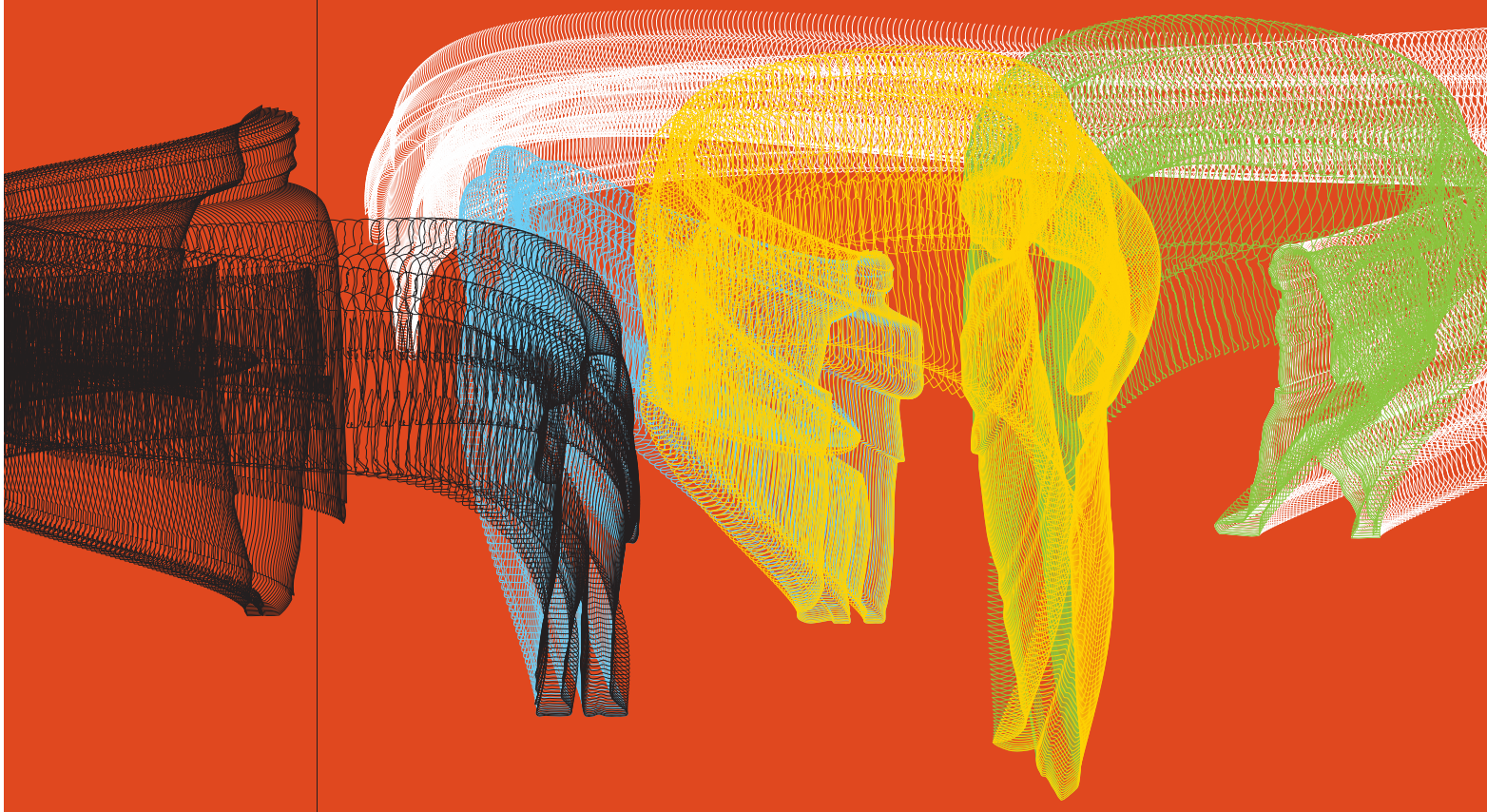
RECOMMENDATION

6 Support economic innovation



The process by which new ideas transform into new goods and services is certainly not as visible as infrastructure or the layout of a community. It is also not as well researched as the education system, nor does it necessarily demand the level of public investment.

However, economic innovation plays a major role in producing sustainable economic prosperity and enhancing the global competitiveness of places around the world. The propensity to conceive and develop new products, technologies, processes, business models, and markets results in goods and services that are faster, cheaper, and better.

Transforming new ideas into concrete, tangible realities has long been a part of the U.S. mindset. Over the last two centuries, Americans have experienced a 20-fold increase in living standards.[1] While this is due in part to increased accumulation and better allocation of capital, it is also due to the commercialization of new forms of production, products, business models, and in the creation of new markets and how they are served. These are advances clearly generated by the private sector but also supported through public policy.

While innovation is not easy to define with precision, the concept is not completely obscure either. The more tangible breakthroughs of contemporary human history — inventions like the light bulb and airplane — are examples of innovations. But the same goes for things like biotech breakthroughs, allowing more drugs to be produced easily and cheaply, or business model breakthroughs like changes in inventory systems that let manufacturers purchase and receive components just before they're needed on the assembly line. Innovations can manifest themselves in both astounding breakthroughs and more mundane, subtle shifts in process. Both of these types of outputs can generate tremendous efficiencies and increased economic vitality.

While the metropolitan Chicago region is certainly imbued with the types of assets to support innovation — world class research institutions, a diverse industry mix, and strong civic organizations and foundations — the available data indicate that the region has been underperforming relative to other metro areas, in terms of its success at commercializing technologies and other processes. For the region to remain globally competitive and a retainer of world class talent, these trends must change. As economies are fundamentally metropolitan in scale, strategies targeting clusters of regional specialization can help address the fragmentation and unfocused investment that sometimes undermines the emergence of new marketable products and technologies.

Since innovation is generated by the private sector, the role of the public sector is to find ways to help spur innovation by supporting ideas, institutions, and relationships. The public sector should be primarily focused on providing support and services that are essential to innovation, but that are unlikely to be provided by private businesses. The public sector can also play important roles in identifying and measuring innovation. Other organizations, including civic groups, foundations, and economic development agencies, can also play important roles in enhancing the regional culture around innovation.

1 Advisory Committee on Measuring Innovation in the 21st Century, "Innovation Measurement: Tracking the State of Innovation in the American Economy," report prepared for the U.S. Secretary of Commerce, January 2008.

The metropolitan Chicago area should be focused on several activities that can help industries to innovate and grow. GO TO 2040 recommends the following actions:

Improve Data and Information Systems
Better systems for collecting, tracking, and analyzing important measures should be pursued. This includes both outcome indicators of innovation, like number of businesses and jobs in key sectors, as well as the success of particular programs and financial incentives, which should make public sector investment decisions more efficient.

Nurture the Region's Industry Clusters
Organizing the region strategically around clusters of regional specialization can help target investment decisions and reduce duplication of effort. These efforts should focus on how to make the region's successful clusters grow and prosper in the 21st Century and enable the region to be proactive in terms of funding and other opportunities.

Increase the Commercialization of Research, Target Investment Decisions, and Pursue New Financing Opportunities
Increasing the commercialization of research requires better linkages among diverse groups, more awareness about what research is being done, and better training for both researchers and entrepreneurs. Leaders should also explore ways to increase the supply of venture capital to enable entrepreneurs and start-up firms to locate and thrive in this region.

Create a Culture of Innovation
To become a leader in innovation, our region needs to change attitudes to support the experimentation and creativity necessary to produce commercial innovations. Innovative success stories should be publicized to help educate the region about the value of experimentation. Furthermore, the state and local government should identify and reform regulations or ordinances which might be creating barriers to innovation.

Beyond these actions, a highly skilled workforce is vital to support economic innovation.[2]

6.1 Benefits

Innovation directly impacts major economic outcomes, like increased global competitiveness and good jobs. The outputs of innovation — goods and services that are faster, cheaper, and better — benefit consumers in a multitude of ways.

New technologies and processes can save people money and time, enhance quality of life, and improve health and life expectancy. Businesses that operationalize new ideas can achieve profitable growth and gain a competitive advantage in the marketplace. The fact that innovative businesses generate more economic growth is common sense, and well known in business[3] and academia.[4]

The regional economy can gain substantial benefits from innovation through the creation of high-paying jobs, specifically knowledge and high tech jobs. The types of institutions and firms directly involved with innovation — research laboratories, technology parks, and advanced manufacturing firms, to name a few — attract and retain the kind of human capital the region requires to remain thriving and globally competitive. The metropolitan Chicago region is already home to powerhouse universities and other research institutions. Harnessing the ideas and people involved in these institutions will be a vitally important strategy for our region to pursue. Seeing that the ideas generated in these institutions are brought to market locally should be a top priority, given the large positive economic returns that will result.

2 See the GO TO 2040 section titled "Improve Education and Workforce Development."

3 Blair Kingslad, "Thinking Big for Innovation and Growth," Industry Week, June 6, 2007.

4 F.M. Scherer, Innovation and Growth, (MIT Press, Cambridge, MA) 1986.

6.2 Current Conditions

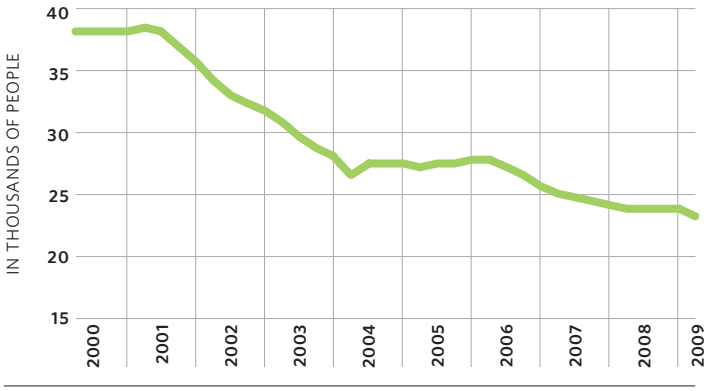
The metropolitan Chicago region has many assets, including a diversified economy with regional specializations in several key sectors, including biomedical/biotechnical, advanced materials manufacturing, and transportation/logistics, as well as emerging specialization clusters like green energy and technology.

The region is home to a number of world class universities, such as Northwestern University, the University of Chicago, and the University of Illinois at Chicago (UIC) and research laboratories like Argonne, Abbott, and Fermilab. The region has strong business and civic organizations as well as a philanthropic community with a long history of supporting diverse initiatives.

In recent years, numerous important innovations have been brought to market by our region's firms and research institutions. While examples abound, here are just a few recent notable cases. Abbott Laboratories, with its national headquarters in Lake County, produced a new drug-eluting stent that prevents previously opened arteries from closing. The Gas Technology Institute (GTI), located in Des Plaines, developed a method for enhanced heat recovery from steam generators and water heaters, a new process that can greatly increase fuel-to-steam efficiency and result in greener, more fuel efficient industrial products. Groupon, a popular website based in Chicago and now operating in markets across the U.S., has harnessed the unique concept of collective buying to promise businesses a minimum number of customers and, in turn, offer deals for consumers that aren't available elsewhere.

At the same time, both the available data, as well as interviews with practitioners in the innovation field, indicate that the region is underperforming and falling behind other places in the U.S. While new types of technologies and business models are certainly emerging locally, the available data indicate that our region is not doing as well as it should. The metropolitan Chicago region is generating fewer successful commercialized innovations from technology transfer programs, employing fewer workers in research and development (R&D) jobs (see **Figure 38**), and receiving less venture capital funding. The pace of innovation (as reflected in the number of patent applications) has stagnated. Furthermore, there is a strong sense within the business community that the Chicago region is simply not perceived as being a hotbed of innovation, in comparison to other places such as Silicon Valley, Boston's Route 128 Technology Corridor, or North Carolina's "Research Triangle."

Figure 38. Research and development employees in northeastern Illinois, 2000-2009



Source: Moody's Analytics

Clusters of Regional Specialization

Our region's industry clusters play a critical role, not only in creating quality jobs, but also in spurring innovation through research and collaboration. Clusters are interdependent firms that share common resources and technologies and depend on a similar labor pool and institutions. Industries and firms in clusters can draw a productive advantage in their close geographic proximity, which can help develop innovative products, build knowledge creation, and enhance cooperation and competition among firms. Clusters of regional specialization provide a substantial amount of the "value added" that the Chicago region brings to the economies of the Midwest, the nation, and the world. These specialization clusters include freight and logistics, advanced manufacturing, financial and related services, health and biomedical products and services, and emerging clusters like green energy and technology. An understanding of regional clusters can focus the efforts of public policy and investment decisions.

Several of these sectors are becoming increasingly more important and merit particular focus. The growing green economy sectors, including green manufacturing, have competitive advantages in the Chicago region, especially for headquarters and white collar jobs. Growth in new wind farms in or near the region has been dramatic in the last two years following the adoption of the state Renewable Portfolio Standard — one of the most aggressive in the country — and the extension of the federal production tax credit for wind power producers. The region's substantial manufacturing base supports technological advances by enabling energy entrepreneurs to interact with engineers, build prototypes when they need to, and purchase goods and services locally. An example of this is the turbine and turbine generator manufacturing industry (the Chicago region produces about four percent of U.S. sales).[5] This industry enjoys a competitive advantage by being able to purchase a much larger share of inputs and specialized labor within the region than similar businesses in neighboring states.

While industry clusters have generated a good deal of research and discussion, many disconnects remain, including a lack of coordination between researchers and entrepreneurs, and unfocused and insufficient public investment. Job training, research collaborations, and even the simple discussion of ideas are subject to "market failure" problems — individual firms cannot capture all the benefits of job training, and understandably, private companies often do not encourage potentially mutually beneficial discussion of ideas because they are concerned that their ideas may be taken by their competitors. Since this is a tendency that cuts across all businesses and sectors, there is a very real economic justification for public sector involvement as well as other collaborative efforts to develop and nurture industry clusters. The region's economic development community may find that "rallying behind" the region's clusters can maximize the effectiveness of different strategies and initiatives, and also get the region organized to respond to funding opportunities, particularly on the federal level.

5 "Turbine and Turbine Generators Industry," 2007 Illinois, Iowa, Indiana, Wisconsin and U.S. Industry Input-Out Model compiled by IMPLAN, based on data collected by the U.S. Census Bureau, Bureau of Economic Analysis and the Bureau of Labor Statistics.

Research Institutions and Technology Transfer

Numerous studies have found that the most essential ingredient for innovation and economic growth is human capital and the production of knowledge.[6] By that standard, the metropolitan Chicago region should be doing very well, given the world class research institutions in the area. These places are obviously important for the research they bring to bear, which is often of both scientific and commercial interest. However, this research needs to be transferred to something tangible of commercial value for it to be profitable in the marketplace. "Technology transfer" encapsulates the process, usually accomplished between entrepreneurs and research institutions, of commercializing theoretical innovations into new goods and services. Universities, other research institutions, and private firms often have technology transfer staff dedicated to this process. However, technology transfer does not happen easily or automatically — it requires coherent information sharing and coordination across different institutions and people.

Despite the number and quality of research institutions in the region, local technology transfer program performance lags other metropolitan areas. Available data indicates that the rate of success in the Chicago region is relatively low, given the stature of the universities. Technology transfer can be measured by a number of metrics, including license income due to patents, number of active licenses, R&D expenditures at universities, and number of start-up firms generated through the process. Northwestern University ranks fourth nationally in license income ($85.3 million in 2007), though much of this income comes from a single drug, Lyrica. The number of active licenses generated by Northwestern (173), University of Chicago (192), and the University of Illinois (399), is much less than places like the University of Washington (1040), University of Minnesota (756), or the University of California system (1819).[7]

While the region can pride itself on a number of technology transfer success stories across diverse areas like life and medical sciences, nanotechnology, engineering, and clean technologies, a number of challenges persist. Early efforts by scientists and engineers to raise working capital for developing and marketing ideas are often counterproductive. Researchers often present overly technical ideas that may confuse or fail to interest prospective funders. Some of the region's research institutions are sometimes seen as aloof and overly focused on theory rather than practicality. At the same time, research leaders have remarked that public investments in technology infrastructure and facilities have been unfocused and scattershot, and more recently, lacking altogether.[8]

6 See W. Baumol, R. Litan, and C. Schramm, Good Capitalism, Bad Capitalism (New Haven: Yale University Press) 2007; P. Blumenthal, H. Wolman, and E. Hill, "Understanding the Economic Performance of Metropolitan Areas in the United States," Urban Studies, Vol. 46 (2009): 605-627.

7 Association of University Technology Managers (AUTM), annual surveys.

8 These views are based on interviews with officials from the Illinois Institute of Technology (IIT) and Samuel Pruitt, President of the Chicago Technology Park (CTP) in the Illinois Medical District at the University of Illinois at Chicago.

Patents and Venture Capital

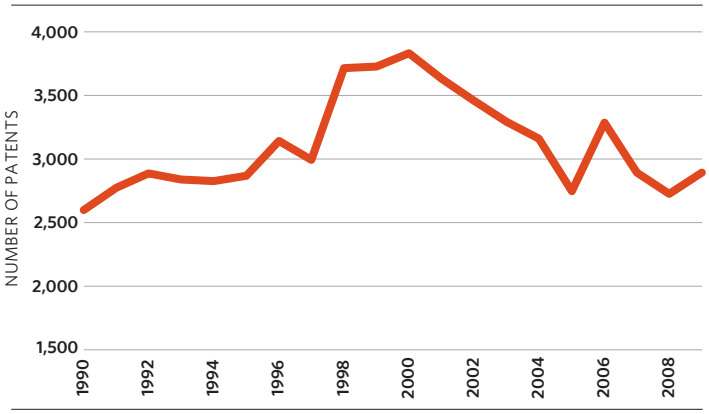
Firms which can develop and get patents for new products have more competitive advantages and can pay higher wages. Metropolitan areas imbued with high tech and R&D jobs, labs, and corporate facilities — places like the San Francisco Bay Area, Boston, and Austin — usually generate the highest numbers of patents. From 1990 to 2001, Illinois and the Chicago region typically experienced annual yearly increases in the number of total patents granted (see **Figure 39**). However, since that time these numbers have shown steady declines. This is in contrast to some other metropolitan areas, such as Boston, which had historically trailed the Chicago region, but now eclipse it in terms of annual patents issued.[9]

Once ideas have been created, and patents filed, funding for commercialization is crucial. The availability of venture capital is an important factor that can incent or limit the amount of innovation-to-market success. Venture capital is the seed money that helps move a small business with a solid marketing plan into a stage where production can advance to actual marketing, and products can be produced. Not all companies need venture capital, but access to venture capital speeds the development of companies and enables them to enter new markets with strength and the backing of resources to help ensure success. There are more than 80 venture capital firms with offices in the metropolitan Chicago region. One major example is the ARCH Development Corporation and its affiliate, ARCH Venture Partners, which work on commercialization with Argonne National Laboratory and focus on seed and early stage investing.

During the period 2000-2009, venture capital funding to the Chicago area fell dramatically, from $2.4 billion to $175 million (see **Figure 40**). This mirrors a national trend post the "dot-com boom," and venture capital has fallen in other places as well, though the declines have often been less dramatic — for example, the Boston area received over $9.6 billion in 2000, but only $1.6 billion in 2009.[10] Although the Chicago region is rich in resources, industry, and intellectual firepower, the majority of venture capital funding that enables production and marketing remains directed toward the coasts. Venture capital funding in Illinois represents only 1.7 percent of the total for the nation, relative to places like Massachusetts (12 percent) and New York (over four percent). Pennsylvania and Minnesota both outpace Illinois as well.[11]

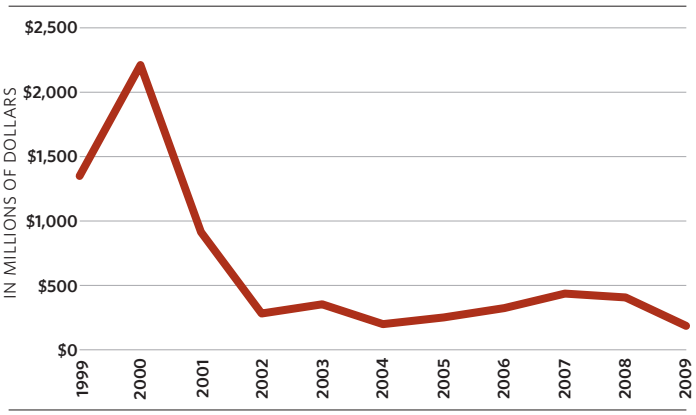
Low and reduced levels of venture capital funding is a trend not just in metropolitan Chicago, but across the Great Lakes states, which are not keeping pace with venture capital powerhouses like California and Massachusetts. Some of the challenges to venture capital in our region and across the Great Lakes include inadequate local deal flow (caused in part by a failure to commercialize research ideas), higher costs for early stage investors, and quite simply, venture capital funds that remain too small. There is some evidence that early-stage companies often choose to relocate to the coasts as a necessary condition of receiving funding.[12]

Figure 39. Total patents granted in Illinois, 1990-2009



Source: U.S. Patent and Trademark Office, Calendar Year Patent Statistics.

Figure 40. Venture capital funding in northeastern Illinois, 1999-2009



Source: PricewaterhouseCooper/Thomson Reuters/National Venture Capital Association MoneyTree Survey

9 U.S. Patent and Trademark Office, Calendar Year Patent Statistics. See **http://tinyurl.com/2vszo8l**.

10 2010 PricewaterhouseCooper/Thomson Reuters/National Venture Capital Association MoneyTree Survey.

11 Frank E. Samuel Jr., "Turning Up the Heat: How Venture Capital Can Help Fuel the Economic Transformation of the Great Lakes Region," Brookings Institution, January 2010.

12 Frank E. Samuel Jr., "Turning Up the Heat: How Venture Capital Can Help Fuel the Economic Transformation of the Great Lakes Region," Brookings Institution, January 2010.

Government and Nongovernment Institutions Involved with Innovation

Beyond the private sector and universities, numerous other organizations and groups work to encourage and fuel innovation by providing an array of financial resources, technical assistance, and support networks. Many programs and financial resources are offered through public-private partnerships (PPPs) and some operate in the region but are part of a larger national or international network. Some programs target specific industries and others target specific types of firms like start-up companies. The variety of programs is significant; the following provides a brief overview of the key agencies and programs that facilitate business development and innovation in the Chicago region.

The Illinois Department of Commerce and Economic Opportunity (DCEO) is the state agency that is most directly involved with programs that relate to innovation. DCEO administers a variety of programs that provide access to capital through loans, grants, and tax incentives. DCEO oversees nine loan programs, six grant programs, and seven tax incentive programs for businesses and financial institutions to promote economic development, job creation, and innovation. Each program targets different markets and utilizes different delivery mechanisms. For example, some programs focus on modernizing equipment while other resources are directed towards upgrading employee skills. The Illinois Department of Employment Security (IDES) complements these efforts. IDES collects and disseminates data on unemployment by sector in the region, serving as an information clearinghouse for workers to help them find information about benefits, jobs, and training.

In addition to the state, many municipal and county governments operate financial assistance programs to support business development and innovation within their own jurisdictions. The City of Chicago offers one of the only publically administered financial assistance programs that targets a specific innovation industry, the Laboratory Facilities Fund. This program expends tax increment financing (TIF) capital to pay for up to 25 percent of eligible lab construction costs, targeted towards companies involved in technology.

In addition to financial assistance, the state and many local governments provide other services to businesses to support their success. DCEO's Illinois Entrepreneurship Network (IEN) offers entrepreneurship centers geared towards different types of businesses. These centers are operated by business development organizations and education institution partners, and a variety of services are offered, including business plan development and access to capital, technology, and networks. Two nongovernmental agencies that operate Entrepreneurship Centers in the Chicago region include the Chicago Entrepreneurial Center, an affiliate of the Chicagoland Chamber of Commerce, and the iBIO Entrepreneurship Center, which operates within the iBIO organization and focuses specifically on biotechnology companies. Another key IEN center in the region is the Chicago Manufacturing Center. Previously, DCEO also provided the Illinois Technology Enterprise Centers (ITEC) program, which helped innovators and small businesses with critical business startup and marketing needs, and served to create new connections between academia, business, and budding entrepreneurs.

Beyond state funded programs, other resources support institutions and agencies that provide focus on promoting innovation and economic development. The Chicagoland Chamber houses the InnovateNow initiative, which brings together businesses, schools, and government to promote the relationships needed for economic prosperity and innovation. The Chicagoland Chamber also facilitated the development of an alliance of several key Chicago innovators to position Illinois to be a leader in the clean technology industry. Known as the Illinois Clean Energy Trust, this group includes leaders in business, government, education, research, and finance. World Business Chicago (WBC) is another regional agency with a focus on attracting businesses and promoting business expansion. The Metropolitan Economic Growth Alliance (MEGA) is an emerging coalition of county economic development agencies and other members with the mission to support effective business development.

6.3 Indicators and Targets

Despite the popular consensus that innovation drives economic growth and prosperity, measuring success in innovation remains elusive. Little consensus exists on the right performance measures, or how best to weigh them.

Innovation indicators often include elements such as number of high tech jobs, degrees granted in science and engineering, number of patents, research and development funding, venture capital funding, or license income (or number of licenses) resulting from technology transfer programs. None of these measures, in isolation, work well to measure progress. For example, high license income resulting from technology transfer programs often reflects only one active license, which does not serve to measure overall success. On the other hand, technology transfer programs which are evaluated based on quantity of patents may be incentivized to encourage innovators to present one idea over several patents, instead of producing a single idea and proceeding to market it.

While problems persist in the data, tracking certain indicators is still important. The longer term goal should be improving collection and analysis of the measures. The most optimal outcome will likely be combining a number of different measures to create an "innovation index" that can be tracked over time. Recently, some groups, including a national Advisory Committee on Measuring Innovation in the 21st Century, have issued reports offering frameworks for how to measure innovation.[13]

GO TO 2040 will track the following indicators related to innovation, with the recommendation that better data collection and analysis on these measures be pursued.

Employment in Research and Development

Employment in "R&D" comprises jobs in high-tech knowledge economy jobs. These are typically good, high-paying jobs that attract and retain talented workers. Since the year 2000, R&D jobs have been on the decline in the Chicago region. On the whole, implementation of GO TO 2040 should increase the number of these knowledge workers, which should improve the overall regional economy.

Venture Capital Funding

Venture capital funding peaked in the year 2000, fell dramatically by 2002, and has remained relatively the same since then. On the whole, the implementation areas listed in this section should increase the amount of venture capital to a level more consistent with other metropolitan areas, like Boston.

13 Advisory Committee on Measuring Innovation in the 21st Century Economy ,"Innovation Measurement: Tracking the State of Innovation in the American Economy," a report to the Secretary of Commerce, January 2008.

6.4 Recommendations

It will require serious action to increase economic innovation to keep the metropolitan Chicago region thriving and globally competitive.

The data indicate that the region is underperforming across a variety of innovation measures, and that the region is falling behind compared to other U.S. metropolitan areas. Relative to other regions, there are fewer successful commercialized innovations coming out of technology transfer programs, there is less venture capital available, and the pace of innovation (as reflected in the number of patent applications) appears to have stagnated. The plan's innovation recommendations seek to address these deficiencies and capitalize on new opportunities.

The goal of the innovation recommendations are to improve government policies, measurement and tracking, regional coordination, and services that can enhance innovation and support our regional industry specializations. Progress toward these goals will increase economic prosperity and provide more jobs in the region. Research, collaboration, and policy implementation are major elements of these recommendations. Emerging funding opportunities, particularly from the federal government, will require regions to be highly organized to be competitive. These recommendations can help position the region to be more competitive for public and private funding over the long term.

It should be stressed that the primary driver of the region's future economic prosperity is the quality of the labor force. Though innovation requires a supportive environment, at its heart it is created by people with ideas — in most cases, these people are educated, well-trained, and experienced. Improving the region's workforce is critical to both meeting current hiring needs as well as showing businesses within and outside of the region that Chicago has a high quality labor pool ready to help the region grow. GO TO 2040 includes a separate chapter with recommendations on these issues.

Improve Data and Information Systems

Improving data and information systems relative to innovation should be a top priority for the region and the State of Illinois. Innovation remains a rather elusive concept for many policymakers to grasp. Better systems for collecting, tracking, and analyzing important measures, including the success of particular programs and financial incentives, will make public sector investment decisions more efficient. Particularly desirable metrics include the number of new business openings, movements, closures, and jobs created within specific, innovation-intensive sectors (a similar measure was developed by San Diego's CONNECT program).[14] These measures could help assess the region's ability to commercialize innovative ideas into the outcomes that truly matter for the region: new businesses and good jobs.

Improved measurements of the success of technology transfer and commercialization are also necessary. The problem with judging success on the basis of the number of licenses is that one idea can be developed into multiple licenses, while the energy spent on meeting the standard for reward might be better spent on developing commercial applications of the idea. A sector-specific analysis of the problem, oriented to improving innovation in the Chicago region, may be able to produce a better evaluation framework that could improve the region's technology transfer programs.

Some measures of innovation are specific to particular sectors. Tracking this data can inform the public and private sector about particular economic trends. Advances in environmentally sustainable/green practices are a good example. Energy consumption and source by sector, the number of energy efficient homes, and greenhouse gas emissions by sector and county are all outcomes that show evidence of regional innovations in energy. There is an effort underway at the federal level to measure this part of the economy. The U.S. Bureau of Labor Statistics is in the process of formulating measures for green economic activity and green jobs. These data, once defined, should be useful for tracking the progress of the region's companies to adopt green technologies and business practices and for charting the development of the growing green technology and energy cluster.

14 For more information on San Diego's CONNECT program, see **http://www.connect.org/**.

Nurture the Region's Industry Clusters

Chicago's regional specializations should be supported to better enable them to compete nationally and internationally. Since each industry faces unique challenges, opportunities for innovation will vary by sector. Using a sector or cluster-based approach to innovation will help identify shared research, collaboration, and implementation needs. An implementation strategy that focuses on specific strategic industries will help build our regional specializations and support long term job growth and regional prosperity. Some examples of clusters of particular importance are freight/logistics, advanced manufacturing, and biomed/biotech. The developing cluster of green energy/technology businesses and institutions is also likely to be fundamental to long term economic growth. Additional sectors should also be targeted to identify specific actions for implementation.

Organizing the region strategically around clusters can help target investment decisions (such as training and infrastructure) and reduce duplication of effort. While the region does not necessarily require a single overall "innovation leader," the presence of a lead organization or group for each cluster will help coordinate efforts, act as a clearinghouse for information, and form coalitions to apply for and receive external funding. The Illinois Clean Energy Trust, established by several key area investors and facilitated by the Chicagoland Chamber of Commerce, is an example of this type of coordination. This group aims to accelerate the development and increase the number of clean tech jobs and companies in the region. This type of leadership should be supported and it can potentially serve as a model for other efforts around industry clusters. It should be stressed that these types of efforts should not revolve around "picking winners" or specific firms to attract. Rather, the efforts should focus on how to make the region's successful clusters grow and prosper in the 21st Century and enable the region to be proactive in terms of funding and other opportunities.

Lastly, environmentally responsible and sustainable business practices and industrial operations, and the "green jobs" that result — will be an integral part of successful business in the future. These are areas where innovations are occurring rapidly and where new solutions are very marketable. Solutions may include highly visible efforts like building wind turbines, or they may mean continuing business as usual but with more environmentally sensitive production processes. Changing to meet green business practice standards may be difficult; providing training information on how to make these changes may be an important role for the public sector and other organizations. It will be very important to publicize the practices of different green innovations across industries to give credit to early adopters and to provide ideas about how to become green for other businesses in the region.

Enhance the Commercialization of Research, Target Investment Decisions and Pursue New Funding Opportunities

Private sector industries must be more closely linked with the region's researchers to draw ideas from them for implementation. The transfer of ideas will provide a valuable testing ground for research, and commercialize ideas into tangible products that can be brought to market. Coordination has sometimes proven difficult among researchers and entrepreneurs, as well as among other groups in the region with an interest in innovation. Multiple programs and resources are offered by both the public sector and nongovernmental groups. In many cases, these resources are not known to a wide swath of the business community and often the programs may be duplicative.

Increasing the commercialization of research requires better linkages among diverse groups, more awareness about what research is being done, better training for both researchers and entrepreneurs, and more targeted public sector investment. At this time, there is no one entity specifically positioned to lead these efforts, though many different entities currently have involvement. Organizations like DCEO, Innovate Now, the Illinois Technology Development Alliance, the Illinois Science and Technology Coalition, and the Illinois Clean Energy Trust should facilitate dialogue and information exchange within and across private industries, universities and other research institutions (including the region's federal laboratories), entrepreneurial programs, and producers and consumers.

Creating new connections among academia, business, and budding entrepreneurs is vital. State programs like IEN and the formerly funded ITEC program have effectively served technology-based entrepreneurs, innovators, and small businesses by assisting them with critical business startup and marketing needs. The ITEC program has been particularly mentioned by some practitioners as being an effective vehicle for assisting entrepreneurs to locate pre-seed and early stage financing, furthering technical or managerial skills, and assisting with new product development and marketing, thus nurturing new venture development in Illinois. Under this program, universities donated faculty time to review technology commercialization plans for start-up firms in a competitive setting. While the costs for this program were quite modest, state funding for this program has unfortunately been cut — while eight ITEC centers existed in 2002, none remain today. The effectiveness of present and past programs like IEN and ITEC should be evaluated, and the state should increase funding for those that have produced positive outcomes.

In an era of constrained state finances, Chicago area businesses, governments, and other organizations must work together to insure that some key innovative businesses survive and move toward expansion.

While Chicago has several venture capital firms, the amount of venture capital funding in the region is relatively low. Collaborative work by businesses, civic organizations, philanthropic groups, and government can seek private and public monies to make some kind of development funding available to the Chicago region. A new major venture capital fund, focused on the metropolitan Chicago region but possibly designed to extend to other regions and states in the Great Lakes region, should be explored. The fund should be targeted toward particular industry clusters. A particular focus on green technology may be a wise focus for this fund.

The Illinois Innovation Accelerator Fund (I2A) may be a good model. I2A is a public-private partnership that has raised several million dollars and makes early investments in well managed companies that have developed a value plan based on recent innovations. I2A makes investments in local companies and in companies willing to relocate to Illinois.

Federal funding opportunities on the horizon increasingly encourage more regional collaboration across business, government, and nonprofits. Federal funding has historically been of great importance in promoting and enabling new science and technology in laboratories, research facilities, and factories across the U.S. Reauthorization of the federal America COMPETES Act (Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science), which invests in science and innovation, is likely to include the establishment of a competitive regional industry cluster grant program that would make available competitive grants and information to stimulate the collaborative interactions of firms and other institutions to produce more commercial innovations and higher paying jobs.[15] Planning activities, including technical assistance and data analysis, are likely to be a major component of this. Given the Chicago region's current room for improvement across a variety of innovation metrics, the region can be competitive for these types of dollars, but it will need to organize its efforts.

On the state side, until June 2008, the State of Illinois provided funding through the Illinois Innovation Challenge Grant, matching grants to recipients of two federal grant programs — the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR). These were relatively small grants, with a corresponding small program cost: approximately $1 million per year for the entire program for the entire state. These grants, however, had an important impact. For example, a two-person Chicago-based firm specializing in radar imaging applications received this grant in 2008. This firm survived and now has 10 employees. Both Indiana and Wisconsin continue to offer similar matching grants. The experience of the Illinois Innovation Challenge Grant should be analyzed and a new, similar program should be instituted in its place.

Other financing strategies should also be addressed. Challenges faced by small businesses should be identified along with new models to support entrepreneurship. For example, micro-loan programs, social entrepreneurship programs, and tax incentives that are most likely to support innovation should be enhanced. It will be important to identify opportunities, gaps, and redundancies in existing state and local programs that seek to assist these sectors.

15 A five-year reauthorization of the America COMPETES Act passed the U.S. House of Representatives in May 2010.

Develop a "Culture of Innovation"

The Chicago region has some of the world's best research institutions, human capital, preeminent foundations, and capable industry which should make the region a hotbed of innovation and economic development. While a host of factors are involved, there is some evidence that few businesses, within or outside the region, envision this region as a powerful engine of growth. To become a leader in innovation, our region needs to change attitudes to support the experimentation and creativity necessary to produce commercial innovations. Furthermore, all levels of government should ensure that their regulatory environments are not creating undue barriers to innovation.

Innovation, by its nature, involves risk-taking and, frequently, failure. These are characteristics that many people do not believe are supported by the culture of the Chicago region.

The cultures that are present in highly innovative parts of the country, and in highly innovative industries in the Chicago region, should be explored to see if any lessons can be applied in other, more risk-averse sectors. Many of the region's innovators have been successful despite initial setbacks; these people should be consulted to learn what barriers they faced and how they overcame them, and their stories should be publicized to help educate the region about the value of experimentation and resiliency following initial setbacks.

There are several existing programs at all educational levels that promote innovative thinking, provided by both civic and academic organizations. Educational programs and competitions that encourage innovation among students should be expanded upon and linked to foster greater dissemination of knowledge and expose more thinkers to each other. Students must learn that often mistakes are valuable learning experiences; the increasingly popular business motto of "Fail Fast and Learn" emphasizes this mentality. Existing innovation competitions, such as the Chicago Innovation Awards, should be continued and expanded to encourage budding entrepreneurs to experiment and provide them with practical experience in how to present their ideas and innovations to external audiences.

There may be a large role for the philanthropic community to play in creating a better culture for innovation. The region's foundations are a strong asset and to date have funded extensive efforts in education, arts and culture, and human services. Focusing more on the regional economy and innovation makes sense on many levels for foundations, as these are truly the catalytic investments which can help the region sustain a high level of prosperity and vitality. Foundations might start their entrée into innovation through an initial group of forums which showcase the region's innovative success stories and create linkages among divergent groups involved in the various fields. Foundations can also strive to support those groups working to organize regional initiatives and policy around a "cluster approach."

Lastly, government can play a role in ensuring that outdated regulations do not create barriers to innovation. Regulations and development ordinances tend to be oriented toward the technological standards in existence when they were promulgated or amended, and there are few avenues for regulations and ordinances to be updated as technology advances. For example, many municipal ordinances regulating the construction and placement of household green energy improvements such as solar panels, small-scale windmills, and energy efficiency retrofitting are based upon 1970s era technologies. This limits what can be developed and deployed and opportunities to harness renewable energy may be precluded because past technologies used for this purpose created problems for their neighbors. By modernizing the technical standards in development regulations, opportunities for local businesses to innovate and capitalize on green energy demands will be created, making local businesses stronger and the region greener.

6.5 Implementation Action Areas

The following tables are a guide to specific actions that need to be taken to implement GO TO 2040. The plan focuses on four implementation areas for supporting economic innovation:

Improve Data and Information Systems

Nurture the Region's Industry Clusters

Increase the Commercialization of Research, Target Investment Decisions, and Pursue New Financing Opportunities

Create a Culture of Innovation

Implementation Action Area #1: Improve Data and Information Systems

Evaluate the success of state innovation programs and financial incentives LEAD IMPLEMENTERS: State (DCEO, and other relevant state agencies)	The history and impacts of state programs and incentives for innovation should be evaluated. Such an evaluation can inform the re-creation of certain programs, like ITEC and Innovation Challenge grants, which have experienced funding cuts in recent years. The state should also evaluate current programs, like IEN as well as the range of other financial incentives and services offered to entrepreneurs and businesses. There is good evidence that many of these state programs have been quite successful — these successes need to be better documented and publicized to inform future state legislation.
Collect data relative to innovative business starts and closures in the region LEAD IMPLEMENTERS: CMAP, WBC, InnovateNow, IDES	Currently there is no solid information about how innovations translate into larger economic effects, such as jobs and business starts. CMAP should measure the number of new innovation start-up firms and jobs created (a similar measurement was developed by San Diego's CONNECT program). This is the best way to track the growth in new firms, as well as their longevity. This information should also have useful research consequences beyond the study of innovation.
Collect and analyze other pertinent data related to innovation outcomes LEAD IMPLEMENTERS: CMAP, WBC, InnovateNow, CMRC, IDES, additional outside experts	CMAP can serve a vital role as a central repository for the collection of data related to innovation. CMAP should also consider how to best measure success through this data — other groups have created weighted measures of a variety of variables — an "innovation index" — which can work to measure future success.
Research and redesign technology transfer evaluation criteria LEAD IMPLEMENTERS: State (DCEO), technology transfer programs at universities and other institutions	There is some evidence that innovators are changing their products to be responsive to the criteria by which technology transfer programs are judged. This is likely inefficient. Alternative metrics that better reward commercialization of new innovations should be explored. Applied research should be carried out by interviewing tech transfer officials and researching other evaluation metrics.

Implementation Action Area #2: Nurture the Region's Industry Clusters

Form coalitions around the region's vital industry clusters to organize regional strategies and obtain public and/or private funding LEAD IMPLEMENTERS: State (DCEO), CMAP, local governments, nonprofits (Chicagoland Chamber, CMC, MEGA, WBC), Chicago Fed, workforce boards, philanthropic, private sector	The region should use its various clusters of regional specialization as an overarching organizing framework for future coordination, collaboration, and proactive initiatives, including organizing around potential funding opportunities such as the reauthorization of America COMPETES, which should include funding for a Regional Innovation Clusters Initiative. Build public/private coalitions to attract funding and involve research labs and universities as appropriate. The Clean Energy Trust, hosted by the Chicagoland Chamber, is a recent initiative that may be a model for such future activity.
Perform a "drill down" analysis into specific established industry clusters, including freight/logistics, advanced manufacturing, and biotech/biomed, as well as emerging clusters such as green technology and energy LEAD IMPLEMENTERS: CMAP, Chicago Fed, regional leaders or coalitions around industry clusters	Industry clusters have been researched extensively, but many gaps, practical linkages and pertinent policy responses remain poorly understood. CMAP should direct research toward "drilling down" into specific industry clusters and groups of interrelated firms in the fields of freight/logistics, energy and advanced manufacturing, and biotech/biomed, for starters. Analyses will present data specific to these clusters, identify infrastructure, workforce and financing needs, present strategies for coordination and communication, and make policy recommendations.

Implementation Action Area #3: Increase the Commercialization of Research, Target Investment Decisions, and Pursue New Financing Opportunities

Bolster or reinstitute successful state programs which assist entrepreneurs and create linkages between researchers and the private sector LEAD IMPLEMENTERS: State (General Assembly, DCEO)	State elected officials should bolster or reinstitute state programs with a track record of success in assisting entrepreneurs with critical business startup and marketing needs, locating pre-seed and early stage financing, furthering technical or managerial skills, and assisting with new product development and marketing. IEN is one current program along these lines. In addition, the ITEC programs previously awarded funding that could be used to put together documentation for venture capital or "angel" investors, apply for federal SBIR money, apply for a patent, or put together a business plan. ITEC is currently unfunded by the state.
Re-institute the Illinois Innovation Challenge Matching Grant program LEAD IMPLEMENTERS: State (General Assembly, DCEO)	Some version of the Innovation Challenge Matching Grant program should be reinstated to provide matching funding for federal SBIR and STTR recipients. SBIR and STTR are federal programs funding small businesses working with universities.
Explore the creation of a major new venture capital fund, at the regional or mega-regional level LEAD IMPLEMENTERS: State (Governor's office, DCEO), the business community, the Federal Reserve Bank of Chicago, nonprofits, I2A fund, philanthropic	A new venture capital fund should be created to help investors and entrepreneurs create and grow profitable businesses in the metropolitan Chicago region and potentially beyond. The fund should be managed and operated by a private firm, but exploration should be done first by government, civic organizations, foundations, and the private sector. The fund should be targeted toward clusters of regional specialization. A range of private and public revenue sources should contribute to such a fund, and philanthropic organizations can play a large role.
Create a more robust national innovation policy LEAD IMPLEMENTERS: Federal (Congress)	Provide more incentives for public/private collaboration around innovation. Provide federal funds that can be leveraged with private resources. Provide competitive funding for regional approaches around specific industry clusters. Many of these types of approaches are being discussed as part of the upcoming reauthorization of America COMPETES, a federal technology, research and education act.

Implementation Action Area #4: Create a Culture of Innovation

Research, compile, and publicize examples of successful innovation LEAD IMPLEMENTERS: State (DCEO), nonprofits (Chicagoland Chamber, CMC, MEGA, WBC) philanthropic, private sector, universities	Innovation success stories should be collected and publicized. Commonalities of these experiences should be emphasized, and the role of experimentation and perseverance must be taught so that workers, entrepreneurs, and sources of funding see experimentation as an important stepping stone to innovation and growth.
Expand and link innovation related training LEAD IMPLEMENTERS: Nonprofit (Chicagoland Chamber, MEGA, WBC), universities	There are multiple conferences and educational programs that support innovative thinking in the region. These programs should be expanded to reach wider audiences. Educational programs, conferences, and innovation competitions should also be linked so that budding innovators can interact across fields and disciplines to share experiences and foster further innovative thinking.
Reorient philanthropic giving toward innovation LEAD IMPLEMENTERS: Philanthropic	The region's foundations are a strong asset and to date have funded extensive efforts in education, arts and culture, and human services. Focusing more on the regional economy and innovation makes sense on many levels for foundations, as these are truly the catalytic investments which can help the region sustain a high level of prosperity and vitality. Foundations can work to support those groups working to organize regional initiatives and policy around a "cluster approach."
Identify opportunities for state and local regulatory reform and modernize local ordinances LEAD IMPLEMENTERS: State (DCEO), municipalities, nonprofits (Chicagoland Chamber, MEGA, WBC), the business community	Review and implement reforms in existing state and local regulations, especially in areas of rapidly changing technology and changes in federal regulation. Convene innovative companies to learn about potentially limiting local regulations or ordinances. Provide model ordinances that contain language about up-to-date regulation and how to keep it updated. Review validation, information sharing, and technical assistance programs for new technology development and implementation. Recommend updates as appropriate.

6.6 Costs and Financing

The costs of the innovation recommendations to the public sector should be modest. The recommendations in this section were designed to minimize costs and to make the best possible use of existing, available resources.

Any gains made, such as businesses remaining in business through the recession, or even expanding, will be substantial, especially in comparison with the modest costs of the programs. The small-scale training and funding programs recommended are the most easily identifiable costs. When the recommended programs (ITEC and the Illinois Competitive Matching Grant) were in place in the past, they were funded at a combined level of $3 million per year, for the entire state. Other initiatives and incentives can be specifically retargeted.

Other efforts, such as the proposed venture capital fund, would require significant financing. A recent report estimated that a new Great Lakes region venture capital fund would likely require in the range of $1 billion to $2 billion in financing.[16] A regional effort could be much smaller than this, though financing needs would still be significant. Public and private sources, as well as philanthropic giving, would likely play a role.

16 Frank E. Samuel Jr., "Turning Up the Heat: How Venture Capital Can Help Fuel the Economic Transformation of the Great Lakes Region," Brookings Institution, January 2010.