt of dedicated service represents \$111 million of investment over a 15-year period, generating more than \$1 million in annual telecom tax revenue.

worldbusinesschicago.com/news/840-south-canal-street

Gigabit Communities Challenge



Through the Illinois Jobs Now! capital program, the State of Illinois has launched construction of more than 4,100 miles of new fiber optic cable across the state, representing more than \$300 million in combined state, federal, and private investment. This effort will connect nearly 5,000 community anchor institutions to ultra-high-speed networks.

The Gigabit Communities Challenge, a subset of this initiative, will award up to \$4 million in funding for plans to build ultra-high-speed broadband connections in Illinois neighborhoods. The contest is open to any private or public organization and will provide seed funding awards to build or expand broadband networks in Illinois. Each viable proposal must connect at least 1,000 end users to an ultra-high-speed broadband network.

worldbusinesschicago.com/news/gigabit-communities-challenge

In the numbers

Driving innovation in Illinois by increasing STEM attainment

As technology has become the foundation of business, from collaboration software in knowledge industries to the programs that manage operations at manufacturing facilities, the economy increasingly requires a highly educated workforce whose skills can adapt to the changing needs of employers. Recent reports¹ point to human capital as a leading component in the economic growth of the Chicago region and Illinois as a whole. Even though the state's unemployment rate tracks the national average, Illinois currently has 140,000 unfilled jobs.

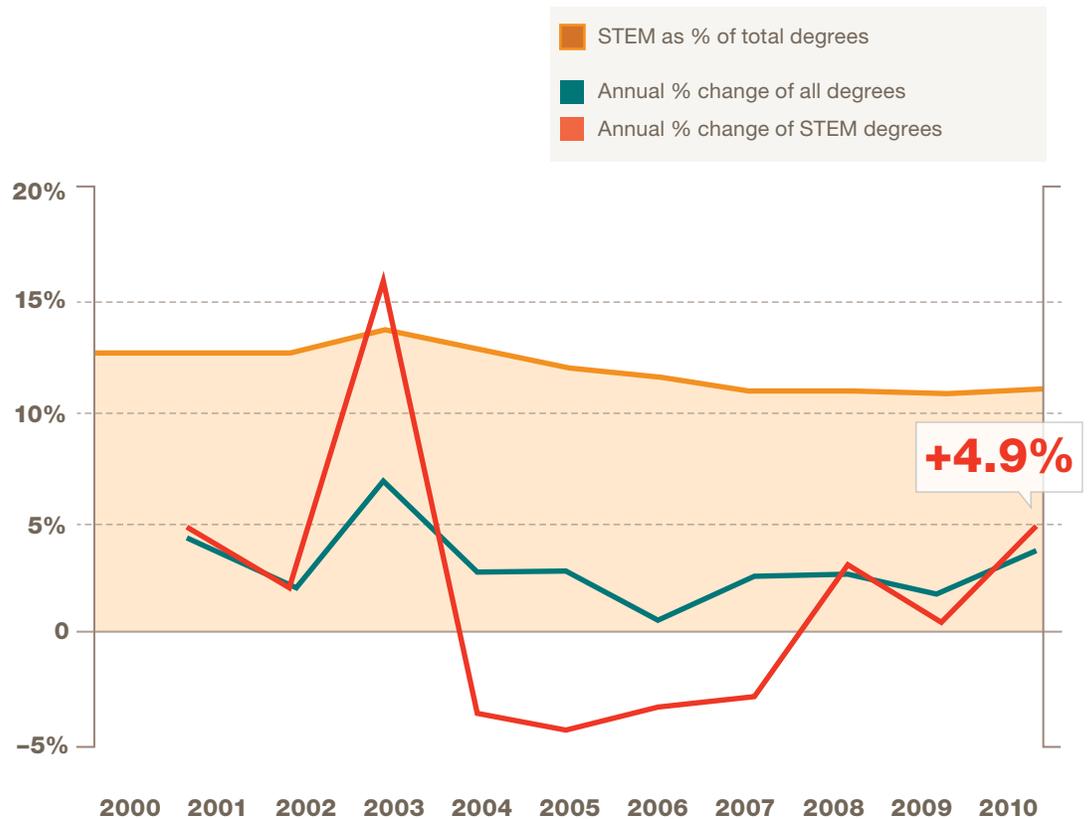
Therefore, post-secondary programs must equip graduates with the skills they need—not only to fill open positions but also to drive innovation. The concentration of degrees in science, technology, engineering, and math (STEM) serves as an important gauge of a state's

ability to develop the right mix of talent and ultimately create and attract new, high-tech businesses and jobs. In recent years, the percentage of Illinois graduates completing STEM degrees has trailed the national average, but new initiatives at the state and local levels are addressing this challenge aggressively.

Recent trends in the completion of STEM degrees

In Illinois, the number of STEM degrees conferred peaked at 20,248 in 2003 and then declined steadily through 2007. Recent years have shown signs of life, however. From 2009 to 2010, the number of STEM degrees rose by nearly 5 percent, reaching 18,400 in 2010. They still made up just 11 percent of all degrees in Illinois that year, slightly below the national average of 14 percent.

STEM degrees compared to all degrees in Illinois, percent, 2000–2010



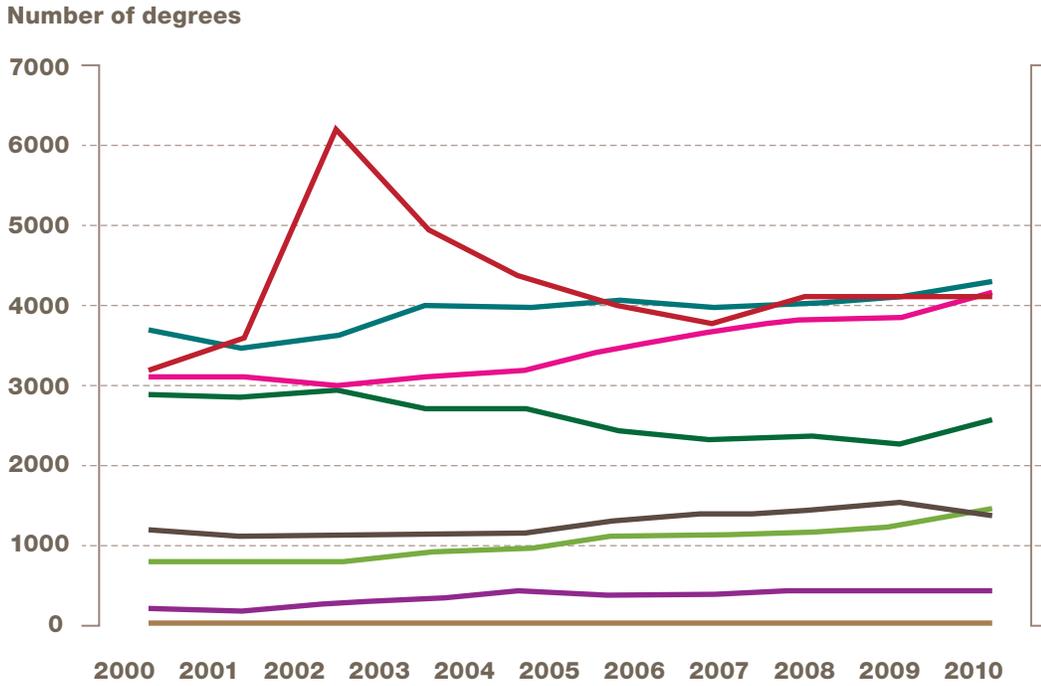
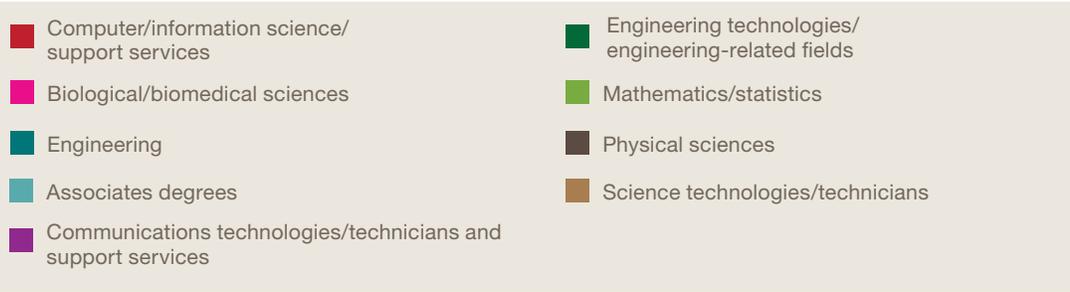
Source: Integrated Postsecondary Education Data Systems (IPEDS)

The state recognizes that it must increase the number of STEM degrees awarded to Illinois graduates to bolster innovation. In February 2012, Governor Quinn launched the Illinois Pathways Initiative to promote attainment in STEM degrees. The state has secured \$43 million in grant money from the federal government's Race to the Top program to support the initiative.

As part of the initiative, Illinois created nine "pathways," each of which includes several program areas grouped according to the Classification of Instructional Programs (CIP) codes. Degree attainment in these areas helps policy makers understand how the degrees of recent graduates meet the projected skill requirements of local employers.

The following chart shows the number of degrees conferred annually for nine of the program areas most related to STEM. The biological and biomedical sciences program area has shown impressive growth, with total degrees increasing from 3,339 in 2000 to 4,147 in 2010—a gain of 24 percent. Illinois has built a substantial pool of talent in the biological and life sciences, which is essential to supporting growth in its biotechnology cluster.² Degrees in the mathematics and statistics program area grew significantly as well, from 860 in 2000 to 1,460 in 2010—an increase of 70 percent.

Number of degrees by STEM-related program area in Illinois, 2000–2010



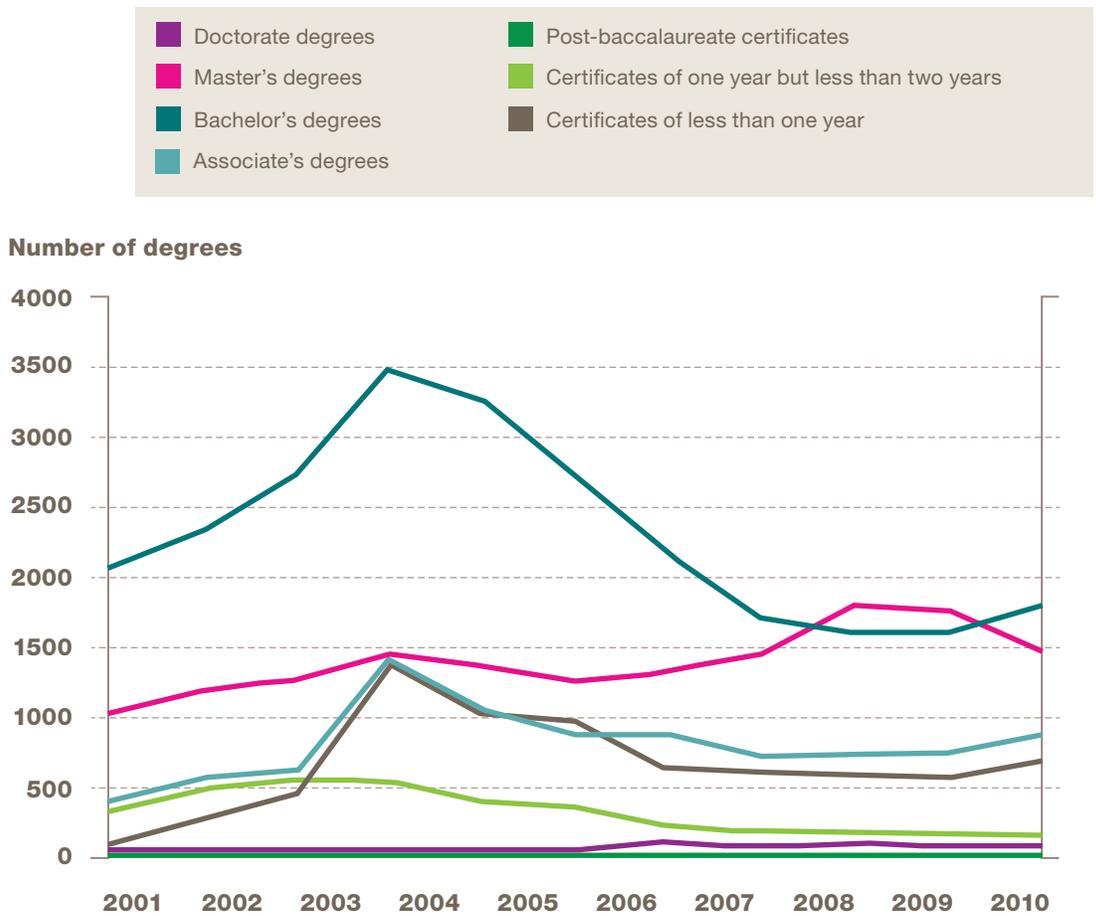
Source: Integrated Postsecondary Education Data Systems (IPEDS)

Tracking achievement across a range of degree types

The type of degree has a direct impact on a workforce’s ability to serve industry. In 2008, for instance, 50 percent of all jobs in Illinois were considered “middle skill,” requiring more than a high-school degree but less than a four-year degree. However, just 41 percent of workers had attained the middle-skill education level.³

One of the most prominent program areas within STEM, computer and information sciences and support services, can serve as a case study for the challenge Illinois faces. While the Illinois Department of Employment Security projects that occupations in information technology and computer operations fields will grow substantially over the next decade in Illinois, the overall number of degrees conferred in this program area has been declining since 2003. Over the past couple of years, bachelor’s and associate’s degrees have begun to rebound, as have certificates of less than one year.

Computer and information sciences and support services by degree type in Illinois, 2001–2010



Source: Integrated Postsecondary Education Data System (IPEDS)

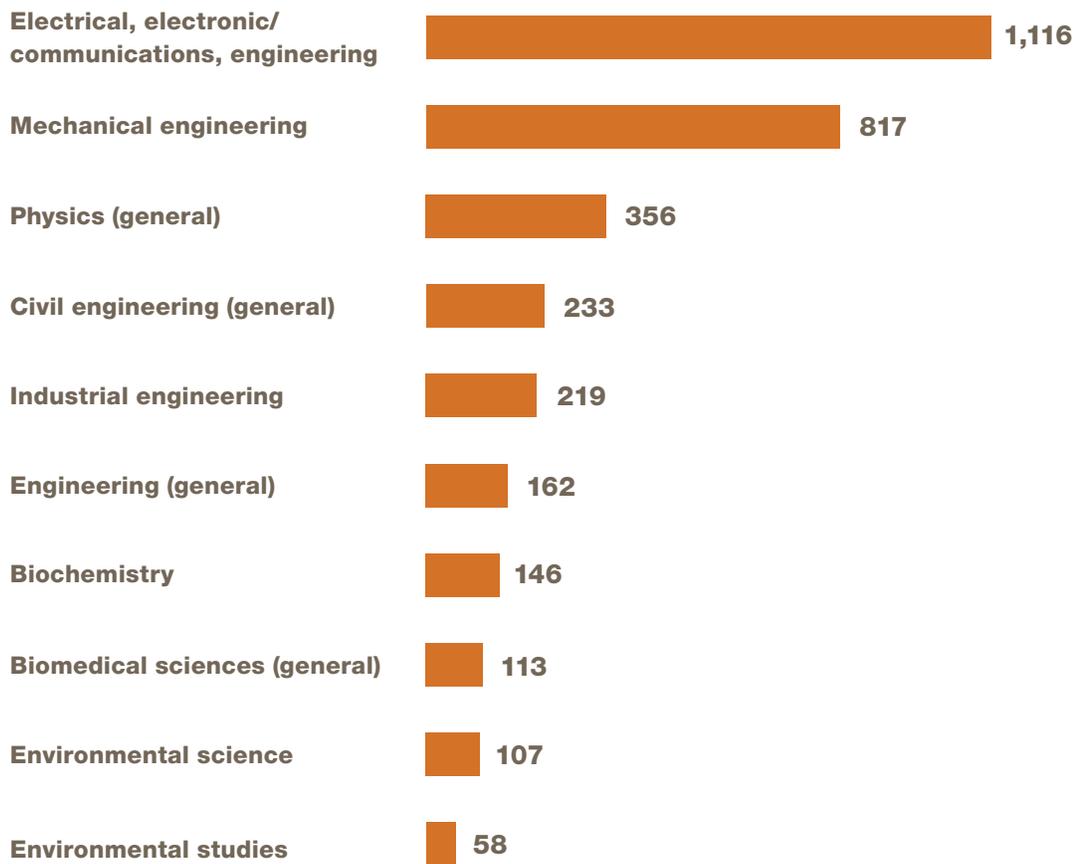
Aligning programs with job openings

In 2009, 5,206 people in Illinois completed degrees in R&D. While the state has 38 programs in the R&D pathway, the 10 most completed programs (of which engineering-related programs account for half) produce nearly 91 percent of all R&D graduates.

A closer look at this pathway demonstrates the potential value in encouraging students to pursue degrees that are aligned with the

labor market's needs. In 2009, electrical, electronics, and communications engineering had 1,116 graduates, making it the leading category. Job openings in these fields from 2008 to 2018 are forecast to be 123 a year, on average, suggesting a large labor surplus. Meanwhile, 233 graduates earned degrees in civil engineering, which is forecast to have 316 annual job openings over a ten-year period, potentially leaving more than 80 positions with an average salary of \$76,000 unfilled each year by Illinois graduates.⁴

Top 10 programs in Illinois' R&D pathway by number of graduates



Source: Illinois Pathways Initiative

Bridging the labor gap in STEM fields

To promote college and career readiness for all students, the Pathways Initiative helps connect educational institutions and business so that they can work together to develop curricula and job-training programs. This coordination between public and private sectors at the state and local levels will be vital in raising the number of qualified graduates across STEM degrees.

However, more progress must be made in aligning the skills of the workforce with the demands of the job market. Key opportunities include increasing overall funding for STEM programs and focusing training on the attainment of midlevel certificates for industry-specific skills. ■

¹ *GO TO 2040*, the Chicago Metropolitan Agency for Planning; *OECD Territorial Reviews: The Chicago Tri-State Metropolitan Area*, the Organisation for Economic Co-operation and Development; and *A Plan for Economic Growth and Jobs*, World Business Chicago.

² For more on clusters in Illinois, see the November edition of the Index.

³ National Skills Coalition report on Illinois.

⁴ Illinois Pathways Initiative.

Spotlight

Excel Foundry and Machine partners with Illinois Central College



Illinois is home to many firms that are growing and innovating. Excel Foundry and Machine, a manufacturer of aftermarket parts for open-pit mining equipment, is in the midst of a \$15 million expansion, but growth has been impeded by a shortage of high-skilled, high-tech employees. Instead of developing its own on-the-job training program, Excel has partnered with Illinois Central College in East Peoria to use the existing curriculums and instructors to train students for jobs on its factory floor. These types of partnerships aim to help advanced manufacturers and other growing industries across the state build the workforce they need to thrive and innovate.

pbs.org/newshour/bb/business/jan-june12/skillsgap_03-27.html

Austin Polytechnical Academy's focus on manufacturing



On Chicago's West Side, Austin Polytechnical Academy is preparing students for college and careers in manufacturing by requiring students to take three-to-four years of pre-engineering classes in addition to traditional subjects. In their junior year, students may obtain up to two nationally recognized credentials from the National Institute for Metalworking Skills. Austin Polytech has partnered with Wood Dale-based Matrix Tooling Inc. to research one of the specialty medical devices it manufactures. Matrix Tooling President and co-founder Paul Ziegenhorn hopes it will spark interest among students to pursue a career in high-tech manufacturing.

chicagobusiness.com/article/20120316/NEWS05/120319812/how-one-manufacturer-is-looking-to-cure-a-labor-shortage

In the numbers

Using online job postings to track Chicago's labor supply and demand

Chicago's vast talent pool ranks among the most diverse in the nation: no industry in the Chicago region employs more than 13 percent of the 4.29 million workers here. Since new ideas often arise from the interaction among workers in different industries, the region's economic diversity is an important driver of innovation. However, an economy as large and complex as Chicago's requires equally sophisticated ways for employers to find the right talent—and for job seekers to find the right opportunities. Since rising to prominence in the late 1990s, online job boards have offered companies a direct connection to qualified employees and a vital tool for individuals to extend the reach of their job search.

Beyond the primary goal of linking employers and job seekers—job boards account for 1 in 5 hires¹—online postings can also provide insight into hiring trends. New technology is able to mine and analyze data from the nation's largest job boards, providing metrics on talent supply and employer demand in real time.² The volume and type of job postings in the Chicago metropolitan statistical area (MSA), particularly in tech-related fields such as IT and computer programming, suggest movement in the sectors that drive innovation. Similarly, the clear demand for healthcare workers³ and industrial engineers also reflects activity in innovative industries.

Top positions and employers

In 2011, the Chicago area had a monthly average of 123,668 online postings for all occupations. Among the top 25 occupations, IT-related fields⁴ accounted for nearly 14,000 average monthly postings—11 percent of total postings. The occupation with the most openings in the Chicago region was computer systems analyst, with Web developer and computer software engineer ranking third and tenth, respectively.

Top ten occupations for Chicago metro, 2011, monthly average

Occupation	Postings
1. Computer systems analysts	4,067
2. Registered nurses	3,772
3. Web developers	3,642
4. Retail salespersons	3,031
5. First-line supervisors/managers of retail sales workers	2,840
6. Marketing managers	2,801
7. Truck drivers, heavy and tractor-trailer	2,485
8. Customer service representatives	2,357
9. Accountants	2,353
10. Computer software engineers, applications	2,127

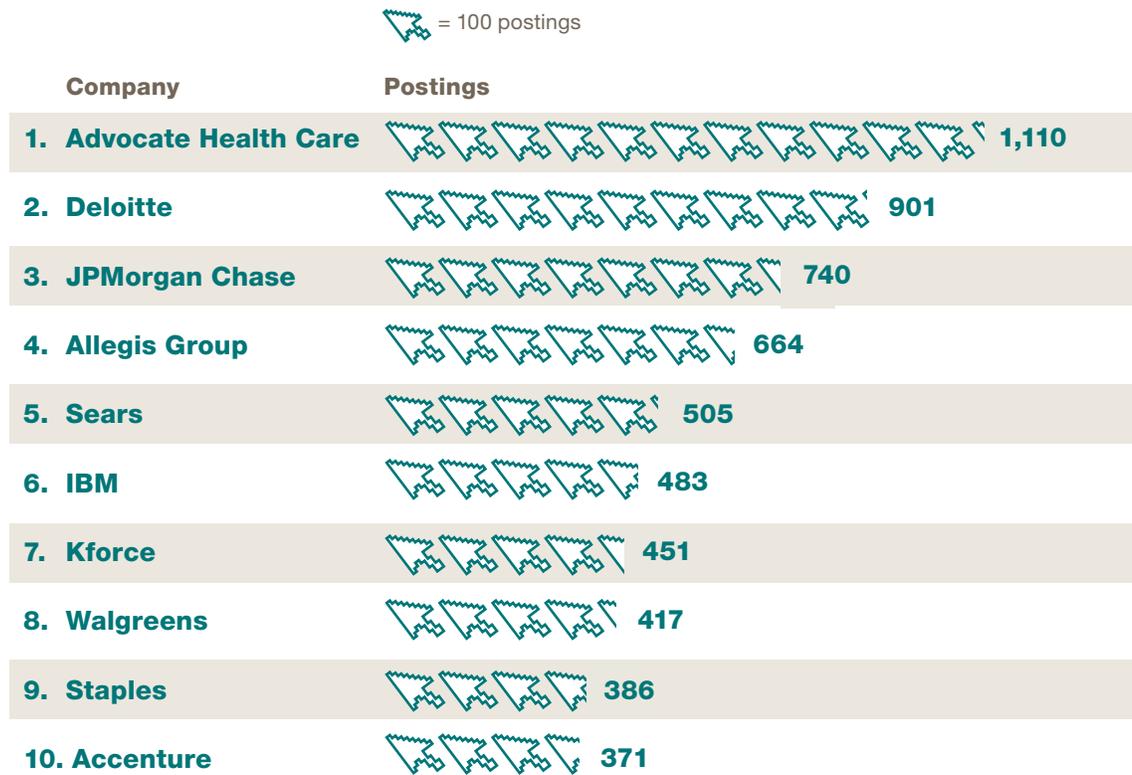
Source: The Conference Board Help Wanted Online (HWOL) data series

HWOL data generously provided by: **Chicago Cook Workforce Partnership**

The top 35 companies by job postings were distributed across a number of sectors, including healthcare, business services, finance, and retail. The top 10 companies accounted for approximately 5 percent of total postings for the year. Advocate Health Care led with more than 1,100 average job postings per month in 2011; IBM was the top technology company, at number six.

Allegis and Kforce, two staffing firms that specialize in placing IT, healthcare, and technical workers, ranked fourth and seventh, respectively. Lingering economic uncertainty has led many companies to alter their approach to hiring, relying more heavily on staffing companies and a contingent labor force.

Top 10 companies by number of online postings in Chicago metro, 2011, monthly average



Source: The Conference Board Help Wanted Online (HWOL) data series

Chicago's deep, experienced talent pool

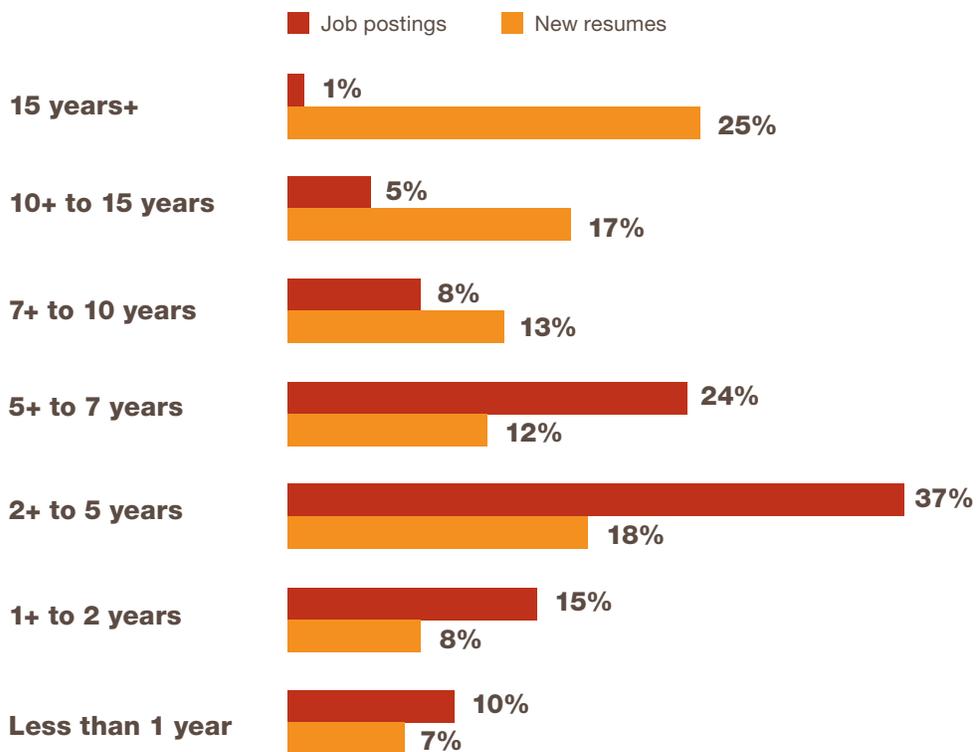
The quality of the region's workforce is a primary driver of business investment.⁵ In 2011, for example, World Business Chicago worked with companies in sectors from finance and healthcare to manufacturing and green technology that cited "workforce" as the second most important reason (after "location") for expansion in Chicago.

Monster.com analyzed Chicago's labor market and highlighted several notable findings.⁶ More than half of the region's talent pool is concentrated in three types of occupations: office/administration (23 percent), management (21 percent), and computer and mathematical (10 percent).

Chicago benefits from an experienced workforce, according to Monster.com's analysis of online resumes. The study found that the majority of Chicago's online job seekers—55 percent—have more than seven years of work experience. One-quarter of candidates had in excess of 15 years of experience—comparable to other major U.S. metro areas. As the following chart illustrates, Monster.com's analysis uncovered a gap between labor demand and supply, especially in middle-skilled jobs.⁷

According to Monster.com, the education level of Chicago's workforce is also an important advantage. Overall, 33.4 percent⁸ of Chicago MSA residents have a bachelor's degree or higher—putting the region 11th among MSAs with a workforce of more than 1 million. In 2011, more than half of Chicago metro job seekers had at least a bachelor's degree.

Chicago years of work experience, job postings vs. new resumes, 2010, percent



Source: Monster.com Chicago Job Conditions Report, 2011

Capturing the value of online job metrics

Online job postings offer an interesting opportunity to research and track current labor market trends in real time. Data from online job boards, when combined with more established employment indicators from sources such as the U.S. Census and Bureau of Labor Statistics, can provide a more complete picture of the region's labor market. As the posting data become better reconciled with more conventional sources and more sophisticated analyses emerge, online postings will provide a valuable tool to track labor market trends and gauge the region's standing in innovative industries. ■

¹ 2012 *Sources of Hire: Channels That Influence*, CareerXRoads, July 2012.

² While online job listings don't include all jobs and job seekers—for example, some employers (construction, agriculture, manufacturing) and applicants (those without Internet access; refer to the May Index) are not posting jobs/resumes—they can reflect dynamism in the job market and provide a snapshot for the depth of talent, concentration of certain types of jobs, and the hiring trends within industries. The Conference Board attempts to filter out duplicate listings so that job postings represent new ads only.

³ Health information management is a growing field of innovation: according to the Bureau of Labor Statistics, the demand for medical records and health information technicians is forecast to increase by 21 percent from 2010 to 2020.

⁴ The top 25 also included computer support specialists (#12) and network and computer systems administrators (#14).

⁵ OECD Tri-State Territorial Review; CMAP, *GO TO 2040*; World Business Chicago, *A Plan for Economic Growth and Jobs*.

⁶ Monster.com Chicago Job Conditions Report, 2011.

⁷ Refer to the June Index, which highlighted the efforts to increase middle-skill attainment.

⁸ According to the 2010 five-year ACS for the Chicago MSA.

Spotlight

CWIC report: *Where Are the Jobs?*

The Chicago Workforce Investment Council (CWIC), which will soon to be merged into the Chicago Cook Workforce Partnership, uses Help Wanted Online (HWOL) data to analyze thousands of recent postings across various Internet job boards. This research helps to provide a better understanding of current job demand and employer needs in the city of Chicago, Cook County, and the Chicago metro region. Each quarter, CWIC publishes a report, *Where Are the Jobs?* which highlights the top 20 occupations, top 10 employers, and top positions in demand.

The reports are available for download:
<http://cwic.org/Resources.aspx>

Healthbox



As the jobs data show, Chicago is a leader in the healthcare industry and a hotbed for tech start-ups. Healthbox, a first-of-its-kind program for the healthcare industry, was launched in Chicago in January 2012 to strengthen the connection between these two vibrant industries. The company provides seed money, mentoring, networking, and other services to healthcare start-ups to support their rapid development and growth. Nina Nashif is one of the leaders behind Healthbox and its parent company, Sandbox Industries.

The inaugural class of ten start-ups from across the United States each received \$50,000 from Healthbox in seed capital (in exchange for a 7 percent equity stake), as well as access to companies including Walgreens and Blue Cross Blue Shield, large hospitals, and professionals from across the healthcare spectrum. According to Nashif, “That’s the force behind Healthbox; it’s not just venture capital but healthcare expertise that entrepreneurs can tap. These start-ups will make invaluable connections, any one of which could lead to customers for their products.” The 2012 class, which includes PUSH Wellness and SwipeSense, graduated in April 2012. Healthbox is seeking to bring ten new companies to Chicago in 2013.

healthboxaccelerator.com

In the numbers

Focus on technology transfer accelerates research activity at Illinois universities

Academic institutions have become increasingly central to driving innovation and contributing to economic development. Over the past decade, the transfer and commercialization of research (tech transfer) at Illinois universities have intensified: the state ranked among the nation's leaders in tech transfer and in 2011 saw an unprecedented number of start-ups based on technology developed at Illinois' universities.¹ However, other states' academic institutions continue to outperform Illinois,' indicating more must be done to spur innovation.

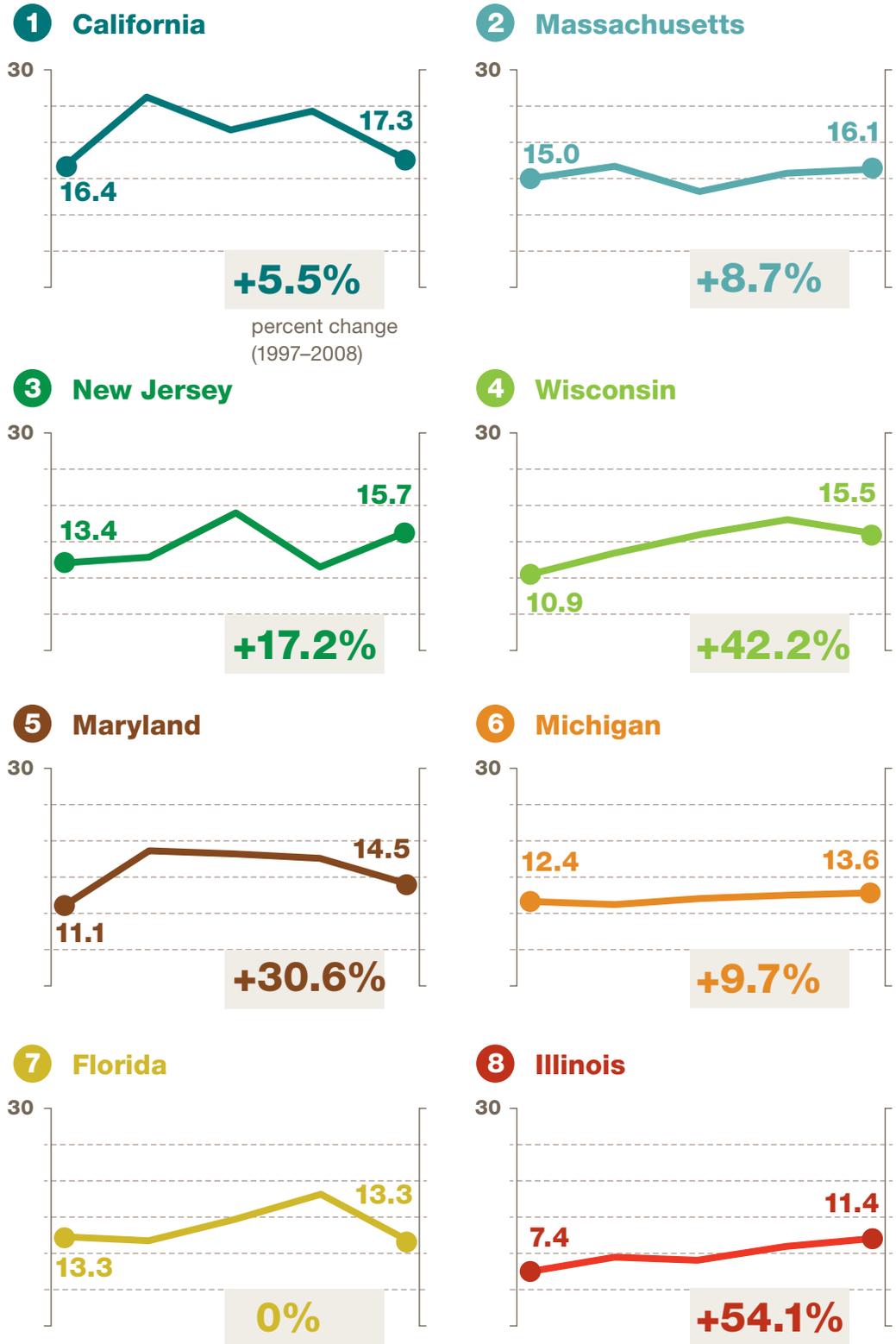
Patent output at Illinois universities

Both invention disclosures² and patents awarded to Illinois' universities have increased significantly over the past decade. The volume of invention disclosures climbed steadily from approximately 500 each year in the early 2000s to 700 per year by 2010.³ Similarly, the number of patents awarded per year to Illinois academic institutions nearly doubled, growing from 109 in 2001 to 200 in 2011.⁴

In 2008, the most recent year for which data on patents per science and engineering (S&E) doctorate holder in academia is available, Illinois' S&E academic researchers had the eighth highest patent output in the nation at 11.4 patents for every 1,000 S&E doctorate holders in academia, compared with the national average of 9.7.⁵ This represents a 54 percent jump from 1997 to 2008, the largest among the top ten states.

Tech transfer data generously provided by the **Association of University Technology Managers (AUTM)**

Academic patents per 1,000 science and engineering doctorate holders in academia, top 8 states (2008), select calendar years (1997, 2001, 2003, 2006, 2008)



Source: National Science Foundation

Technology licensing and commercialization

A university's success in producing and marketing in-demand technology can be measured by its licensing of patented technologies to companies. From 2007 to 2010, Illinois universi-

ties licensed a total of approximately 130 technologies per year compared with less than 120 per year in the early part of the decade. Illinois hit a decade-high in 2010, with 142 executed licenses and options.

Technology licenses and options, top U.S. states, 2007–2010 (fiscal years)

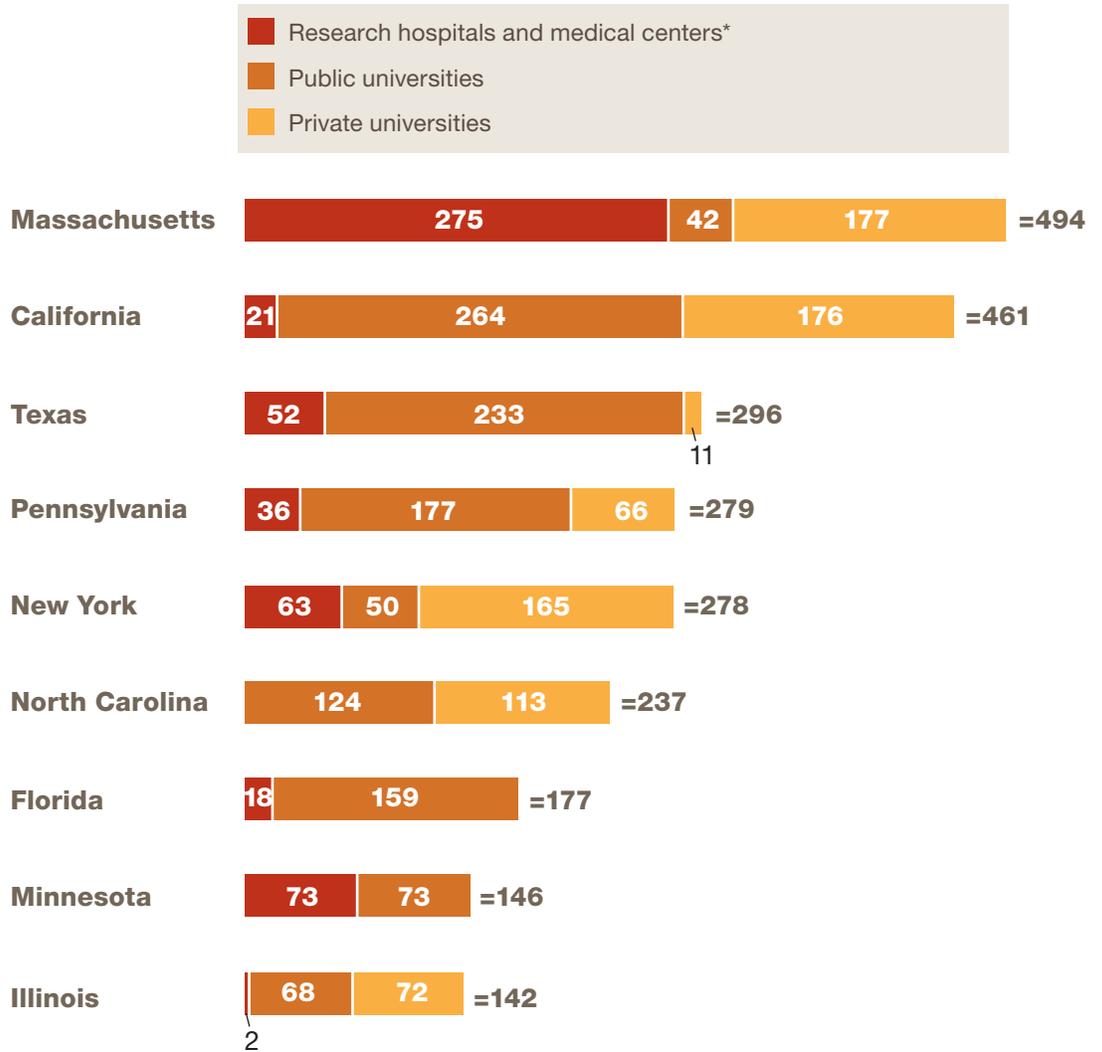
	2007	2008	2009	2010
California	432	466	417	461
Florida	133	133	162	177
Illinois	130	138	111	142
Massachusetts	527	476	528	494
Minnesota	145	128	131	146
North Carolina	299	243	290	237
New York	230	253	242	278
Pennsylvania	185	217	221	279
Texas	291	312	296	296

Source: AUTM, *U.S. Licensing Activity Survey*, and university-reported data for Illinois

In spite of the higher volume, Illinois universities and research hospitals executed relatively few licenses and options compared with other innovative states of a similar population, such as North Carolina and Pennsylvania. Licenses and options executed by performer (private and

public universities, non-university research hospitals, and medical centers) have remained relatively constant from 2007 to 2010, the most recent period for which comparative data are available. The following exhibit shows the breakdown for 2010, a representative year.

Technology licenses and options by performer, top U.S. states, 2010 (fiscal year)



* University figures include medical schools affiliated with those universities. For instance, licensing and options for Duke University include Duke's medical school.

Source: AUTM, *U.S. Licensing Activity Survey* and University reported data for this issue

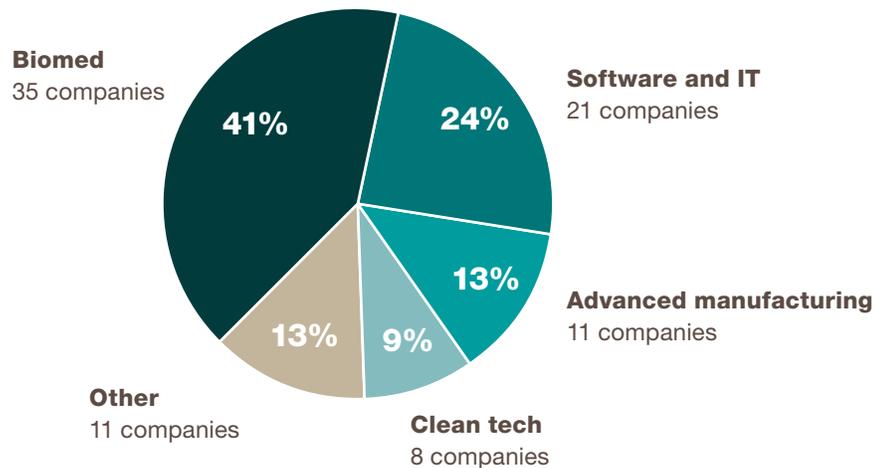
University start-ups

From 2006 to 2011, at least 122 university start-ups⁶ were founded in Illinois, with 27 established in 2011, a new record.⁷ This growth was driven primarily by increased commercialization of research over the past decade at the University of Illinois, Northwestern University, the University of Chicago, and Southern Illinois University. Of the 115 start-ups (out of 122) for which detailed information is available, 86 companies (75 percent) are still active, and 84 percent of these are based in Illinois (with concentrations in Champaign and northern Cook County).

More than 40 percent of the active start-ups are in biomedical applications, ranging from therapeutic and diagnostic methods to new drugs. The majority of federal funding for university-based research is in the biological sciences; biotechnology patents make up the majority of patents granted to universities. Large federal investments in super computing and the mathematical sciences at the University of Illinois have also led to several software and IT-based start-ups. Imaging technology, an often overlooked field with potential applications in multiple industries, accounts for eleven start-ups in our sample. In addition, seven start-ups use nanotechnology for applications in clean technology, advanced manufacturing, and biomedicine.

Industry focus of active university start-ups created from 2006 to 2011

100% = 86 active companies



Source: Companies in this sample include all active startups to emerge from Northwestern, University of Champaign–Urbana, University of Illinois Chicago, Illinois Institute of Technology, and Southern Illinois University. Due to incomplete information on operational status, sample does not include startups from University of Chicago

Maintaining momentum in tech transfer

Invention disclosures and academic patenting are at an all-time high, and more high-tech start-ups based on university research are being created in Illinois than ever before.

Progress can be sustained and further encouraged by increasing support for publicly funded universities and research hospitals, and introducing policies that promote the geographical concentration of high-tech companies. These efforts are essential to create a cluster of high-tech start-ups that will accelerate innovation, facilitate tech transfer and commercialization, and spur economic growth in Illinois.⁸ ■

¹ AUTM data vary from year to year because the number of university respondents fluctuates. However, institutions that account for the majority of technology transfer activity in each state are consistently represented in the survey for the period of time we examined.

² An invention disclosure occurs when a researcher officially announces a potential discovery to a technology transfer office (TTO) and establishes for the legal record the time of the invention's conception.

³ Association of University Technology Managers (AUTM), *U.S. Licensing Activity Survey*.

⁴ United States Patent and Trademark Office (USPTO).

⁵ National Science Foundation, *Science & Engineering Indicators*, 2012.

⁶ University start-ups are defined as companies that are established based on technologies licensed by university TTOs.

⁷ Figures come from AUTM and are supplemented by additional data reported by universities. Data on start-ups created out of the University of Chicago in 2011 were not available.

⁸ Alan Thomas, "Start-up Efficiency Benchmarking," extract from internal white paper presented at UChicagoTech. University of Chicago, 2007.

Methodology

Figures for invention disclosures, licenses and options executed, and start-ups in Illinois are primarily based on data provided by AUTM through the STATT 3.1 database. This information was supplemented by survey data on Illinois universities for which tech transfer data wasn't available for each of the years discussed in this study (2006–2010).

The Illinois Science & Technology Coalition (ISTC) surveyed tech transfer offices at Southern Illinois University, Northern Illinois University, Illinois Institute of Technology, Loyola University of Chicago, and Rush University Medical Center. To make the supplemental data comparable and consistent with AUTM data, universities were asked to provide information only for financial years and only for metrics included in AUTM's STATT 3.1 database.

Since the AUTM survey offers a more comprehensive list of research institutions for other states, we included supplemental data on all major research universities and institutions with a TTO to provide the most complete picture of tech transfer activity in Illinois.

Spotlight

Ocean Tomo



Established in 2003, Ocean Tomo, LLC, provides financial products and services related to intellectual property (IP), including expert testimony, valuation, research, ratings, investments, risk management, and transactions. Ocean Tomo assists clients—corporations, law firms, governments and institutional investors—in realizing value from their intellectual capital.

From its inception, Ocean Tomo has dedicated itself to providing a truly global platform for value and wealth creation in the intellectual property world. Most recently, the company entered into a joint Technology Transfer Service Center with the Shenzhen United Property and Share Rights Exchange (UPEX) in China.

Based in both Chicago and Shenzhen, the Technology Exchange Center supports IP-driven businesses in the United States seeking entry into the Chinese market and provides similar services to Chinese companies seeking to expand into the United States. By serving as a bridge for easier technological and entrepreneurial transfer, Ocean Tomo's alliance with UPEX facilitates the exchange of innovation across country borders and provides companies with capital and opportunities to build international businesses through IP joint ventures.

ocean-tomo.com

Spotlight

Chicago Innovation Pipeline

The screenshot shows the homepage of the Chicago Innovation Pipeline. On the left is a vertical navigation menu with categories: Pharmaceuticals, Medical Devices, Medical Imaging, Diagnostics / Biomarkers, Materials Science, Research / Drug Development Tools, Biofuels / Alternative Energy, and Health Care IT. The main content area features a large yellow graphic with a quote: "The Chicago Innovation Pipeline bridges industry and academia, enhancing biotechnology research and bringing discoveries to market." Below this is the title "The Chicago Innovation Pipeline" and the subtitle "Highlights of technologies currently available for licensing". A "Participants" section lists Argonne National Laboratory, Children's Memorial Research Center, Loyola University, and The University of Chicago. A "Spotlight" section highlights three items: "Lipotease gene used for biomedical innovation", "Argonne nanoscientists invent better imaging technique", and "New drug studied at the University of Chicago and Duke University aids poor patients with kidney disease".

The Chicago Innovation Pipeline is an interactive database of licensable technologies developed by several of Chicago's leading universities and research institutions. The pipeline offers a single, searchable portal for a broad range of technologies, from pharmaceuticals, diagnostics and medical devices to nanotechnology and biofuels. It is a tool that enables industry members to view more than 120 licensable technologies in a single database and shop for technologies of interest.

Argonne National Laboratory, Children's Memorial Research Center, Loyola University, University of Chicago and University of Illinois at Chicago premiered the Pipeline at the 2010 Biotechnology Industry Organization (BIO) International Convention in Chicago. Designed to be "industry-friendly," the pipeline groups technologies by product type, therapeutic area, and development stage. The development stage of each technology is represented graphically, allowing users to rapidly assess the potential use and status of each technology. Users can view products of interest, click on one-page summaries of the products in the pipeline, and add them into a shopping cart.

Its potential for forming productive partnerships between industry and universities represents an exciting opportunity for the Chicago area.

chicagoinnovationpipeline.org

News and events

September 2011–August 2012



September 2011

TDA II program

Local venture capital firms will soon get a boost, courtesy of the State of Illinois. Recently signed into law by Governor Pat Quinn, the Technology Development Account II (TDA II) program will build on the success of TDA I. TDA accounts provide the early-stage capital necessary to accelerate the Illinois business economy. TDA II will inject an additional \$75 million to \$150 million into the innovation ecosystem and attract millions more in follow-on funding.

October 2011

Chicago Ideas Week

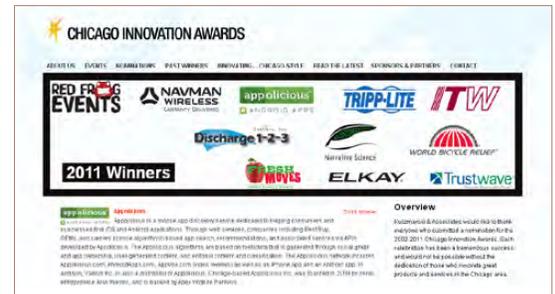
October 16 marked the end of the inaugural Chicago Ideas Week. The event brought together Chicago's thinkers and leaders in the spirit of innovation and collaboration and also included two days of TEDxMidwest and TEDxYouth. Highlights included Governor Pat Quinn's Lab at Engineered Glass Products, where he talked with EGP's leaders about the future of manufacturing in Illinois, and an international mayoral Megatalk, which featured Chicago Mayor Rahm Emanuel discussing the importance of innovation to cities.



November 2011

Chicago Innovation Awards

The 10th annual Chicago Innovation Awards, held on Tuesday, November 7, was both a showcase for new ventures and technological advances and a celebration of the culture of innovation in Chicago and Illinois. The ten winners and a "People's Choice Award," selected from more than 400 nominations, were recognized for strengthening the Illinois economy, improving standards of living, introducing cost and energy-saving efficiencies, and attracting talent to the region. An expanded Up-and Comer program, supported by venture capital firm New World Ventures, highlighted the region's vibrant start-up community, including Power2Switch (featured in the October Index).



December 2011

University of Illinois honored with 2011 Outstanding Research Park award

The Research Park at the University of Illinois at Urbana-Champaign was named the 2011 Outstanding Research Park by the Association of University Research Parks (AURP) during its annual Awards of Excellence ceremony on December 1. The AURP Awards of Excellence, now in their 16th year, recognize the achievements of research parks and industry veterans and encourage the development of best practices among research and science parks.

The Outstanding Research/Science Park Achievement Award recognizes parks that excel in bringing technology from the laboratory to economically viable business activities, thus promoting the growth of businesses, jobs, and public revenue.

The U of I's Research Park, which opened a decade ago, is now home to more than 90 companies employing more than 1,200 people. It provides internship opportunities for students, resources for faculty to commercialize new technology in conjunction with academic work, and engagement opportunities for companies that want to collaborate with the University of Illinois.



© University of Illinois at Urbana-Champaign

February 2012

1871 launched to promote innovation and support entrepreneurs

Last month, Chicago welcomed the official launch of 1871, a nonprofit community enterprise featuring a 50,000-square-foot location for startups and entrepreneurs. The organization is the culmination of an unprecedented collaborative effort of hundreds of leaders from Chicago's digital community.

From its offices on the 12th floor of the Merchandise Mart, 1871 will provide an ecosystem of supportive minds and creative thinkers for startups and individuals—designers, developers, and innovators—who set their sights on solving challenging problems. The organization's name is a nod to the year of the Great Chicago Fire and the city's brilliant engineers, architects and inventors who joined forces to rebuild Chicago.

Longtime entrepreneurial champion, venture capitalist, and current World Business Chicago board member J.B. Pritzker conceived of 1871 and committed the resources to establish the organization. His vision was to draw on all parts of the community—universities, serial entrepreneurs, civic organizations, investors, designers, corporate leaders, and beyond. In his State of the State address on February 1, Governor Pat Quinn announced that the state would invest \$2.3 million in the center.

With venture capital funding on the rise in Chicago, 1871 will be a critical asset to harness innovation in the city. The Chicagoland Entrepreneurial Center will manage 1871, which will be a vital addition to Chicago's innovation landscape. The organization is set to open in the spring and is currently taking applications.

March 2012

OECD Study Recommends Regional Cooperation to Realize Innovation Potential

On March 9, 2012, the Organisation for Economic Co-operation and Development (OECD), in tandem with the Chicagoland Chamber of Commerce, released The Chicago Tri-State Metropolitan Area, United States report, the 23rd OECD territorial review and the first of its kind in the United States.

At the report release event, OECD Secretary-General Angel Gurría noted that the region derives its economic power from a strong manufacturing base and capacity for innovation, as well as human capital that is young, ethnically diverse, and educated. The secretary-general noted, “One thing we’ve learned: what happens in the Chicago region affects the economy of the entire country.” However, the region faces several challenges—most acutely, its consistently high unemployment and a lack of dynamism to propel the economy forward.

The tri-state study classifies the Chicago region as a high-performing “Industrial Production Zone” but reveals that Chicago falls short compared with other areas it labels “Knowledge and Technology Hubs.” The region could achieve higher levels of success by increasing investment in R&D and patent activity and improving coordination among entities within the tri-state region.

April 2012

Governor Quinn Convenes Export Advisory Council

On April 3, Governor Pat Quinn convened the first meeting of the Illinois Export Advisory Council. This new organization will support the governor’s ambitious goal of doubling Illinois’ exports by the end of 2014, mirroring national targets set by President Obama. The council will provide state policy and program recommendations and advise the governor on advocacy positions on federal trade policy. The council’s efforts seek to build on Illinois’ competitive strengths in the international marketplace and the 29 percent growth in exports achieved in 2011.

The council is scheduled to meet once a quarter and will work with the Illinois departments of Commerce and Economic Opportunity (DCEO) and Agriculture (IDOA). Navistar chairman and CEO Daniel C. Ustian heads the group, which consists of 21 prominent private and public sector leaders who will serve as international ambassadors for Illinois, working with their peers in the private sector to promote exports by Illinois companies as well as attract new companies to the state.

June 2012

Reinventing City Colleges of Chicago

The shortage of qualified workers in Chicago coupled with low graduation rates at City Colleges of Chicago has spurred a reinvention of these institutions. The effort's primary goal is to ensure that students succeed and are prepared for jobs in the 21st century. To achieve this objective, City Colleges has implemented the "College to Career" program: employers inform the colleges about the positions they want to fill and the required skills and competencies. Many companies have dedicated staff to develop curriculum or teach some of the classes.

Over the course of the next five years, six of the seven city colleges will be transformed into highly specialized, industry-specific training institutions linked directly to growing industries in the Chicago region. Two colleges have already launched programs—a health academy at Malcolm X College and a transportation, distribution, and logistics program at Olive-Harvey College.

July 2012

IllinoisJobLink.com connects businesses and qualified candidates

On December 13, 2011, the Illinois Department of Employment Security (IDES) launched IllinoisJobLink.com. The website is a free resource that connects employers with job seekers. Companies can use the site to post job openings and search thousands of resumes for talented, skilled employees. Currently, more than 19,000 businesses have registered and posted 116,000 positions; individuals have uploaded approximately 72,500 resumes.

IDES employment service staff conduct regular outreach to businesses, colleges, technical schools, chambers of commerce, and economic development organizations. In addition, IDES has resources in place at the local level to assist employers in posting jobs, match qualified candidates, and set up job interviews. The IDES team also works to identify tax credits of up to \$9,600 per employee available to businesses.



illinoisinnovation.com/innovationindex

