A WORD ABOUT THIS REPORT

Dear reader:

The right people ... the right investment ... the right policies ... and the right technologies.

Those are the main ingredients for a healthy tech-based economy in Wisconsin, a state that is emerging as a leader in cutting-edge research, innovative business models and entrepreneurial excellence.

Building Wisconsin's tech-based economy is core to the mission of the Wisconsin Technology Council, which serves as the independent, non-profit and non-partisan science and technology adviser to the Governor and the Legislature. Incorporated in 2001, the Tech Council has embraced its duty to inform policymakers about trends in tech development – and to make that information available in forms that may be easily accessed by the public, press and the R&D community.

In 2002, the Tech Council first published "Vision 2020: A Model Wisconsin Economy," a document that has served as a foundation for a number of programs and publications. They include:

• The Wisconsin Angel Network, which was created in 2005 to help connect angel networks and investors with entrepreneurs.
• The Wisconsin Innovation Network, which serves entrepreneurs in six regions statewide.
• The Wisconsin Governor's Business Plan Contest, which helps entrepreneurs write their business plans and jumpstart their businesses.
• The Wisconsin Entrepreneurs' Conference and the Wisconsin Early Stage Symposium, which provide hands-on learning for entrepreneurs.
• The "Economic Value of Academic Research and Development in Wisconsin," a report that has catalogued R&D activities and calculated their economic value.

At the Tech Council's web site, readers may find more information about publications, events and resources that are geared toward growing Wisconsin's tech-based economy. Also available are the 18 "white papers" published in this report.

These papers stemmed from deliberations by the Tech Council board of directors, and were written by Tech Council staff familiar with the challenges and opportunities facing Wisconsin's tech-based economy. We hope they prove helpful to Gov. Jim Doyle and the Legislature as they look ahead to the 2007-2008 session.

Please visit www.wisconsintechnologycouncil.com for more information. To order additional copies of the White Paper Series, call 608-442-7557 or e-mail gleahy@wisconsintechnologycouncil.com

Sincerely,

Tom Still, president
Wisconsin Technology Council

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Vision 2020:
White Paper Series

Human Capital

Building a Knowledge Economy: The value of Human Capital

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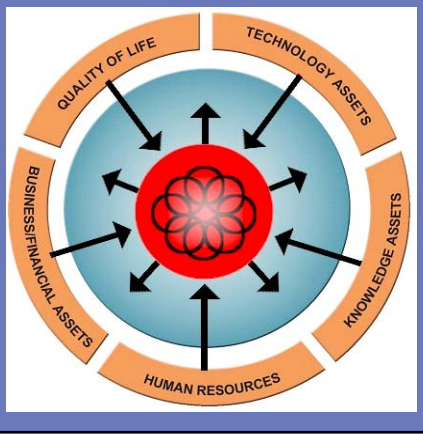


What is the Knowledge Economy?

In the new Knowledge Economy, wealth is created through the generation, exploitation and application of *knowledge* to traditional economic foundations. That stands in contrast to the old industrial economy, in which wealth accumulation was tied to commodity production and an inexpensive supply of land, labor and capital. In the 21st century economy, *knowledge* is the most basic and fundamental form of capital.

The rise of the Knowledge Economy is due in large part to an increasingly globalized economy and to rapid advances in information communications technologies (ICTs) over the past quarter century. The ease and speed with which ideas and processes can be shared has dramatically increased worker productivity while simultaneously decreasing the cost - and therefore the profitability - of commodity production. In the Knowledge Economy, products and innovations are created at a faster rate than ever before in human history. Because of this reality many of the most successful firms are smaller, more nimble and quick to adapt and adopt.

In order to compete in the Knowledge Economy, it is essential to "add value" to products and services through knowledge inputs such as lean manufacturing, R&D investments, branding, innovative design and effective marketing. Because these inputs are skill intensive, a firm's "human capital" is as important as its financial capital in the Knowledge Economy.

What are "knowledge jobs" and "knowledge workers"?

Generally, knowledge jobs are those which are "knowledge intensive" and often utilize ICTs and R&D inputs to a high degree. These jobs require mental agility rather than physical strength. Typically, knowledge sectors include:

- high- and medium-tech manufacturing;
- finance;
- insurance;
- telecommunications;
- business services;
- biotechnology / life sciences;
- education; and,
- health care.

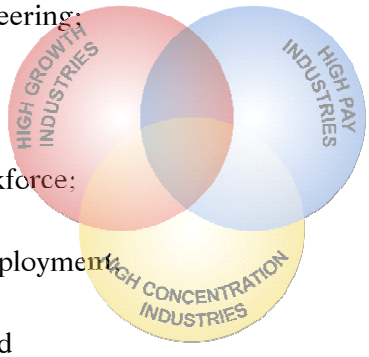
Although these and other high-tech, high-growth sectors are most often considered to be "knowledge jobs," knowledge inputs are vital to the health of almost every sector of the economy. As a result, the retail, agricultural, creative, service and many other sectors are also Knowledge Economy industries.

Knowledge workers are generally considered to be employed in managerial, professional and technical positions and have at least two years of post-secondary education. Knowledge workers are also often found in the creative fields such as fashion design, architecture and academic research.

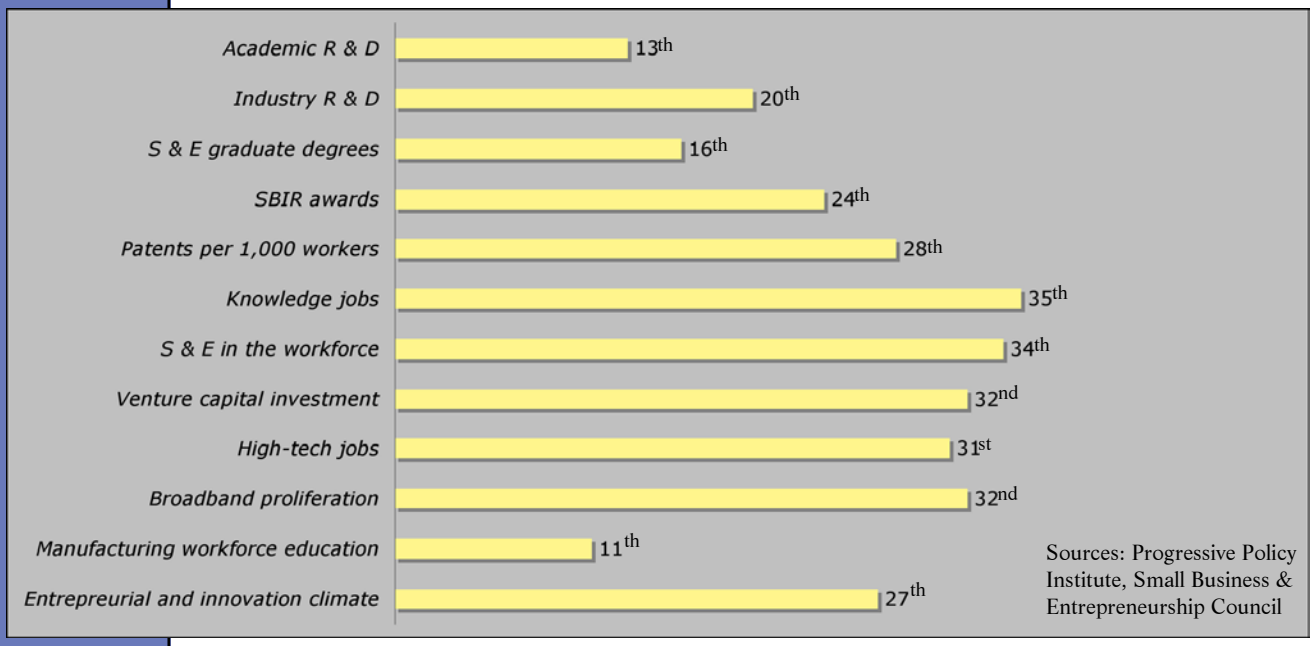
Measuring the health of the knowledge economy

Because the vitality and dynamism of a state's economy is so reliant on intangible inputs such as knowledge and innovation, it can be difficult to accurately measure the health of the economy. Although no standardized set of criteria exist to measure the health of state's knowledge economy, some key indicators are:

- R&D conducted by industry and academic institutions;
- The number of PhD graduates in science and engineering;
- The number of federal SBIR awards;
- Patents issued per capita;
- The total number of knowledge jobs;
- Scientists and engineers as a percentage of the workforce;
- Venture capital invested as a percentage of GSP;
- The number of high-tech jobs as a share of total employment;
- The proliferation of broadband;
- Education level of the manufacturing workforce; and
- Entrepreneurial and innovation climate.



While these indicators are not exhaustive, they are good measures of the dynamism and diversity of a state's knowledge economy. So, how does Wisconsin rank? The graph below lists key knowledge economy inputs and Wisconsin's ranking among the 50 states.



While Wisconsin ranks in the middle of the pack for most indicators, it is clear that Wisconsin's ability to compete in the knowledge economy will increasingly depend on its ability to produce and retain a highly skilled, highly educated workforce. High-growth, high-tech businesses require large numbers of technically skilled workers and technically-proficient managers.

Our state currently lacks sufficient numbers of high-tech businesses that require highly skilled, highly educated knowledge workers, which has resulted in a "brain drain" of many Wisconsin graduates. **The only reliable way to reverse this alarming trend is to design and carry out policies and strategies to create more job opportunities in high-tech businesses that capture new knowledge workers and highly educated people.**

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Human Capital

An Education Tax Credit for Wisconsin

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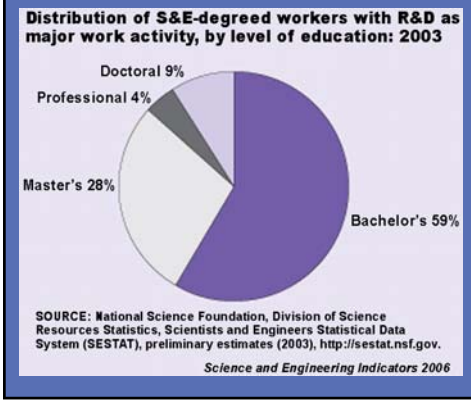


Helping the Marketplace Fill Worker Voids

The educational attainment of a worker has become a key differentiator in the market for human resources. The higher the educational attainment of the worker, the more knowledge the person can bring to the job, thereby increasing the worker's overall effectiveness. Higher education is the foundation for a knowledge-based economy because knowledge is the key input to increasing economic productivity (getting more goods and services from existing inputs) and fostering technological innovation (creating new products and services).

Unfortunately, at a time when our success in the global economy will increasingly depend on our ability to train workers for knowledge-based industries, just 47 percent of our high school graduates go on to enroll in a Wisconsin college, university, or technical college, while another 12 percent enroll in an out-of-state college or university. While some scholars focus on the 20 percent of Wisconsin college graduates who leave the state post-graduation, (a number which happens to be near the average for Midwest states), it is our failure to educate our homegrown population that hampers our ability to compete in the Knowledge Economy. Consider that just 24.1 percent of Wisconsin adults hold a bachelor's degree, well behind Minnesota (32.7 percent), Iowa (24.6 percent) and Illinois (28.1 percent). Even more alarming is that Wisconsin also ranks behind Kansas, Montana and even North Dakota in terms of the percentage of adults who hold a college degree. As the National Center for Public Policy and Higher Education reports, "only a fair proportion of Wisconsin residents have a bachelor's degree and this impairs the state economically." The Wisconsin deficit occurs at a time when there is already a serious worldwide shortage of knowledge workers. Talented knowledge workers are a relatively scarce resource in Wisconsin, and we'll need more if we expect to grow.

Because of that reality, it must be a permanent part of our long-term economic strategy to devise a politically viable incentive to promote the attraction of workers, whether those workers are from Illinois, India, or Iola, Wisconsin. ***The answer is an Education Tax Credit.***

Why Adopt an Education Tax Credit?

Enacting an Education Tax Credit will go a long way towards addressing Wisconsin's shortage of college educated citizens while:

- Leveraging private investment in education, especially for those low-income groups that are not fully participating in the "knowledge economy";
- Attracting investment in current and prospective employees;
- Allowing *employers and the marketplace* the opportunity to make workforce training decisions based on company- and industry-specific needs; and,
- Providing real economic incentives that are much more likely to stimulate an increase in Wisconsin's supply of knowledge workers.

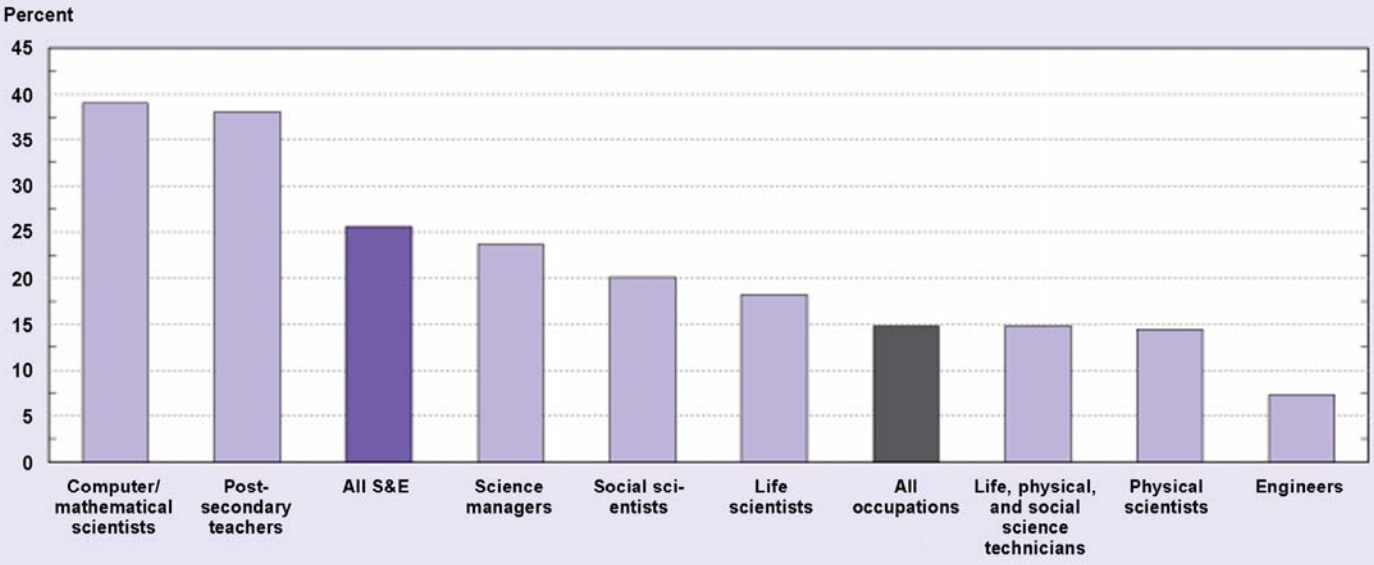
To illustrate, Minnesota enjoys a higher median family income of $62,500 compared to Wisconsin's $55,700 – a gap that economists say is tied to Minnesota's higher percentage of adults with bachelor's degrees or higher. Minnesota ranks 12th among the 50 states in that category, compared to Wisconsin's 35th place position. If Wisconsin brought its degreed population to just the national average, (an increase of 150,000 college graduates by 2020), it would add $7 billion to the state's family income levels and tax base combined.

Elements of an Education Tax Credit for Wisconsin

In order to be most effective in growing a pool of knowledge workers in Wisconsin, an Education Tax Credit would create an income and franchise tax credit for employers who support the costs of tuition for certain individuals who attend a Wisconsin college, university, or technical college. The program would:

- Provide employers a credit equal to 50 percent of tuition paid at any Wisconsin college, university, or technical college for individuals whose income is greater than 185 percent of the federal poverty line, and 75 percent of the amount of tuition paid for any individual whose income is 185 percent of the federal poverty line or less;
- Allow employers to claim the credit for current or prospective employees;
- Allow employers to carry forward any unused credit to subsequent tax years;
- Not prohibit multiple members of one family from benefiting from the program;
- Not exempt certain types of employees or their children from benefiting from the program.

Projected increase in S&E employment, by occupation: 2002-12



SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, Office of Occupational Statistics and Employment Projections.

Science and Engineering Indicators 2006

An Education Tax Credit has been endorsed by the Technology Council, Wisconsin Manufacturers and Commerce, the University of Wisconsin System, the leading University of Wisconsin student group (United Council), the Wisconsin Association of Independent Colleges and Universities, and the Wisconsin Technical College System.

We cannot aspire to higher wage levels for Wisconsin workers unless we have the political, social and educational policies to ensure that all our citizens are as educated and skilled as any in the nation. Enacting an Education Tax Credit will go a long way toward achieving that goal.

Wisconsin Technology Council

Vision 2020:
White Paper Series

Human Capital

Improving Access to Higher Education

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Fast Facts:

- *In 1984, 80 percent of the aid students received was in the form of grants and 20 percent was loans. Today that percentage is reversed.*
- *Nearly half of all college-qualified low- and middle-income students will not go to a four-year college because of financial barriers. Of that group, 42 percent will not go to college at all.*
- *In the next five years, businesses will change their hiring practices in the following ways:*
  - *28% reduction in hiring workers with only a high school diploma*
  - *49.5% increase in hiring graduates of two-year colleges*
  - *60% increase in hiring graduates of four-year colleges*
  - *42% increase in hiring of post-graduates*

Source: Advisory Committee on Student Financial Assistance and the Conference Board

Higher Education and the Knowledge Economy

It is common today for people to say that knowledge is power. The idea is central to almost every circumstance in the modern world, including education, commerce, politics, the military, and interpersonal relationships. Indeed, knowledge is the most fundamental form of capital in today's Knowledge Economy and the educational attainment of a worker has become a key differentiator in the market for human resources. George Gilder, a self-made, dot-com millionaire, described it like this: "Today, the ascendant nations and corporations are masters not of land and material resources but of ideas and technologies."

The degree to which "knowledge" attainment is linked to economic success and prosperity can be difficult to quantify. Despite this relative difficulty, data from the U.S. Census show that educational attainment is positively correlated with higher personal income levels. In fact, a person with a bachelor's degree earns almost twice as much as a person with only a high school education. Over the course of a lifetime, that translates into $1 million more in earnings.

The business community has also affirmed the importance of education as a function of job performance. According to "Are they really ready to work?" a study conducted by the Conference Board, Corporate Voices for Working Families, the Partnership for 21st Century Skills and the Society for Human Resource Management:

- Businesses will hire 28 percent fewer workers with only a high school diploma but they will hire 49.5 percent more two-year college graduates, 60 percent more workers with a bachelor's degree and 42 percent more workers with a post-graduate degree;
- 42 percent of employers surveyed rated workers with just a high school diploma "deficient" in their overall preparation for the entry-level jobs they typically fill, while they rank 80 and 88 percent of two- and four-year college graduates respectively as "adequate" or "excellent" in terms of overall job preparedness;
- 57 percent of U.S. CEOs report education and workforce preparedness is a "very important" or "most important" policy issue; and,
- Between 2000 and 2015, about 85 percent of newly created U.S. jobs will require education beyond high school.

This fundamental shift in hiring practices is occurring at a time when significant numbers of workers are set to retire in the next 10 years creating a shortfall in the skilled workforce. With communications and transportation costs consistently falling, these higher skilled jobs will continue to move to places such as India and China where larger numbers of skilled employees are turned out without significant increases in education attainment in the U.S.

Access to Higher Education in Wisconsin

In Wisconsin, the concern is even more pronounced. According to the U.S. Census Bureau, Wisconsin's population over 64 will increase by 82 percent by 2030, while the 18 to 64 population will actually decrease by 0.7 percent. In fact, because of Wisconsin's relatively low per capita income, (22nd in the nation behind both Minnesota and Illinois), our state needs 150,000 more college graduates in its workforce just to meet the U.S. per capita income levels. The knowledge economy and per capita income growth are increasingly driven by advanced education, but in the U.S. and Wisconsin tuition increases - 34 percent increase in Wisconsin over five years compared to 32 percent nationally - are outpacing per capita income increases - 3.6 percent increase in Wisconsin over five years compared to 2.2 percent nationally. This fact, coupled with the federal government's simultaneous increase in student loan interest rates, decrease in the amount of aid available and the changes to the eligibility criteria for Pell Grant program, has had the effect of forcing students to take on expensive loans leaving the average Wisconsin college graduate $17,528 in debt.

This formula has left students of low- and moderate-income families, who are often unable to take on this level of debt or are debt averse, priced out of higher education. Despite UW-Madison having the second lowest in-state tuition in the Big 10, in 2003 it meant that 33 percent - $242 million – of Wisconsin students' documented financial need went unmet, according to the Higher Educational Aids Board. Additionally, the enrollment rate of Pell Grant recipients, students whose families earn less than $35,000 generally, has decreased by more than 30 percent over the last five years at UW-Madison.

2004-05 Total Aid Awarded by Category

	Need-based Grant Aid	Nonneed-based Grant Aid	Nongrant Aid	Total
Illinois	338.24	32.40	6.82	377.46
Indiana	265.52	11.38	18.54	295.43
Iowa	50.85	0.41	5.36	56.61
Kansas	15.06	0.90	2.05	18.01
Michigan	96.08	105.13	49.66	250.87
Minnesota	130.99	0.07	148.12	279.18
Missouri	24.29	32.84	11.30	68.43
Nebraska	8.34	--	81.62	89.96
North Dakota	1.41	0.40	0.34	2.15
Ohio	159.55	79.49	0.96	240.00
Wisconsin	79.12	3.18	7.60	89.90

Source: Midwestern Higher Educational Aid Compact

Grant Aid is Most Effective

Despite doubling the amount of aid available to college students, expanding the state's tuition tax deduction and promising a place in a UW System school or technical college for every Wisconsin student with at least a B average, Wisconsin still lags behind other Midwestern states in terms of its financial commitment to need based financial aid. In 2005, Illinois committed $338 million, Indiana and Ohio committed $159 million and Minnesota committed $138 million to need based aid programs, while Wisconsin committed just $79 million to its need based aid programs. It is no surprise then that Minnesota, which is demographically similar to Wisconsin, is winning the "brain gain" race against Wisconsin.

Studies like those conducted by the Lumina Foundation show that grant aid – not elaborate programs at institutions – was the best way to increase enrollment and persistence by students at colleges and universities. The Sallie Mae Fund also confirmed that those with the greatest need for student financial aid have the least knowledge about financial aid and how it works and also found that those with the most knowledge about financial aid are most likely to attend a college or university. The net result has been that, even when resources are scares (as they are now), subsidies go to those who would attend college in any event. **To remedy this counterintuitive cycle, increases in financial aid must rationally accompany any tuition system that is reflective of ability to pay. For Wisconsin, it means significantly increasing funding for student aid programs.**

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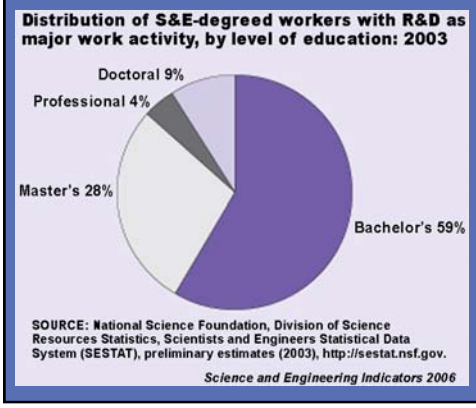

The shift from an economy based on raw materials and physical labor to an economy founded on innovation and knowledge has broad implications for Wisconsin's competitiveness in the global marketplace. Increasingly, high-wage jobs are created in "high-tech," knowledge-based industries such as advanced manufacturing, biotechnology and information technology.

Unlike previous periods of economic expansion, however, these jobs rely not only on inexpensive commodity-based inputs, but also on knowledge-based inputs. Tax incentives, land costs and wage rates still matter, but today's "gazelle" firms and multi-national corporations alike are just as likely to make relocation and expansion decisions based on the vitality of a region's high-tech clusters, the availability of skilled workers and managers, the presence of a vibrant R&D culture and the proximity of research universities and technical colleges.

The 20th century was the American century. The United States was a dominant force in many sectors, including technological innovation. In the 21st century, America must work harder – and smarter – to maintain its edge. Despite traditional American pre-eminence in science, technology and innovation, other nations have begun to catch up due in large part to continued and substantial investments in education, particularly Science, Technology, Engineering and Mathematics (STEM) education. Unless this core education gap is closed, the next generation of Americans may not know enough about science, technology or mathematics to significantly contribute to, or fully benefit from, the knowledge-based society taking shape around us.

Both Presidents Bill Clinton and George W. Bush have stressed the need for quality education, particularly in the areas of science and mathematics, as a part of our comprehensive national defense and economic strategies. Nationwide, fully 86 percent of U.S. voters believe the United States must increase the number of workers with a background in science and mathematics or risk a diminished American ability to compete in the global economy. That's according to a 2006 survey conducted by the Business Roundtable.

America's Dominance is Being Tested

Unfortunately, and at precisely the time when educational attainment has become so important, and when information can transcend borders at the blink of an eye, U.S. dominance in the high-tech economy is being seriously challenged. Consider these facts from Rising Above the Gathering storm: Energizing and Employing America for a Brighter Economic Future, a 2006 report issued by the National Academy of Sciences:

- Fewer than one-third of U.S. 4th grade and 8th grade students performed at or above a "proficient" level in mathematics; about one-third of the 4th graders and one-fifth of the 8th graders lacked the competence to perform even basic mathematical computations.
- In 2000, 93 percent of students in grades 5-9 were taught physical science by a teacher lacking a major or certification in the physical sciences (chemistry, geology, general science or physics).
- American 15-year-olds ranked 24th out of 40 countries that participated in a 2003 examination administered by the Program for International Student Assessment, which assessed students' ability to apply mathematical concepts to real-world problems.

Models in Place to Enhance STEM Education

In Wisconsin, the situation is not quite as dire: Wisconsin ranks 16th in the country in terms of the number of science and engineering (S&E) degrees granted per capita, and the state's students have for the past 15 years ranked either first or second in the nation on the ACT and SAT college entrance exams. Here are 2005 results from the Wisconsin Knowledge and Concepts Exams (WKCE), this state's educational proficiency test:

- 72 percent of 4th graders, 73 percent of 8th graders and 70 percent of 10th graders received scores of proficient or higher in mathematics.
- 77 percent of 4th graders, 73 percent of 8th graders and 70 percent of 10th graders received scores of proficient or higher in science.

While educational attainment in Wisconsin generally paints a rosier picture than much of the rest of the country, Wisconsin still struggles to educate and retain science and engineering professionals: Wisconsin ranks a disappointing 34th in the number of S&E graduates in the workforce and fully 20 percent of all college graduates leave the state post-graduation.

Key to retaining Wisconsin's educational competitive advantage – and therefore growing a competitive high-tech economy – is educating our students in STEM principles and ensuring that upon graduation, jobs that leverage their full economic potential will be waiting for them. Gov. Jim Doyle has proposed requiring a third year of math and science education as a requirement for graduation from high school, an important and necessary step, but alone not enough to guarantee a first-class S&E workforce in Wisconsin.

Improving the quality of STEM education is central to ensuring a ready supply of future scientists and engineers. Most students learn about science, technology, and mathematics first through interaction with their teachers. Improving those interactions will ensure great gains in achievement and interest in the STEM fields. In Wisconsin, support for programs such as Project Lead the Way, the Wisconsin Center for Academically Talented Youth and other STEM education programs will go a long way towards assuring that our best and brightest are prepared for the high-tech jobs of the 21st century.

Project Lead the Way. Project Lead the Way is a national, non-profit STEM educational program for middle and high-school students. Its curriculum is designed to maximize a student's math and science literacy and competency so that they are not only interested in, but also prepared for, a future in tech related industries. Project Lead the Way is consistently cited as a "best practice" program to prepare students for careers in a technology-driven world.

- Nearly 100 schools from Kenosha to Superior and Oshkosh to La Crosse, including the Milwaukee School of Engineering and the UW-Stout participate in the program;
- Nationally, 86 percent of 12th graders completing its classes in 2003 are attending college;
- 73 percent of PLTW students have entered engineering or technology programs, and 98 percent of those who do advance to their second year of college compared to a national persistence rate of just 50 percent.

Wisconsin Center for Academically Talented Youth. Another promising project is the Wisconsin Center for Academically Talented Youth. WCATY serves as the Wisconsin chapter of the Midwest Academic Talent Search. To achieve its mission of nurturing Wisconsin's most academically talented students by providing and encouraging programs that support, motivate, and challenge them, WCATY:

- Works with elementary, middle and high school students year round;
- Engages in talent recognition and mentorship programs that celebrate and encourage intellectual and personal development.

While Project Lead the Way and the Wisconsin Center for Academically Talented Youth represent only a portion of the full body of STEM education programs, they are examples of programs with demonstrated outcomes. **So whether it's an extra year of math and science in high school or a focused program such as Project Lead the Way, or a combination of both, Wisconsin must do more to steer students toward careers in math, science and engineering.**

Wisconsin Technology Council

Vision 2020:
White Paper Series

Investment Capital

Building on the Foundation of Act 255

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Despite some improvements to the state's investment climate, there continues to be a shortage of seed capital for Wisconsin's entrepreneurs:

- ***Venture Capital Investment.*** *Venture capital investment in Wisconsin rose slightly in 2005 over levels in the prior three years. Venture capital invested in Wisconsin companies in 2005 amounted to $69 million in 12 venture capital deals. Despite that modest increase, Wisconsin's venture capital ranking slipped from 26th among the 50 states in 2004 to 35th in 2005.*
- ***Angel investment.*** *In 2005 it is estimated that angel investing in Wisconsin exceeded $50 million, with group angel investing (networks) accounting for $5.6 million, or more than 11 percent of the total. Group angel investing increased 65 percent between 2004 and 2005.*

Source: Risk Capital in Wisconsin, a report prepared by NorthStar Economics, Inc.

Making Wisconsin's Strong Investment Law Better

Since taking effect in January 2005, Wisconsin's tax-credit program to encourage investments in tech-based companies has been a general success. Angel investors, in particular, are using the credits provided by Wisconsin Act 255 to invest in early-stage companies that meet the state's definition of a "Qualified New Business Venture." Investments by angel networks have climbed rapidly as available tax credits were claimed over the past two years. In fact, the bipartisan passage of Act 255 and the related creation of the Wisconsin Angel Network have sparked a doubling of the number of angel networks in Wisconsin.

Like any relatively new program, however, Act 255 is not perfect. It has not generated new investments by venture capital funds, which are larger private-sector funds that typically invest after the angel capital round. And while Wisconsin has made strong progress in spurring angel capital investments, more venture capital investments will be needed – or many angel-backed companies will "die on the vine" for lack of latter-stage capital.

Wisconsin has examined and even experimented with other models (Certified Capital Company and fund-of-funds strategies) but its policymakers have generally concluded that a tax-credit program offers the most flexibility and accountability. It has structural advantages for investors because it doesn't stand in the way of their "prime objective," which is to maximize return, while still allowing taxpayers the most long-term bang for their bucks. The vast majority of the risk remains where it belongs – with the investor and the company, not the taxpayer – but some of that risk has been reduced due to the tax credits.

Limitations in Current Law

And yet, there are some flaws in Act 255 as currently written:

- Available tax credits under the law are too small to attract major pools of capital. For example, more participation by in-state venture capital firms would likely leverage five or six times that amount in out-of-state venture.
- The $1 million cap on eligible angel investments in a Qualified New Business Venture hinders the growth of some angel-backed companies.
- The law places too many restrictions on all investors, local or otherwise, in terms of the size of their investments and the number of allowable rounds in an investment.
- The law could be expanded to include tax credits for funds run by major private institutions that are taxable. This might spur more investment by the financial services and insurance sectors, rather than just tax-exempt funds such as pensions.

The current pool includes $30 million in angel credits and $35 million in venture fund credits, spread over 10 years. Investors receive Wisconsin income-tax credits totaling 25 percent of their eligible investment. Those credits (an aggregate $3 million per year for angels and $3.5 million per year for venture funds) provide incentives for $12 million in angel investments and $14 million in venture investments per year. That's a good start, but Wisconsin must grow its supply of private equity even faster.

Wisconsin attracted about $68 million in venture capital investments in 2005, a tiny percentage of the $21.856 billion invested nationally. If Wisconsin stood even at the per capita U.S. average in 2005, it would have attracted $405 million in venture investments. Reaching that average won't take place overnight – but it will likely never occur if Act 255 credits spur only $14 million per year in new venture investments.

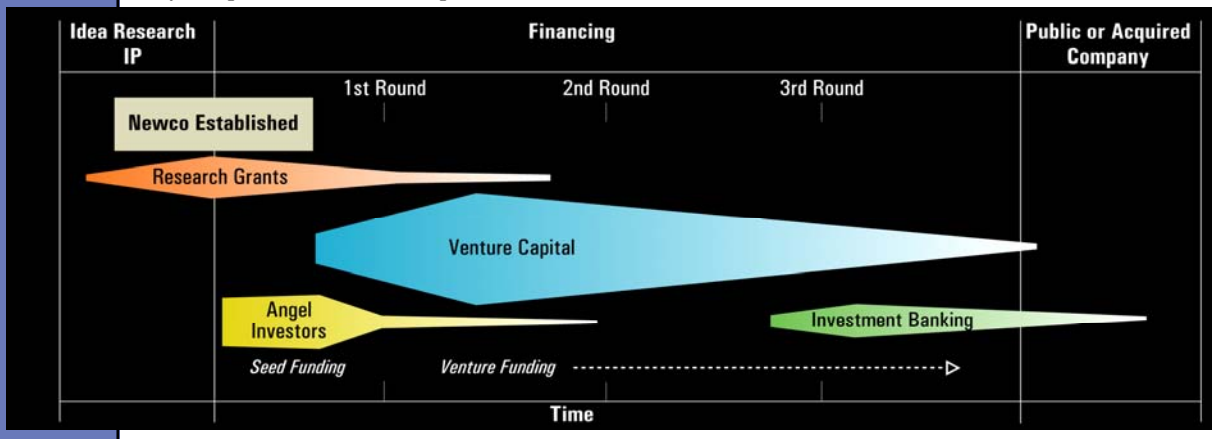
Keeping Wisconsin Competitive

Tax credits for angel capitalists and venture funds efficiently leverage investment dollars. If the state makes more credits available, more investments may be attracted. Unused credits cost the state nothing; credits put to work create jobs and economic benefit. For example, increasing the total pool of credits to $25 million could lure up to $100 million in angel and venture investments, much of it from larger funds that tend to make larger investments in latter-stage deals.

When it was proposed, Act 255 envisioned a tax credit of 40 percent for qualified investments. That was reduced to 25 percent out of a general political concern that 40 percent sounded excessive, even though all available evidence suggested that level was necessary to attract larger investment funds. **Raising the credit to 40 percent for first round investments would provide an additional incentive to investors.** If "follow-on" rounds become eligible for credits, as recommended below, those rounds could receive the current 25 percent credit.

State policymakers may perceive it is best to attract many investors to a number of smaller, qualified investments versus fewer investors to a limited number of larger deals. Before they conclude that is the case, however, policymakers must bear in mind that investing is rarely a "one-shot" game. Small investments made at the angel level usually are followed by a series of larger investments so the company can grow to the point it is selling goods and services, becoming profitable and – most important to policymakers and taxpayers alike – creating jobs.

For angel and venture capitalists alike, it is important to remove impediments to "follow-on" investments that are made as companies grow and meet important performance-based milestones. That would include removing the Department of Commerce rule that limits any one investor to $500,000 in credits on the first $2 million of investment, and up to $1 million on the first $4 million by multiple funds. Already, there have been instances in which angel networks have been "capped out" in receiving tax credits for making follow-on investments. That situation may become more commonplace, even for angel-backed companies that are not likely recipients of venture capital.



High-tech businesses are capital and research intensive. That is particularly true in biotech, pharmaceutical and medical-device sectors, where companies face costly and lengthy regulatory approval processes before they sell products. These companies may require tens of millions of dollars in investments from angels and venture capitalists in multiple rounds. Credits for follow-on investments should remain available until a company has hit certain employment or revenue milestones set by the state. For example, the definition for a Qualified New Business Venture could be expanded to 100 or fewer employees and $10 million in aggregate investment.

Finally, there is a unique opportunity to use Act 255 to leverage federal credits under the New Markets program. The $16 billion New Markets program is designed to target investment in low-income communities, and New Markets "pockets" exist in most of Wisconsin's 72 counties. By adding a provision in Act 255 that augments the federal tax credits for investments in operating companies in low-income communities in Wisconsin, the state can attract more federal dollars and expand tech-based development to hard-to-reach communities.

Act 255 is right for Wisconsin – but its potential is far greater. With a right-sized investment in the overall program and more flexible rules for investors, Wisconsin can attract a significant amount of new capital for companies that will help grow our 21st century economy.

Wisconsin Technology Council

Vision 2020:
White Paper Series

Investment Capital

Capital Gains: Investment Capital for Wisconsin's Early-stage companies

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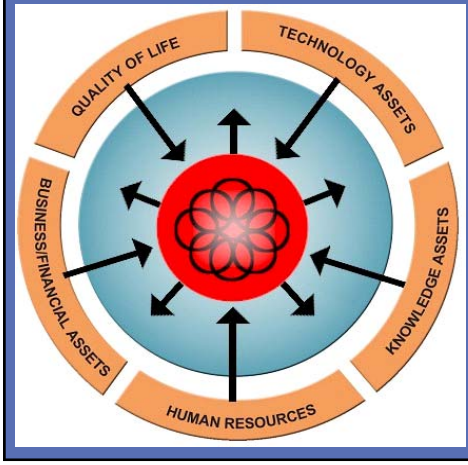


Wisconsin's Investment Capital Shortage

Despite its ability to attract academic research and development grants and its knack for producing a high number of patents per capita, Wisconsin struggles to turn its good ideas into successful high-tech business ventures. Some cite Wisconsin's entrepreneurial culture as a culprit, or a shortage of seasoned managers, but most observers of the state's tech economy believe the lack of adequate investment capital is the primary reason for the state's disappointing performance in converting its patents into licensable technologies and producing high-growth firms.

Although investment capital inputs in Wisconsin are increasing in real dollars, the state's venture capital ranking slipped to 34th in 2005 (from 25th in 2004) among the nation's 50 states. Minnesota and Illinois ranked 14th and 17th, respectively, in 2005. Angel investing within formal networks and by "family networks" or individuals is rising in Wisconsin, and those investments are laying a foundation for future venture capital investments. But it will take an adequate supply of investment capital at all levels – from seed rounds to "B" rounds – to grow companies and to attract and retain the right entrepreneurs and managers. Wisconsin firms need to know that private equity capital may be available to them at all stage of growth, and that their businesses won't be left to "die on the vine" after early-stage investments bring them to an initial plateau of success.

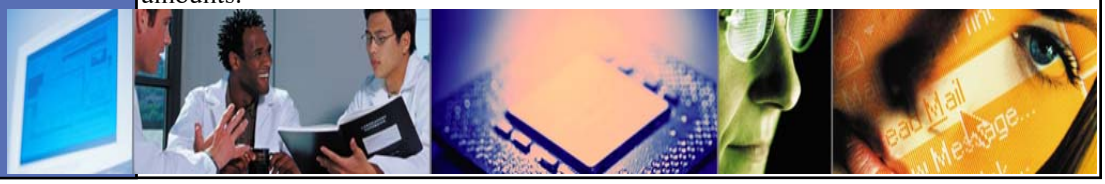
While the 12 quarters ending in June 2006 showed a steady increase in venture investments by out-of-state firms, the state must rely first on homegrown investors. We need to grab the attention of more of potential investors and convince them they can make money by investing at home. To get more of these investors off the sidelines and into the game, Wisconsin must take some bold steps to create incentives for investing in the tech-based economy.

Capital Gains as Investment Capital

One such action would be to fully eliminate the tax on long-term capital gains *only* if the gains are reinvested in small, Wisconsin-based growth companies. By some estimates, entrepreneurs are responsible for some 70 to 80 percent of all new job growth in the United States.

To be successful, however, entrepreneurs – whose operating costs as a percentage of total revenues are greater than most Fortune 500 companies – are deeply reliant on capital inputs from family, friends, and other informal sources.

In fact, one survey showed taxable individuals to be the major source of funds for firms raising $500,000 or less at a time. By enabling entrepreneurs' financiers to reap greater returns on their investments through a capital gains tax reduction, entrepreneurs will find it easier to attract equity financing, and that the investments will often be in larger amounts.



Elements of a Capital Gains Tax Credit for Wisconsin

To ensure that a capital gains tax reduction produces the desired economic stimulus of investment in Wisconsin growth companies, certain minimum criteria should be set forth:

- Requiring that recipients of these investments are companies that fall under the Qualified New Business Venture (QNBV) definitions set forth by 2005 Act 255, or amendments to the act;
- The firm is Wisconsin-based and at least 51 percent of its employees are in Wisconsin;
- The firm engages in a "high-growth" industry;
- The firm has annual revenue growth of 20 percent or more; or
- The firm has fewer than 500 employees.

Wisconsin's long-term capital gains tax rate (40 percent in the top tax bracket) is more favorable than rates in some states. However, Wisconsin is operating at a disadvantage compared to most states when it comes to attracting and retaining private equity capital. The gap between Wisconsin's "intellectual capital," which is above average compared to other states, and its investment capital, which is below average, means the state must do more to encourage taxable individuals and other informal investors to invest in homegrown, high-growth companies.

Because only those gains that are reinvested in qualifying companies would receive favorable tax treatment, this recommendation would not result in the $100 million revenue reduction of an untargeted, long-term capital gains exemption.

Rather, according to the Legislative Fiscal Bureau, a modest revenue loss of just $1.39 million would occur for every 1 percentage point of gains re-invested in high-growth companies. That amount would be recaptured by the corporate and income tax revenue of these firms.

In summary, a targeted capital gains tax would (1) "unlock" money that would be redirected to high-growth investments in Wisconsin; (2) encourage investments in companies that produce high-end jobs; (3) lower the cost of capital available to qualified entrepreneurs, and; (4) speed the ability of growth firms to translate their technologies into marketable products.

Other Recommendations to Encourage Investment

The Legislature should study recent reports that show Wisconsin is one of the least "friendly" states to retirees when it comes to overall taxation. Kiplinger's magazine recently developed data on the total tax burden – income, property and sales taxes -- for a typical retired couple in each of the 50 states and Washington, D.C. The Wisconsin couple ranked 49th out of 51 with a total burden of $6,016. The top 26 states showed total burdens of less than $3,400. Wisconsin cannot afford to be on the "don't-retire-there" warning list of personal financial advisers.

The governor and Legislature should implement the proposal to create a Wisconsin Venture Center to build strategic relationships between universities, high-tech managers and sources of capital. This center would be modeled after Ohio's successful BioEnterprise program. It should be linked to existing state efforts to build entrepreneurial capacity and to create investment capital.

The Department of Financial Instiutions should create a "carve-out" for annual report filing fees paid by start-up foreign corporations. This is a change that will reduce state fees associated with moving a new (five years or less) Wisconsin venture-backed company from another state or country to Wisconsin.

Wisconsin Technology Council

Vision 2020:
White Paper Series

Outreach & Public Policy

Growing Wisconsin's Economy Through Bio-Based Industries

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Fast Facts:

- *By increasing its production of bio-fuels, including digester gas and landfill gas, and other renewable energies to levels compliant with 2005 Act 141, Wisconsin would see:*
  - *The creation of nearly 2,160 jobs and an additional $110 million in gross state product.*
  - *$1.3 billion in new capital investment*
  - *$35 million in payments to rural areas resulting from biomass energy production;*
  - *$31 million in new property tax revenues for local communities.*
- *Wisconsin has the technical potential to generate more than 2.7 times its current electricity needs from renewable energy sources such as biomass, and other agricultural products.*

Source: The Union of Concerned Scientists

Turning Green into 'Green'

America is grappling with an energy crisis. Our dependence on foreign oil is not only a national security concern, but a drag on our economy. As 2006 closed and crude oil future prices hovered above $60 per barrel, it had become clear the days of "cheap oil" were long gone. But just as necessity is the mother of invention, higher prices for petroleum have accelerated the search for alternative sources of energy and new ways to conserve energy. Technology is driving that quest.

Recognizing the increasing world demand among developing countries for oil, many nations have increased R&D investments and sped the commercialization of renewable energy sources. Where the United States was once the leader in the technological innovation of renewable energy, we have slipped behind, leaving the nation ill-equipped to compete with other nations in the $600 billion global market of renewable technologies. Some facts:

- California is the birthplace of wind power, yet the U.S. wind power generation capacity of 6,370 megawatts (enough for about 6 million homes) is dwarfed by Germany's 14,600 megawatts.
- In 1996, the United States was the largest manufacturer of solar panels, surpassing Japan's production capacity by 60 percent. Now, Japan produces more than twice as many solar cells as the U.S.
- Among the top 20 renewable energy companies in the world, only two are American; the rest are Japanese, European and Australian.
- The United States' environmental R&D as a percentage of the national budget is smaller than 14 other members of the Organization for Economic Cooperation and Development, including Norway, Denmark and Japan.

Although some federal policies for supporting a market for clean technologies have been enacted, states are also spurring the development of renewable energy sources.

Midwestern states, including Wisconsin, have a chance to be major participants in the bio-fuels, wind power, solar photovolaics, fuel cells, and distributed hydrogen revolution. All told, these few renewable industries alone are expected to quadruple into a $170 billion market over the next 10 years. Wisconsin should take aggressive steps to capture a share of this market, especially given its wealth of forests, fibers and waste that could be converted into bio-fuels and other bio-products.

The state also has the potential to be a leader in conservation technologies, such as lighting, "green" building, battery design and building controls, and could help blaze a path toward a new generation of clean nuclear power plants if a moratorium on building such plants in Wisconsin is lifted.

Wisconsin has the agriculture, natural resources and research infrastructure to develop its bio-based industries, especially in crop and forest residues, such as corn stover, straw and soybean stubble; the bio-refining of forest and paper products; the bio-refining of organic waste streams created by industry; and the bio-refining of new and dedicated crops.

What Other States are Doing

Not surprisingly, other Midwestern states have also recognized the potential economic boon to their economies and have made substantial financial investments:

- Iowa has invested more than $400 million in state funds to create the Grow Iowa Value Fund;
- Michigan has made $400 million available for capacity building in alternative energy, life science and advanced manufacturing industries; and,
- Ohio has invested $11.6 million in the Ohio Bioproduct Innovation Center.

Sixteen states, among them Wisconsin, Arizona, California, New Mexico, Texas, Minnesota, Iowa, Pennsylvania and Maine, have passed mandatory renewable portfolio standards. Wisconsin's legislation, 2005 Act 141, which was a product of the recommendations made by the Governor's Task Force on Energy Efficiency and Renewables, will serve as the blueprint by which to streamline Wisconsin's renewable energy policy. Notable elements of the proposal included:

- Increasing the percentage of renewables in Wisconsin's electric energy mix to 10 percent by 2015;
- Committing state government to source 10 percent of the electricity it uses from renewable sources by 2007, and 20 percent by 2011; and,
- Requiring electric energy providers to increase their renewable energy sales by 2 percentage points by 2010 and 6 percentage points by 2015.

Fully implemented, this legislation will not only help stabilize energy prices in Wisconsin, but also to create jobs and reduce the state's use of imported energy.

What Can Wisconsin Do?

Wisconsin's rural communities wonder what will happen next to their economies. Most have attractive assets such as a well-educated workforce, modest high-speed telecommunications capacity, and a quality life style, but they must leverage those assets in ways that will create more high-paying jobs. Growing their bio-economy may be part of the answer.

In the fall of 2006, Gov. Jim Doyle proposed a series of initiatives meant to further Wisconsin's bio-fuels and bio-products economy. He proposed a series of public-led investments to leverage substantial private investment, including:

- The creation of the Wisconsin Energy Independence Fund, which will make loans and loan guarantees to businesses seeing to expand their production and use of renewable fuels and energy, especially bio-fuels and bio-products;
- Tax incentives for gas stations and fleet operators to invest in E-85 ethanol and biodiesel tanks and pumps; and,
- Grants for companies and researchers to develop new technologies to increase renewable fuels and spped the commercialization of new renewable fuel and energy technologies.

These proposals will solidify the state's leadership position in the bio-economy. To this list, the Wisconsin Technology Council would add that the creation of a cabinet-level or similarly high-ranking position to act as the clearinghouse and advocate for the expansion of Wisconsin's bio and renewable energy economy. This step would send a strong signal to investors, researchers and business interests that Wisconsin is ready to compete. Consider also that just two short years after creating its own cabinet-level position, Indiana was chosen by Louis Dreyfus Agriculture Industries as the site for the world's largest biodiesel plant and initiated construction on six other ethanol plants.

Wisconsin Technology Council

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Outreach & Public Policy

Tech-based Development in Rural Wisconsin

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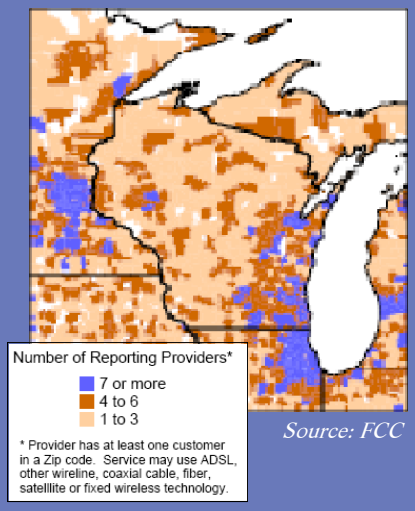
Broadband Proliferation in Wisconsin



Source: FCC

Wisconsin counties with the highest unemployment rate, October 2006:

1. *Menominee, 8.9 percent*
2. *Iron, 5.6 percent*
3. *Milwaukee, 5.3 percent*
4. *Marinette, 4.9 percent*
5. *Florence, 5.1 percent*
6. *Adams, 4.9 percent*
7. *Rusk, 4.8 percent*
8. *Washburn, 4.8 percent*
9. *Racine, 4.7 percent*
10. *Marquette, 4.6 percent*

Source: Wisconsin Department of Workforce Development

Most rural communities in Wisconsin have not enjoyed the same degree of economic success as the state's more urbanized areas. In October 2006, eight of the 10 Wisconsin counties with the highest unemployment rate were predominantly rural; the same was true of 16 of the 20 Wisconsin counties with the highest jobless rate.

Declines in the number of jobs in farming and related agribusinesses, in forestry and paper products, and in mining explain part of the gap. But many of the state's urban areas have undergone their fair share of economic dislocation, too, especially in the manufacturing sector. So why has the rural economy in Wisconsin generally been slower to recover?

One explanation is that rural Wisconsin has not attracted the kinds of service and high-technology industries that have accounted for a strong share of the state's economic growth since 2000. While that's not universally true, there is good reason to believe rural Wisconsin has yet to fully share in the "technology boom" of the 21st century. To hasten the rate of change, state policymakers should examine a well-rounded strategy with the following elements:

- **Infrastructure improvement**: Let's make sure rural Wisconsin not only has the right physical roads and highways, but up-to-date "information highways" needed by tech-based businesses. Higher broadband penetration is essential. For a more detailed explanation, please read the broadband section on the next page.

- **Targeted business assistance**: Wisconsin should utilize available federal, state, university and private programs to bring expertise, as well as grants and financial aid, to rural areas. For example, the U.S. Department of Agriculture offers a range of programs targeted at rural economic development. The USDA's Rural Economic Development Loans and Grants help develop projects that will result in a sustainable increase in economic productivity, job creation, and incomes in rural areas. Projects may include business start-ups and expansion, community development, incubator projects, medical and training projects, and feasibility studies.

- **Education and training**: Rural Wisconsin's workforce, renowned for its work ethic, must also have the skills to compete with workers in urban America and beyond. The state's educational institutions, including its tech colleges, private colleges and the UW System, are capable of providing those skills.

- **Leveraging tax credits**: The state should ensure that its Technology Development Zone tax credits program is working to full potential. It should also expand its Act 255 investment tax credits program to take advantage of federal "New Markets" tax credits. The $16 billion New Markets program is designed to target investment in low-income communities, and New Markets "pockets" exist in most of Wisconsin's 72 counties. By adding a provision in Act 255 that augments the federal tax credits for investments in operating companies in low-income communities in Wisconsin, the state can attract more federal dollars and expand tech-based development to hard-to-reach communities.

State Broadband Rankings

Ranking	State	Score
1	Michigan	144.4
2	Florida	80.6
3	Missouri	75.7
4	Texas	73.0
5	Ohio	71.1
6	Washington	70.0
7	Kansas	67.3
8	Virginia	65.6
9	Colorado	58.5
10	Iowa	55.9
11	Oregon	52.1
12	Arizona	51.2
13	Indiana	47.5
14	California	46.6
15	Illinois	45.3
16	Minnesota	45.0
17	Nebraska	42.7
18	North Dakota	37.7
19	North Carolina	35.8
20	South Carolina	34.3
21	Maine	26.0
22	Pennsylvania	25.5
23	Alaska	25.2
24	Kentucky	24.3
25	Wisconsin	23.0

Source: Analysys

WISCONSIN TECHNOLOGY COUNCIL

- **Angel capital**: Formation of more angel capital networks in regions outside the Madison-Milwaukee-Green Bay corridors will make more private equity available for investment in tech-based start-ups in rural Wisconsin. Since January 2005, Wisconsin has gone from six to 14 organized angel networks. The Wisconsin Angel Network provides assistance to networks in the formation stage.

- **Full participation in the "bio" revolution**: The next green revolution will revolve around production of renewable biofuels and other bioproducts. Wisconsin is uniquely situated to be a leader in production of cellulose-based ethanol, bio-plastics and other products made from wood or wood waste. Wisconsin has a significant R&D base committed to research in agriculture and forest products; that's a head start most states don't enjoy.

Broadband penetration in Wisconsin: Why is it important?

In general, broadband refers to telecommunication in which a wide band of frequencies is available to transmit information. Because a wide band of frequencies is available, information can be multiplexed and sent on many different frequencies or channels within the band concurrently, allowing more information to be transmitted in a given amount of time -- much as more lanes on a highway allow more cars to travel on it at the same time.

Having greater broadband access in rural Wisconsin is necessary for these reasons:

- It allows small businesses, which account for 60 percent of new jobs in Wisconsin, to expand their market and customer bases to the national and even international levels.

- It creates more opportunities for creation of businesses related to information technology, one of the fastest-growing sectors in the U.S. economy.

- It enables hospitals and clinics, such as the Marshfield Clinic and its related research foundation, to better utilize telemedicine applications. An example might be rapidly locating digital medical records and medical images that can then be easily transmitted to doctors or clinics in remote locations.

- It provides rural Wisconsin residents with greater access to higher education through distance learning systems.

In large part because of the great distances that often separate rural areas from cities, the United States ranks only 16th in the world in broadband penetration. Wisconsin ranks a mediocre 25th among the states, despite some progress over the past five years. For example, Wisconsin Act 479 will provide $7.5 million in sales and use tax credits for Internet Service Providers that make investments in the state's underserved areas.

The state cannot compel broadband markets where there are none, nor can it afford to subsidize broadband in places where the customer base is too sparse. But policymakers can remain open to improvements in current law, including policies that stimulate demand for broadband use in rural areas. Discounts, low-interest loans and grants to public and private sector consortiums, especially in rural areas, may help close the "digital divide" that now exists between urban and rural regions.

Vision 2020:
White Paper Series

Outreach & Public Policy

Growing an Entrepreneurial Climate: The Importance of Innovation

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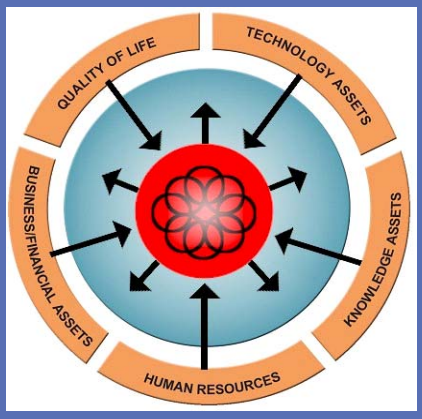

"The World Bank has shifted much of its emphasis to the intangibles of knowledge, institutions and culture in an attempt to fashion a new development framework for our work."

-Joseph Stiglitz

As the global economy transitions from a traditional industrial economy to an innovation economy, business models are changing, too. Here is a passage from a recent report, *Transforming Learning for the 21st century: An economic imperative*, which summarizes the new rules: "Systems of economic development based on geography, trade rules and tariffs, slow dissemination of scientific and technological discoveries, and long cycles of product life have given way to global trade, rapid product innovation, the lowering of trade barriers, rapid dissemination of (discoveries), and rapid global deployment and movement of capital and the means of production."

The 21st century company must be innovative or face certain death. Big or small, it must be quick on its feet. It is born locally but it often must compete globally. These high-growth firms, often called "gazelles" because of the speed at which they leap ahead, are becoming the new backbone for our economy. According to the U.S. Small Business Adminstration's Office of Advocacy, these small businesses (firms with fewer than 500 employees):

- Represent 99.9 percent of the 24.7 million businesses in the U.S.;
- Employ 50 percent of all private sector workers;
- Account for 45 percent of U.S. private payroll;
- Employ 41 percent of all high-tech workers;
- Created between 60 and 80 percent of net new jobs annually over the last decade;
- Produce 13 to 14 times more patents per employee than large firms;
- Generate 26 percent of all export value.

Entrepreneurs and small businesses are key to Wisconsin's economic success. They are responsible for the majority of job growth, are key engines of economic development and, most importantly, are innovators.

Wisconsin's Entrepreneurial Climate

While Wisconsin has in recent years made great strides towards yielding a more entrepreneurial economy, the state still ranks 27th nationally in terms of entrepreneur-friendly policies, and 23rd nationally in terms of entrepreneurial "hot spots," (Madison ranked sixth among midsized cities nationally), according to the Small Business & Entrepreneurship Council and Entrepreneurship.com.

Wisconsin must be aggressive in attracting entrepreneurs and skilled managers from other states, and in cultivating its own at home. The state of Wisconsin, and the Wisconsin Technology Council specifically, has built a solid foundation of entrepreneurial-focused programs and initiatives.

Establishing an entrepreneurial climate in Wisconsin

The National Governor's Association and others have identified areas considered important to the cultivation of an entrepreneurial economy, many of which Wisconsin has already begun to implement:

- ✓ **Integrate Entrepreneurship into State Economic Development Efforts.** The Wisconsin Governor's Business Plan Contest, the Wisconsin Angel Network and the Wisconsin Entrepreneurs Network are three of the most recent examples of a state-led policy of encouraging entrepreneurism.
- ✓ **Implementing Regulatory Reform Policies**. The Jobs Creation Acts I & II were important steps towards making our state's regulations more navigable for small firms, which, because of their size, have more than two times the expense associated with regulatory conformance.
- ✓ **Improving access to capital**. The Wisconsin Angel Network, which links entrepreneurs to 24 Midwestern angel networks or funds, is adding connections and and an organized conduit for investing in high-growth, high-potential Wisconsin companies.
- ✓ **Creating industry clusters.** Wisconsin, in cooperation with numerous public-private partnerships, has established a strong base of clusters in biotechnology, small engine manufacturing, medical devices, paper technology and others.
- ✓ **Refining the tax structure.** Wisconsin must make sure that its 21st century tax structure provides incentives to entrepreneurs, especially those in sectors that have the potential to grow.

While these efforts geared at enhancing Wisconsin's entrepreneurial climate have already shown great success, they must be further augmented in order to propel Wisconsin to the top of the entrepreneurial "hot spots" list. To accelerate growth in its entrepreneurial sectors, Wisconsin could:

Encourage direct investment by state agencies. Agencies such as the State of Wisconsin Investment Board have already demonstrated the financial return and the economic value associated with investing in growth companies. This agency, and other agencies like it, should continue to be given latitude to make investments in Wisconsin-based growth companies. Another example of untapped potential is the Wisconsin Health and Educational Facilities Authority.

Diversify entrepreneurs' sources for early-stage capital. The Wisconsin Angel Network, which was created in 2005, is an important example of how demystifying the investment process can pay dividends to Wisconsin companies seeking investment. Since its inception, the number of group angel investing deals and dollars invested increased by 65 percent and the number of active angel networks in Wisconsin increased from 6 to 14. Continuing to develop a diverse base of risk capital options is required to ensure that growth firms' financial needs are met.

Augment existing efforts to provide entrepreneurs with technical assistance. Most entrepreneurs are not skilled in attracting private equity investments, marketing their product or managing their accounts. The Department of Commerce in cooperation with the Wisconsin Entrepreneurs' Network and the Wisconsin Innovation Network helps guide entrepreneurs through the processes and pitfalls of entrepreneurship, but more resources must be directed towards these efforts to guarantee their effectiveness.

Streamline regulatory and licensing environments. Though Wisconsin has begun to streamline its regulatory climate, there must be perpetual efforts to simplify and speed the process. One-stop-shops for licensing/regulatory applications and making more predictable the amount of time and the outcome of permitting processes, which Wisconsin has started to move towards in recent years, are an important, but ongoing, responsibility of a state sympathetic to entrepreneurs' needs.

Improve entrepreneurship education. Because a culture that values entrepreneurism is equally important as a policy environment that favors it, entrepreneurial education is central to growth in an entrepreneurial economy. Entrepreneurial education - such as internship programs, entrepreneurship programs in universities, state SBDC's and county extension offices, STEM education, and business plan contests - not only teach individuals how to succeed as entrepreneurs, but also provides awareness about entrepreneurism as a viable career path and affirms the important roll that entrepreneurial activities have on Wisconsin's economic growth.

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Encouraging Entrepreneurship at Our Colleges and Universities

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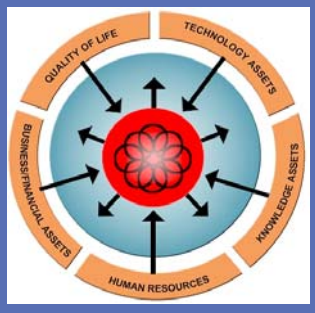

WARF
Wisconsin Alumni Research Foundation

WiSys TECHNOLOGY FOUNDATION, INC.

OFFICE OF CORPORATE RELATIONS
University of Wisconsin-Madison

Turning Ideas Into Businesses

Based in part on a model created by the UW-Madison and the Wisconsin Alumni Research Foundation (WARF) in the 1920s, the 1980 federal legislation known as the "Bayh-Dole Act" has greatly expanded the ability of universities to own, license and market their federally funded faculty research. The passage of Bayh-Dole marked the official beginning of universities acting not just as institutions of higher learning, but as catalysts for entrepreneurship and economic development.

Research and innovation, considered vital to the generation and dissemination of knowledge in the global economy, are naturally occurring elements of a research university. However, entrepreneurship, technology transfer and the process of turning research into businesses are newer concepts to many of these same universities. Even so, these processes are increasingly important because the private sector can only benefit from university research if it is converted into marketable goods and services. Steps must be taken to encourage and facilitate more entrepreneurism on our state's public and private campuses and research institutions.

Entrepreneurial Accomplishments in our Academic Institutions

Wisconsin's research institutions have had many successful forays in technology transfer and entrepreneurism, especially in recent years, including:

- The partnership between **WARF and UW-Madison** has resulted in a significant number of high quality faculty start-up companies that have enhanced the economic growth of Dane County and the state. A recent analysis of the University Research Park, where most of the park's tenants are high-tech start-ups with ties to research developed at UW-Madison, showed a total statewide economic impact of more than $600 million.
- Several years ago, at the urging of the president of the UW System, WARF formed WiSys Technology Foundation (WiSys) to provide technology transfer assistance to the other **four-year campuses of the university system**. While the efforts of WiSys promise positive results for the state's economic growth, it is still in its infancy.
- At the UW-Madison, the former University-Industry Relations office was disbanded and a new **Office of Corporate Relations** was created to serve as a direct link between the chancellor and the state's business community. Three years after its founding, OCR serves as a "front door" to the UW-Madison for the business community.
- The **Medical College of Wisconsin** is recognized as one of the top 100 research-based academic medical centers in the United States, and received $139 million in academic R&D dollars in fiscal 2004. In recent years, this research engine has resulted in several high-quality biomedical start-up companies that have enhanced the state's economy and particularly the economy of Milwaukee.
- The Fox River Valley is a solid industrial corridor for Wisconsin with an emphasis in the paper and packaging industries. **UW-Green Bay** has established a Research Council which provides grants for teaching and research and the Paper Technology Transfer Center to facilitate public-private partnerships.

- In 2001, with the help of a grant from the Wisconsin Department of Commerce, **TechStar** was formed to help facilitate the formation of start-up companies based on technology from Milwaukee area research institutions. TechStar and WiSys in turn established a collaborative agreement that has resulted in the first license agreement with technology from **UW-Milwaukee**.

- The Chippewa Valley includes **UW-Eau Claire**, **UW-Stout** and the **UW–River Falls**. This region has a tradition in the manufacturing of computers and components, materials (rubber and plastics), wood products and food products and has now become focused on state of the art industries with signs of real success due in large part to UW-Stout's well-organized manufacturing and industry-relations office in the Stout Technology Transfer Office.

How to encourage more entrepreneurial activity on campus

Despite these impressive examples of entrepreneurial activity in universities and research insititutions across the Wisconsin, more must be done to ensure that this activity is enhanced. According to "Mind to Market," a recent study by the Miliken Institute, the University of Wisconsin, despite generating high amounts of licensing income and executing a large number of patents, had relatively low technology transfer and commercialization. This finding reveals that the university's faculty is highly innovative and inventive, but not very entrepreneurial. As a means to increase entrepreneurial activity on campus, the study noted that:

- For every 10-point increase in research activity, a centerpiece in the development of marketable technologies, an additional $1.7 million in licensing income is generated;

- Start-ups increase as tech transfer offices age, for every 10 years in existence, 1.5 more start-ups occur; and,

- For every $1 invested into offices of technology transfer staff, such as those at WARF or WiSys, more than $6 in licensing income is generated.

These numbers illustrate the benefits that can be reaped from long-term commitments to offices of technology transfer. Other ways to encourage entrepreneurialism at universities and research institutions include:

Encourage a "culture" of entrepreneurship in universities and government. First and foremost, it is important to encourage entrepreneurism and minimize any adverse perceptions that might be associated with "failure" in starting a business. To achieve that goal:

- Faculty should be encouraged to pursue entrepreneurial ventures, collaborate with private industry, commercialize research results, begin/enhance business plan contests, and pursue entrepreurial ventures without penalty.

- University administrators, from the top down, should offer leadership, provide incentives to faculty for entrepreneurial endeavors, replicate successful entrepreneurial programs from other universities, and augment and incorporate interdisciplinary entrepreneurial and business-management courses more fully into all university curriculums.

- The state should support existing business incubators, such as University Research Park and Milwaukee Research Park, and encourage the growth and development of other incubators, act as the clearinghouse for benchmarking and evaluation procedures for researchers turned entrepreneurs, ensure that long-term financial commitments are made to university tech transfer offices, maintain a well-trained, well-educated workforce and ensure that there is an ample supply of risk capital available for early-stage start-ups.

The public benefits derived from entrepreneurial activity at universities are numerous and they continue to grow. From R&D to tech transfer to the commercialization of new technologies to local economic development to job creation to attracting bright individuals to Wisconsin, the impact of university-based entrepreneurial activities represent an increasingly important spoke Wisconsin's overall economic development strategies.

Wisconsin Technology Council

Vision 2020:
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Outreach & Public Policy

Expanding the mission of the Wisconsin Health and Educational Facilities Authority

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Successful WHEFA-backed projects include:

- *$19.7 million in new money for **Reedsburg Area Medical Center** in Reedsburg*
- *$10 million in new money for **Amery Regional Medical Center** in Amery*
- *$37.1 million in new money and refinancing for **Bellin Memorial Hospital** in Green Bay*
- *$12 million in new money for **Concordia University Wisconsin** in Mequon*
- *$13.4 million for refinancing for **Wisconsin Illinois Senior Housing** in Lake Geneva, Elkhorn, Wild Rose and Ripon*

Leveraging the financial power of a cost-effective resource

What would you say if you knew Wisconsin has a time-tested and efficient financing tool in its economic development toolbox – but that state law prevents its full and most efficient use?

You might reply that it's time to consider measured but immediate changes in the law so that Wisconsin can take advantage of an economic development edge in today's competitive world.

That scenario is not fictional. It describes the Wisconsin Health and Educational Facilities Authority, which has been providing active capital financing assistance to Wisconsin non-profit health-care institutions for more than 26 years.

Since its first financing was closed in 1979, WHEFA has issued more than 550 bonds for more than $11 billion. More than 180 health and education borrowers have been able to access the capital markets at federally tax-exempt interest rates.

Over time, WHEFA's statute has been expanded to include the issuance of bonds for the benefit of independent colleges and universities, independent K-12 schools, continuing care facilities and health education centers. Interest cost savings from authority financings are reflected in lower costs to the consumer through the rates, fees and tuition established by the borrowing institutions.

The credit supporting any authority bond issue is the credit of the borrowing institutions involved. The availability of financing depends in each case upon the credit-worthiness of those institutions. In short, bonds issued by WHEFA are not a debt, liability or "moral" obligation of the State of Wisconsin. In most cases, interest paid on authority bonds is exempt from federal income taxation, resulting in materially lower financing costs to the borrowing institution. However, interest on bonds issued by the authority is not exempt from present Wisconsin income taxation. Contrast that with most other states, where the interest is also exempt from state income taxation.

A recent example of the efficiency of WHEFA is the $117-million joint research facility being constructed by the Medical College of Wisconsin and Children's Hospital and Health System. When dedicated in 2007, the new facility in Milwaukee County will provide shared research space and two wings of laboratories, one for the Medical College's Biomedical Research Building and the other for the health system's new Children's Research Institute.

From idea to completion, this project will have taken just three years compared to seven years typically needed for similar projects approved by the State of Wisconsin Building Commission.

WHEFA and the State Building Commission

It is important to note that WHEFA and the State Building Commission are not "competing" organizations; one serves 501c3 groups, the other government. However, greater use of WHEFA for joint public/non-profit projects could create additional efficiencies. For example, bonds issued by WHEFA, while exempt only from federal taxation, have become competitive with state bonds based on the amount of interest accrued over the life of the project. Some of the competitiveness stems from the downgrading of Wisconsin's bond rating, but there is some evidence to suggest that WHEFA projects may be between 15 and 20 percent cheaper than those authorized through the Building Commission process.

As state bonding levels approach the upper end of their statutory limit, it may make sense to turn to WHEFA in those cases where its non-profit authority could be more quickly leveraged. This could avoid a "backlog" of projects. For research facilities, which require the most updated technology and which are based on rapidly evolving science, such delays are potentially troublesome. Also of concern are archaic building requirements imposed on new construction. From outdated equipment requirements to unnecessary building specifications, the state building process can create undue red tape for our state's most promising researchers and economic developers.

What can Wisconsin do?

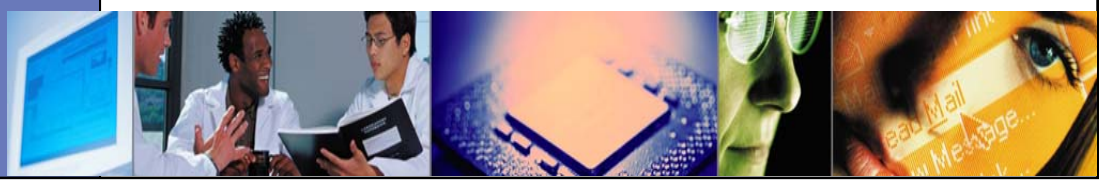
As the state looks at offering tax-exempt financing to stimulate and support its economy and its 501c3 institutions, additional legislative eligibility could be given to WHEFA. Sectors and potential borrowers could include home health providers, applied research and new product development organizations, associations and consortiums involving 501c3 partners, and cultural facilities.

Purposes for which borrowed funds could be utilized could be expanded to include working capital -- to the extent permitted under federal law.

Certain projects perceived to be beneficial by the state, such as investment in information technology, the life sciences or other sectors, could be enhanced by legislation which offered a state tax exemption for such purposes. As a starting point, the Legislative Fiscal Bureau could compare the costs associated with the MCW-Children's Hospital Research Facility with similar UW System projects to determine how much is being saved through the WHEFA process.

All of these initiatives would result in more effective access to capital, thus strengthening these important sectors of our economy. Similar legislative initiatives, in full or in part, are in place in Missouri, Iowa, Minnesota, Georgia and Michigan.

The mission of the Wisconsin Health and Educational Facilities Authority is to assist all eligible Wisconsin health care and educational institutions to obtain and maintain access to the broadest range of low-cost, private capital market financing. That mission would not change with new eligibility criteria – but it would be amplified to better fit a changing and more competitive world.



Wisconsin Technology Council

Vision 2020:
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Technology Development

The Biomedical Technology Alliance: Building Milwaukee's high-tech capacity

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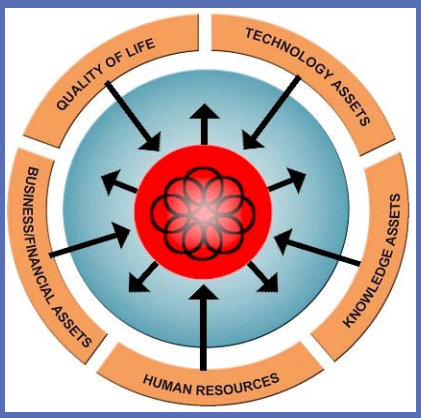

The National Institutes of Health is the world's foremost medical research catalyst and the federal focal point for medical research in the United States. It recently recognized interdisciplinary biomedical research – and the centers that house such research – as key to accelerating the pace of scientific discovery and technology transfer. Long organized into distinct, departmentally segregated specialties, researchers and institutions are only beginning to understand the value that collaborative, interdisciplinary research offers in solving complex biomedical problems.

Although the concept is still new to some in medical research, Wisconsin was an early adopter of the interdisciplinary research model. Upon completion, the Medical College of Wisconsin's Children's Hospital, the Marshfield Clinic's Laird Center for Medical Research and UW-Madison's Institutes for Discovery will represent some of the world's leading research centers, underscoring Wisconsin's position among the leaders in biomedical research.

Despite MCW, UW-Milwaukee, and other Milwaukee-based academic institutions' demonstrated ability to annually attract some $180 million in research dollars – and the promise to attract even more with the opening of MCW's Children's Hospital – the Milwaukee region lags behind the nation's 50 biggest metro areas in terms of attracting competitively awarded federal research dollars. It ranks just 36th among that group, according to the Public Policy Institute.

Many successful tech-based states have two academic research centers. In Michigan, for example, it's Ann Arbor and East Lansing. In Illinois, it's Chicago and Champaign-Urbana. In Iowa, Ames and Iowa City are the research poles. California has nine research centers and leads the nation in attracting R&D dollars.

While Milwaukee does not have a single institution the size of UW-Madison ($764 million in R&D in 2004), it has a collection of strong institutions that are willing to work together. Regional cooperative efforts, notably those such as the Biomedical Technology Alliance (BTA), can maximize the research funding attracted by individual institutions by leveraging the existing strengths of member organizations.

Why the Biomedical Technology Alliance?

Modeled after the highly successful Minnesota model, the BTA is considered crucial to enabling Wisconsin to compete with other national and international biomedical clusters. Key to its success as an economic development catalyst are the cross-institutional partnerships that will be forged across five academic campuses: MCW, UW-Milwaukee, Marquette University, Milwaukee School of Engineering and UW-Parkside.

Officially formed in 2004 to foster research collaboration and commercialization, the BTA concept has already resulted in a high-profile partnership between researchers at Marquette University and UW-Milwaukee that led to a licensing agreement with Bristol-Meyers Squibb. Among the other strengths in the Milwaukee-area research base that are expected to be tapped by the alliance are:

- Proteomics
- Bioinformatices
- Biopreparedness
- Bioengineering
- Neuroscience
- Aquatic biology
- Detection technologies
- Medical imaging
- Physiology
- Biochemistry
- Molecular biology

Funding for the Biomedical Technology Alliance

Though slated to receive $2.5 million in the 2005-06 budget to sustain the efforts of the alliance, just $500,000 – one-fifth of the original commitment – was ultimately released, severely impairing the BTA's efficacy as a regional research engine. In fact, of the more than 20 grant applications to the BTA – all of which include researchers from more than one academic institution in southeastern Wisconsin – totaling over $2 million, just 11 research projects worth $1 million were able to be funded due in large part to the underfunding of the BTA.

In order to ensure that the future viability of the alliance are not hampered, and that the progress already made is not lost, it is the recommendation of the Wisconsin Technology Council that the full $2.5 million be released to the alliance to advance the important work being conducted by Wisconsin's biomedical community.

Advances in Research at the Biomedical Technology Alliance

Although full funding for the BTA was proposed in stand-alone legislation during the 2005-06 session of the Legislature, debate regarding the alliance's ability to conduct human embryonic stem cell research ultimately stalled the bill's progress. It should be noted that only one of the BTA partners - the Medical College of Wisconsin - has engaged in human embryonic stem cell research of any kind.

All science evolves quickly, and the same is true with stem cell technologies. Recent announcements indicate scientists may be discovering new techniques to generate human embryonic stem cell lines from embryos while fully preserving the embryo's potential for life. This and other developments are illustrative of the unexpected – and quick – turns that the science behind this bourgeoning field can take.

Because a broad interdisciplinary research base is critical to the success of the BTA, it is important that research restrictions not put the overall program at a disadvantage in the state, the nation or the world. In the 21st century, science moves at "mind" speed, and the direction that it takes is often unanticipated.

Central to the Biomedical Technology Alliance is creative collaboration, the convergence of information and ideas from many different people and sources. By breaking down traditional disciplinary boundaries, invention is accelerated as the work of one research is reinvigorated with new knowledge from outside fields of study.

Wisconsin Technology Council

BiomedicalTechnologyAlliance

Vision 2020:
White Paper Series

Technology Development

The Importance of Industry-led Research & Development (R&D)

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Fast Facts:

- *Science & Engineering (S&E) occupations, many of which are primary contributors to R&D operations, are projected to increase 70 percent faster than the overall growth rate for all other occupations from 2002 to 2012.*
- *The public rate of return on private R&D averages 50 percent, and can achieve 100 percent.*
- *In 2001, the most recent year for which data are available, U.S. Industry spent more on tort litigation than on R&D ($184 billion versus $205 billion).*
- *Wisconsin R&D expenditures represent just 1.83 percent of GSP, below the national average of 2.71 percent and below all but one of the surrounding states.*

Sources: National Science Foundation, National Academy of Sciences & Wisconsin Policy Research Institute

Creating incentives for industry investment

Fueled by a knowledge-based workforce, high-technology industries are increasingly becoming the drivers of global economic growth. In fact, even during the slow growth period between 2000 and 2003, high-tech industries grew at nearly four times the rate of all other sectors. Over the 23-year period from 1980 to 2003 the statistics are equally staggering: High-tech industries grew at an average annual rate of 6.4 percent compared with 2.4 percent for other manufactured goods. There is little doubt that growing a competitive high-technology sector is crucial to Wisconsin's success in the Knowledge Economy.

Because of the significant amount of knowledge-based inputs that go into high-tech industries, these firms tend to be leaders in developing innovative new products and processes. In turn, those innovations beget gains in market share, increased productivity and new product development. Because of the innovation that takes place within these firms, they also tend to be R&D intensive industries. It goes hand-in-hand then that R&D is not only important to the advancement of knowledge, but also to the economic future of our state.

In addition to the obvious economic value that the $200 billion in R&D industry could add to our state's revenues, R&D intensive industries also add value to the economy in other ways. For instance, they:

- Develop technologies that bring new products and services to the marketplace;
- Produce higher quality jobs and pay higher salaries;
- Exhibit a positive correlation with performance measures such as sales growth and share price;
- Are able to maintain a competitive advantage in an increasingly global market;
- Export more of their products;
- Develop high value-added products;
- Use resources more productively; and
- Contribute to higher standards of living and long-term productivity growth.

However, because the ancillary benefits of R&D to the economy as a whole greatly exceed privately appropriable returns, private industry tends to "under-invest" in this publicly beneficial activity.

The Future Impact of R&D in Wisconsin

In Wisconsin this is especially true. Despite the presence of the one of the most well-funded research institutions in the country (fourth behind only Johns Hopkins, UCLA and the University of Michigan System) and academic R&D expenditures totaling nearly $1 billion in fiscal 2004, Wisconsin ranks a disappointing 27th in industry R&D expenditures. Both neighboring Minnesota (11th) and Illinois (20th) rank above Wisconsin according to 2003 National Science Foundation (NSF) figures.

Across the nation, industry provides some two-thirds of all R&D funding and will increasingly become a pivotal indicator of a state's economic vitality. This fact is highlighted by the Industrial Research Institute's (IRI) findings for industry R&D trends for 2005 which revealed that companies are:

- Shifting the focus of their R&D spending from directed basic research and support of existing business to new business projects;
- Increasing total expenditures on R&D;
- Increasing hiring of new graduates; and,
- Increasing participation in alliances and joint R&D partners.

Keeping Wisconsin competitive

In order for Wisconsin to maintain and eventually enhance its competitiveness in the knowledge economy, the Wisconsin Technology Council recommends enactment of the following policies.

Adopt tax credits / refunds targeted at specific high-tech, high-growth industries. Although all industries benefit from R&D, certain industries have relatively low R&D intensities such as the utilities, finance, insurance, and real estate industries. According to the NSF, just six industries account for three-quarters of industry-based R&D and 95 percent of federally funded industry R&D. Those industries include the computer and electronic products, chemicals (including pharmaceuticals and medicines), computer-related services, aerospace and defense manufacturing, R&D service industries and automotive manufacturing. Tax credits / refunds should be targeted at those industries which have the highest R&D intensity and in which Wisconsin has a competitive advantage such as biotechnology/ life sciences, medical devices, medical imaging, computer design, data processing, control systems, and others.

Enact a "Super R&D Tax Credit." Maine has with great success spurred industry-led R&D with the enactment of a Super R&D Tax Credit. Firms are eligible for the credit if their qualified research expenses increased by at least 50 percent over their average expenditure for the previous three years. Qualifying companies are awarded a credit in an amount equal to any new spending in excess of their three year average.

Create a Small Business Innovation Research (SBIR) program at the state level. The federal SBIR program provides more than $2 billion a year to small companies that are developing leading-edge technologies. Since its inception in 1982, the SBIR program has proven to be a successful mechanism for fostering and commercializing high-tech innovations. The program is meant to help small businesses compete with large enterprises that have more resources for research and development and subsequently stimulate the U.S. economy by encouraging the development and commercialization of new technologies. Enacting a similar program at the state level would not only stimulate that same kind of entrepreneurism, but it would also prepare inventors to seek federal SBIR funding, a process that is notoriously complex.

Enhance the competitiveness of Wisconsin firms competing for federal SBIR/STTR funding. Attracting funding for proof-of-concept related expenditures is critical to the success and the longevity of early-stage firms. While SBIR/STTR funding can mark a turning point in a company's life-cycle, the process is long and complicated and the amount of funding available continues to shrink. That is why it is critical for firms to have adequate mentoring and logistical assistance available both through formal state networks, such as the Wisconsin Department of Commerce, the Wisconsin Entrepreneurs Network, the Governor's Business Plan Contest, the Wisconsin Innovation Network, university programs and informal networks, such as local inventors clubs.

Wisconsin Technology Council

Vision 2020:
White Paper Series

Technology Development

The Industrial and Economic Development Grant Program: An Economic Development Tool

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Advancing Public-Private Partnerships

To give Wisconsin's economy a more competitive edge and to increase its per capita income above the national average, a situation which the state has not enjoyed for some time, new Wisconsin discoveries and technologies must be used to fuel innovation in products and services on a global scale. Inevitably, businesses and academic institutions will incrementally cause this to happen on their own, but the process can be accelerated by facilitating collaboration between the existing public and private infrastructure.

Because of Wisconsin's deep bench of world class technologists and research institutions, public–private partnerships are already beginning to positively affect the state's high-tech sector. Some of Wisconsin's most notable partnerships have resulted in researcher-led spin off companies and innumerable transfers of technology. Examples of notable public-private partnerships include those that exist between:

- UW-Madison and the Wisconsin Alumni Research Foundation (WARF);
- UW-Green Bay and the Paper Technology Transfer Center;
- TechStar and the Medical College of Wisconsin, the UW-Milwaukee, Marquette University, the Milwaukee School of Engineering, and UW-Parkside;
- The UW System and WiSys Technology Foundation; and,
- The Marshfield Clinic and WiSys.

These broad, far-reaching partnerships are critical to maintaining Wisconsin's strong tradition of researcher-led invention and innovation.

While support for the infrastructure that makes these relationships possible is vital to the continued success of Wisconsin's academic institutions, not all public-private partnerships need be as large scale financially or geographically. In fact, maintaining and cultivating an interconnected network of support programs that encourage tech transfer and entrepreneurism among faculty and academic staff are critical, especially in the formative stages of a research idea or project.

How can Wisconsin best utilize its scarce resources?

Scarce public resources must be carefully targeted at those programs that are most effective at generating the desired effect of encouraging economic growth among Wisconsin's high-tech sectors. Strategic planning of how to use limited state resources in this effort reduces waste and can result in the application of state resources to technology areas or projects that will produce a high, sustained level of economic growth for Wisconsin. Certainly, not all programs deserve increased support, but we should accelerate the progress and increase the capacity of those programs that do.

Increase funding for the Industrial and Economic Development Research Program. In 1987, recognizing that the transfer of public sector technology to the private sector will give private sector actors the tools to solve problems unique to Wisconsin industries, one key program was established to enhance the relationships between UW System institutional research and Wisconsin's private industries. The Industrial and Economic Development Research Program, funded by the state and administered by UW System, provides competitive seed grants to researchers and faculty for seeking to perform applied, innovative research on technologies that have near-term potential to improve the state's economy.

Grants from the program have typically been awarded in the $35,000 to $40,000 range. The program has been well used and it has served to leverage private funds many times greater than the initial grant. However, many promising technologies have gone unfunded due to the program's limited resources. Increasing funding from $1.6 million to $2.5 million would provide significant opportunities for proponents of promising technologies to seek leverage from other sources and continue their commercialization process.

Because many grant programs often fund narrow research, not the type that will bring together the critical mass of resources necessary to start firms, ensuring that programs like the Industrial and Economic Development Research program remain healthy is vital to the interdisciplinary research models that represent the future of academic research.

Wisconsin has technology assets and a "tech transfer" process to rival virtually any state. However, it needs more tech-savvy leaders in private industry and government to point the way to greater commercialization of that technology to help create high-wage jobs and a better quality of life for Wisconsin. The enhancement of the Industrial and Economic Development program will make great strides towards achieving that goal.

WISCONSIN TECHNOLOGY COUNCIL

Vision 2020:
White Paper Series

Technology Development

Clusters: A New Approach to Economic Development

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Focusing on what Wisconsin does best

The role of technology clusters in accelerating the development of successful new businesses has been widely reported. There is growing evidence that nurturing the state's key industries can improve the competitiveness of businesses within those industries, in turn boosting the state's overall economy. In October 2001, the U.S. Council on Competitiveness published a report citing the benefits of regional clusters of innovation, benefits that it believed could form the foundation for future U.S. competitiveness in global markets.

TECHNOLOGY CLUSTERS

Structure	Community based, private sector driven
Complement	10 to 15 independent public and private businesses
Access	Access to local Research Centers of Excellence
Leadership	Led by 1 to 3 large anchor companies
Influence	Surrounded by 10 to 12 small, emerging companies
Support	Supported by local angel network and regional VCs
Advice	Supported by local legal, financial, and consulting services

Source: UW-Extention

What is a technology cluster?

A technology cluster is a geographic concentration of interconnected companies, specialized suppliers, service providers and associated institutions in a particular field that collaborate through partnerships that better prepare members to face the challenges created by the global marketplace. Technology clusters combine the market knowledge and expertise of businesses within the industry with the shared resources of technological research, education and workforce development, and regulatory relationships with all levels of government.

The philosophy behind clusters is simple: Large and small companies in similar industries achieve more by working cooperatively rather than individually. Clusters are export orientated, are of a significant size, experience rapid growth, have a regional concentration that is higher than the national average and have business interdependence with competitors, buyers and suppliers. Successful technology clusters enhance business competitiveness by improving productivity, fostering innovation and accelerating the commercialization of innovations. The environment of a technology cluster, with its built-in infrastructure, creates a significant competitive advantage.

"Technology clusters solve common problems and exploit shared opportunities – a powerful combination for Wisconsin."

~John Torinus, CEO, Serigraph Inc.

"In healthy regions, competitiveness and innovation are concentrated in colusters of inter-related industries in which the region specializes"

~Michael Porter, co-founder of Monitor Group, and one of *Thinkers 50* most influential living management thinkers

Why Cluster?

In recent years, Arizona, California, Connecticut, Minnesota and Utah – states which have seen significant improvements in their own high-tech economies – have adopted clustering techniques as a part of their overall economic development strategies. Clusters are an attractive economic development strategy because they encourage the creation of new companies, products and employment opportunities in high-skilled, high-wage jobs.

The Wisconsin Department of Commerce has also identified a "cluster-based" approach to economic development. By adopting policies that enable state government to move from assisting one business at a time to working with a collaborative group of firms in key industry sectors, Wisconsin will be more equipped to assert its competitive advantage in key industries such as IT, biomedical research, advanced manufacturing and biofuels and other biobased products.

Nurturing Successful Clusters: What can Wisconsin do?

Establish policies which necessitate industry cooperation rather than industry competition. Businesses operate beyond the local political boundary in which they are located. A cluster-based economic approach therefore demands a new approach that goes beyond these typical political boundaries. Interdisciplinary research strategies such as the Biomedical Technology Alliance, regional growth strategies and directing resources towards established and bourgeoning industries to be used for identifying and sharing best practices will facilitate in the development of clusters and result in more even economic development activity across the state.

Support public-private R&D. Clusters are public-private collaborations between research institutions, key anchor companies and smaller growth companies. By encouraging collaboration at the R&D level, clusters grow more quickly because of initial investments in two-way communication and knowledge sharing. Good examples are the Global eCommerce Consortium at the UW-Madison, and some of the 14 different research consortiums organized through the UW-Madison College of Engineering.

Improve Wisconsin's positive business climate. Though Wisconsin has begun to streamline its regulatory climate, there must be perpetual efforts to simplify and speed the process. One-stop-shops for licensing/regulatory applications, making more predictable the amount of time and the outcome of permitting processes, improving the liability climate in which business operate and ensuring the existence of a well-maintained infrastructure of roads, telecommunications and air travel at a statewide level are all important in the development of strategic clusters.

Encourage entrepreneurship. It is important to encourage a culture of entrepreneurism and to minimize any adverse perceptions that might be associated with "failure" in starting a business. Much of the Midwest, including Wisconsin, has adopted a risk-adverse culture in which failure is not greeted as a learning experience but as a career-ending mistake. Successful innovations, processes and technologies – the cornerstones to Wisconsin's future economic success – are the product of several iterations of research and should be recognized and accepted as such.

Ensure an ample supply of risk-capital. Adequate supplies of risk-capital, including venture capital, angel investments and federal SBIR/STTR funding, are necessary to ensuring that early-stage firms located in clusters have the resources they need to move their products and innovations beyond the proof-of-concept stages into marketable technologies and products. The lack of access to capital is the primary reason for entrepreneurial failure, a high cost, especially when small businesses are responsible for 70 percent of all new job creation in Wisconsin and nationwide.

Wisconsin Technology Council

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Outreach & Public Policy

Moving People, Power and Ideas: A Strong Infrastructure = A Strong Economy

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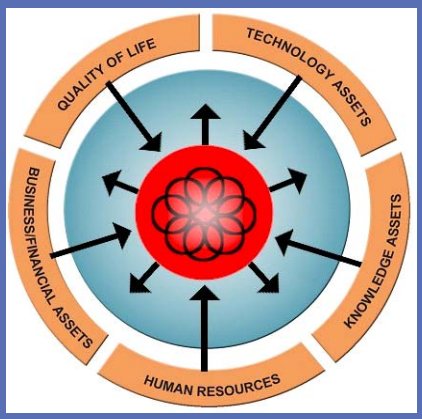

Wisconsin's infrastructure at a glance:

- *11,755 miles of state and Interstate highways*
- *13,589 bridges spanning the state's roadways*
- *Annual vehicle miles of travel (VMT) on Wisconsin roads is 60.4 billion miles*
- *134 public use airports*
- *About 5.2 million people boarded commercial flights in Wisconsin in 2004*
- *Wisconsin airports handle over 122,000 tons of cargo and mail each year*
- *3,400 miles of track*
- *Freight railroads carry more than 107 million tons of cargo each year*
- *Two Amtrak passenger train routes carry a half million passengers annually*

Source: Wisconsin Department of Transportation

Wisconsin has a tradition of manufacturing excellence. It also has a tradition of educating workers who can adapt to changing times. If Wisconsin acts now to retool its industries and its schools, it *can* compete in a changing world. There is more to the equation, however. Wisconsin must build an infrastructure that supports business growth, the cornerstones of which continue to include traditional inputs such as the transportation system, the telecommunications system and energy reliability, among others.

A stronger infrastructure for the knowledge-based jobs and businesses of Wisconsin's future means a stronger foundation for businesses and workers in *all* sectors. That is because commercial applications of technology will be essential to the competitiveness of virtually every business sector in Wisconsin, from agriculture to manufacturing, from business services to tourism.

Interstates and roadways

To illustrate the importance of a sound infrastructure, consider Wisconsin's dairy industry. Never would it have risen to be No. 1 in the nation if not for the construction of a farm-to-market road system that allowed farmers and cooperatives to speed milk, cheese and butter to the grocery shelves. In the "Real-Time Economy," much of the intellectual "product" can travel via the Internet. However, the people who create that product cannot travel through cyberspace. That is why Wisconsin must focus on building a transportation system that suits the state's 21st century needs.

Wisconsin has 743 miles of Interstate highways, which represents less than 1 percent of the state's 113,700 miles in roadways. But those 743 miles carry 18 percent of the traffic. The state Department of Transportation estimates that traffic on Wisconsin's I-system is up 140 percent in 25 years, while capacity has grown by just 35 percent.

The interstate system is a massive investment in Wisconsin's infrastructure. That investment must be protected. **Even in an era when people are increasingly living and working on the information superhighway of the Internet, our economy still depends on the old-fashioned highways of the Interstate.**

Air travel

A frequent complaint about Wisconsin airline service, especially by business travelers to and from the East and West Coasts, is that it's not a "direct flight" state. That lament may be more perception than fact, but there is still every reason for Wisconsin to work for improved air links so that it is more directly connected to the global economy. For example, the rise of Austin, Texas, as a high-tech city was due in at least some part to the fact that it was able to secure non-stop flights to San Francisco and Boston by negotiating a business relationship with American Airlines.

General Mitchell International Airport in Milwaukee is an example of how the facts do not support the perception that Wisconsin is inaccessible. This airport, operated by Milwaukee County, is served by 13 airlines that offer about 235 daily departures and a like number of arrivals. About 90 cities – including Boston, which is home to many of the nation's private equity backers – are served nonstop or direct from Mitchell. A 2006 analysis showed that between 1996 and 2005, 3,549 direct and indirect jobs had been created; business revenue grew by $96 million and the visitors industry grew by $315 million.

Leading members of the business community indicate that adding more nonstop routes has a significant impact on economic development, particularly for high-tech industries such as biotech and IT. **When venture capitalists and other prospective investors, scientists, consultants and employees can arrive and return from destinations without downtime, it makes a big difference in the "destination" versus "fly-over" equation.**

High-speed and commuter rail

Establishment of a high-speed rail network in the Upper Midwest would also go a long way toward bringing Wisconsin closer to global markets. Keys to the success of an advanced rail network are frequent service, convenient schedules and competitive travel times. An initial system based on the "Midwest Regional Rail Initiative" would serve all primary and secondary population centers. Trains would travel up to 110 miles per hour on primary corridors. Frequencies and speeds could be increased as the network gains ridership.

Another initiative of importance is the proposed Kenosha-Racine-Milwaukee commuter line, called the KRM Commuter Link, which would tie into Chicago's Metra system through a train change. The projected cost to develop the service is $237 million. It is expected to cost another $14.7 million a year to operate, with fares covering $3.8 million. **Commuter rail lines run on existing freight tracks, connecting a major city and its suburbs. They're designed for local trips, unlike intercity Amtrak trains such as the Milwaukee-Chicago Hiawatha line. In many major cities, commuter rail lines have led to dramatic development around stations.**

Telecommunications

Wisconsin is still a state of small towns and rural communities. Some of these areas lack the critical mass of people, institutions and capital to easily attract high-tech businesses. But that does not mean they are bereft of assets. Rural communities and small cities can offer a quality of life that is attractive to many workers. They can supply highly motivated workers with a commitment to quality. They can offer lower business costs for land and construction. For rural Wisconsin to prosper in the Real-Time Economy, however, it must fully participate in the global communications revolution.

To provide more certainty in regulatory issues affecting telecommunications companies doing business in Wisconsin, the state should seek tighter timelines on review periods by the state Public Service Commission. This could speed the introduction of new technologies and reduce the costs of providing such technologies. Such a change would be consistent with recent regulatory changes in the natural resources area. In addition, state laws governing broadband investment and the "unbundling" of services should more closely mirror those in surrounding states as well as federal requirements. Significant departures from laws in other jurisdictions could slow the deployment of broadband, especially in rural areas. **To expedite improved cell phone coverage in rural Wisconsin, the state should encourage local governments to streamline the approval process for installation of towers. The state should also enhance competition by striving for a more level playing field for different providers, such as cable companies and phone companies.**

Energy

There is little standing between Wisconsin and periodic shortages of electrical power. If our economy continues to grow, as we expect it will, the state could expect to spend much of its peak energy seasons on the verge of brownouts. Even with aggressive conservation and efficiency measures, the demand for electricity will grow in Wisconsin by at least 2 percent per year; the growth rate was 3 percent per year during the 1990s.

That's why it falls to policymakers – and citizens – to weigh carefully the effects of "not in my backyard" responses to proposals to add to Wisconsin's generation or transmission capacity. If we keep saying "no" to everything, the day will eventually come when Wisconsin runs short of electrical power for its homes, schools and businesses.

Wisconsin is running out of options. Either it accepts reasonable proposals to add electrical power generating capacity, including a new generation of nuclear power, or it could easily run short on power during the hot summers to come. The latter option is unacceptable – unless Wisconsin wants a permanently crippled economy.

Without a rational approach to meeting the state's energy needs, Wisconsin will be hampered in its bid to grow its economy. That especially includes emerging high-tech businesses, which require high-quality, reliable electricity.

Wisconsin Technology Council

Vision 2020:
White Paper Series

Technology Development

'Rust Belt' no more: Traveling the "I-Q Corridor"

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Fast Facts :

- *Since 2005, Wisconsin has created a system to provide state tax credits for investments in "qualified" technology-based start-up companies. A unique public-private effort is the Wisconsin Angel Network, which has grown to include 24 investment groups that have the ability to review hundreds of deals made available through an on-line "pipeline."*
- *Wisconsin has recognized centers of research excellence in tissue regeneration, personalized medicine, error-free hospitals, genetically modified organisms, zoonotics disease control and small molecule pharmaceuticals. Its bioinformatics and medical devices clusters are strong and growing.*

Wisconsin lies at the core of the I-Q Corridor, a region rich in *ideas*, *innovation*, *investment capital* and some of the world's most exciting *intellectual* property – especially in biotechnology, biofuels, information technology and advanced manufacturing.

The fifth "I" in the I-Q Corridor is the *interstate* highway system that binds Chicago, Wisconsin and Minneapolis-St. Paul, Minn. That corridor contains some of the nation's leading research universities, well-educated tech workers and thriving tech-based companies at all stages of development. The region also houses significant capital to invest in early-stage companies – the job engines of tomorrow.

A distance of only 400 miles separates two dynamos of the Midwest economy, Chicago and the "Twin Cities" of Minneapolis and St. Paul. That's a shorter distance than what separates San Diego, California's biotechnology capital, from the "Silicon Valley" in northern California.

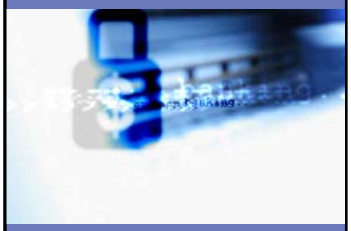
Strategically located between Chicago and the Twin Cities and traversed by Interstates 90 and 94 lies Wisconsin, one of the nation's fastest-growing technology states. Milwaukee, Madison, the Janesville-Beloit area, the Fox Valley and Green Bay market, Marshfield and the Chippewa Valley acts as spokes along the hub of the I-Q Corridor.

Although some people in Wisconsin cling to the belief that economic development is accomplished by Madison bashing Milwaukee or Wausau one-upping Stevens Point, the real competition in the 21st century will take place globally. Identifiable regions such as the I-Q Corridor, where the "Q" stands for *quality of life, education, workforce and environment*, will flourish if they can produce globally competitive goods and services.

Here are some examples of Wisconsin's high-quality ideas, innovation, intellectual property and investment strategies:

- Biotechnology and the life sciences is a $5 billion industry in Wisconsin, making up a cluster of about 200 companies employing 28,000 people. In 2006, it was named one of the top five biotech regions in the world by FierceBiotech. The state is the birthplace of human embryonic stem-cell research and, over time, has produced discoveries in Vitamin D, DNA and RNA, Magnetic Resonance Imaging, human collagen, genomics and internet technologies.
- Wisconsin's academic research institutions attracted nearly $1 billion in funding for research and development in fiscal 2004, with the UW-Madison leading the way with about $760 million of the total.
- Wisconsin provides a complete resource package, from start-up financing to manufacturing and production assistance, uniquely designed to maximize profitability and success for all tech-based ventures. The Wisconsin Entrepreneurs' Network (www.wenportal.com) provides hands-on services to entrepreneurs from all sectors. The Wisconsin Department of Commerce has a number of coordinated programs aimed at tech-based entrepreneurs and investors.

Wisconsin has leading research facilities, growing capital markets, strong partnership organizations, a thriving cluster of science companies and a healthy climate for business, academic and government cooperation. And yet, it's the combined power of the region that makes the "I-Q Corridor" a vibrant location for biotechnology, information technology, advanced manufacturing, biofuels and bioproducts, and more.



Major tech-based companies in Wisconsin include:

- *GE Healthcare*
- *Firserv*
- *Metavante*
- *Epic Systems*
- *Promega*
- *Plexus*
- *Johnson Controls*
- *Rockwell Automation*
- *TomoTherapy*
- *Manpower*

Wisconsin Technology Council

A Brief History of Midwestern Innovation

In the Twin Cities, a long history of innovative companies and risk-taking investors has produced one of the nation's leading medical device clusters and leaders in agribusiness and information technology. The Minnesota Miracle may soon extend to biotechnology, due to the emergence of new state initiatives, cooperation between the University of Minnesota and the Mayo Clinic, and a burst of investment in research buildings.

Tech leaders in Minnesota have decided that the next wave of tech success will be interdisciplinary – with biotechnology, medical devices and IT melding into fields such as bioinformatics. That's increasingly the approach in Wisconsin, as well, where the UW-Madison, the Medical College of Wisconsin and the Marshfield Clinic are all taking an interdisciplinary approach to research and company spinoffs.

The Wisconsin Institutes for Discovery project in Madison will produce the only public-private interdisciplinary research center outside the East and West Coasts. The first phase of this project is being financed by $50 million from the state of Wisconsin, $50 million from the Wisconsin Alumni Research Foundation, and $50 million from Wisconsin natives John and Tashia Morgridge, who helped build Cisco Systems.

In Chicago, the tech economy is driven by a vibrant financial sector, a strong pharmaceutical base and the presence of leading academic and research institutions, such as the Argonne National Laboratory, Northwestern University, the University of Chicago and leading medical centers. In 2006, Chicago was the site of the Biotechnology Industrial Organization's international convention, which brought nearly 20,000 people to the Midwest.

The "I-Q Corridor" is more than a branding slogan. It's a place where Midwest technology, values and people meet the global economy.

What can Wisconsin do?

A number of formal and informal connections between the Chicago region, Wisconsin and the Twin Cities metropolitan area have been established in recent years.

- The Midwest Research University Network includes the UW-Madison, Northwestern University, the University of Minnesota, Argonne National Laboratory, the Mayo Clinic, the University of Chicago and the Medical College of Wisconsin among its 20 members.
- The Mid-America Healthcare Investors Network is an association of more than 48 venture capital firms from 14 states, with more than $2 billion under management. MHIN focuses on life science investment opportunities in the Midwest. These life science opportunities include companies involved in biotechnology, medical devices, bioinformatics, healthcare information technology, and healthcare services.
- Angel networks from northern Illinois have joined the Wisconsin Angel Network and have invested in Wisconsin deals. The Angel Network and the Tech Council have also worked with a number of tech-based groups in Minnesota.
- An "I-Q Corridor Summit" has been proposed within the June 12-13, 2007, Wisconsin Entrepreneurs' Conference in Milwaukee. Also, Milwaukee will be the site of the Mid-America BIO Venture Forum, Sept. 24-26, 2007. Those two venues will build upon the state's growing reputation for being a tech crossroads in the Upper Midwest.
- The Wisconsin Biotechnology and Medical Device Association is a leader among other Midwest BIO associations, coordinating joint projects where appropriate.
- State policymakers can begin to work with their counterparts in other states on an "I-Q Corridor Agenda" that could include pursuit of federal research dollars for major projects, such as high-speed rail and preserving the quality of the Great Lakes. More uniformity among state laws and regulations governing tech transfer and investments is another potential area of interest.

Vision 2020:
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Technology Development

Marketing the Creative Class

Developed by:
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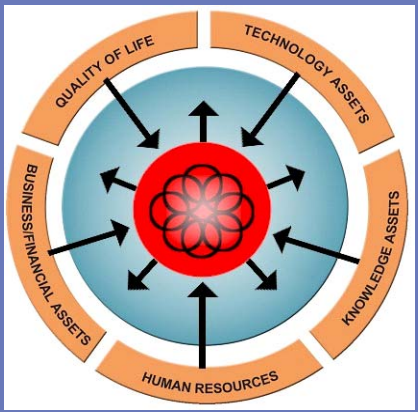

How Wisconsin Can Attract Workers

Cities and states have long competed over job growth, often working to improve their downtowns and images. Some even resorted to "smokestack chasing," or trying to lure existing businesses over state or city borders. The changing demographics of the early 21st century – hordes of soon-to-retire Baby Boomers – means the game has changed. Today, cities and states must fight to attract and retain educated 25- to 34-year-olds, a group that is far more likely than their parents to think about "place" over "career" when making choices about where to work and live.

- In Lansing, Mich., people can sample the city's night life by riding the "Entertainment Express" trolley – part of Michigan's Cool Cities Initiative.
- In Memphis, Tenn., employers pay for recruits to be matched with hip young professionals in a sort of corporate "Big Brothers and Big Sisters" program. Also in Memphis, a new biotech park is under construction within walking distance of Beale Street, the city's nightlife center.
- Cities such as Atlanta, Charlotte, N.C., Austin, Texas, and Portland, Ore., are booming because the combination of strong economies and active cultural settings are attracting young, educated people. In Portland, for example, employees at an advertising firm can watch indie rock concerts at lunch and play "bump," an abbreviated form of basketball, in the afternoon.

The tactics vary widely from one place to the next, as those examples show, but most states and cities have realized that building a strong "Knowledge Economy" in the 21st century means attracting the right kind of workers. That often involves a social climate that encourages creative people who, in turn, produce ideas and businesses.

Who are the "creative class" and why do they matter?

Studies have shown that economic prosperity in the Knowledge Economy is directly related to the presence of creative people in a community that is ethnically diverse, and which offers the ability for creative people to be themselves. Creative communities demonstrate a certain amount of disorder and even chaos. In contrast, well-ordered communities of homogeneous people do not encourage innovation. In such communities the demand for order usually overrides intrinsic human curiosity, the desire to explore, to invent and to build.

Wisconsin has a proud tradition of manufacturing and agricultural excellence. While the continued economic success of the state will inevitably rely on these sectors, significant growth is being charted in high-tech sectors, which include biotech and medical devices, information technology, business services, nanotechnology, advanced manufacturing, engineering and others. These emerging sectors and the jobs that accompany them are populated by what is often called the "creative class."

Regional economic growth is driven by the location choices of creative people, the holders of creative capital who prefer places that are diverse, tolerant and open to new ideas," wrote researcher Richard Florida, author of "The Rise of the Creative Class." Florida has spoken several times in Wisconsin.

Wisconsin cities such as Madison, which ranked first among small cities in Dr. Florida's "creativity rankings," have already proven their ability to adapt to the needs of the Knowledge Economy. Through organizations such as Spirit of Milwaukee and NEW North, other regions are doing their best to show off their "hip" sides to creative-class workers who may have outdated views of what Wisconsin has to offer. Examples of creative class "lures" include cities that are pedestrian and biker-friendly, distinctive neighborhoods, openness to artists and entrepreneurs, racial diversity, a mix of housing choices, proximity to colleges or universities, and a range of recreational activities.

Sending the Right Message Matters

In order to attract, retain and grow its own creative class, Wisconsin must stand out as a place where innovative people want to live and work. If existing or proposed laws, ordinances and constitutional amendments send the message that Wisconsin is not diverse or tolerant, the state will be placed at a disadvantage in the national and global competition for human capital. And without the right human capital, Wisconsin cannot grow a prosperous, knowledge-based economy.

As Midwesterners, we are often not good cheerleaders for ourselves. We find it easier to be humble than to be braggarts, and until recently, that strategy did not hamper our economic development efforts. Rather, our products – such as Harley Davidson motorcycles, beer and cheese – spoke for themselves. Now, as Wisconsin seeks to compete nationally and internationally for its own slice of the economic development pie, intangible knowledge exports are increasingly as important as commodity exports.

Because Knowledge Economy products can be difficult to quantify, however, Wisconsin's must be marketed as one in which knowledge inputs and the "creative class" are primary assets. Just as Wisconsin needs to attract investment capital, it must attract and retain human capital, as well.

With the information technology revolution and the increasing ease with which information and news can be transmitted, there are more messages with which Wisconsin must compete. Wisconsin must not only devote more resources towards the announcement of its arrival as a knowledge-economy "hot-spot," but it must also earn a reputation as being hospitable to entrepreneurs seeking to start new businesses and existing businesses seeking to expand.

Wisconsin Cities Creativity Rankings

City	*Overall Rank*	*Creativity Rank*	*High-Tech Rank*	*Innovation Rank*	*Diversity Rank*
Madison, WI	20	19	82	14	31
Milwaukee, WI	56	111	61	38	128
Appleton - Oshkosh - Neenah, WI	118	185	157	15	115
Eau Claire, WI	123	91	160	58	186
Duluth- Superior MN - WI	164	104	115	156	188
La Crosse, WI - MN	164	77	191	95	*not available*
Green Bay, WI	168	159	197	112	126
Janesville- Beloit, WI	216	162	256	86	181
Sheboygan, WI	231	248	236	63	195
Wausau, WI	252	191	263	195	195

Source: http://creativeclass.org, Richard Florida Creativity Group

Wisconsin has what it takes to be competitive in the Knowledge Economy, including these existing strengths:

- Many of Wisconsin's cities, especially those along the "I-Q Corridor," are well-positioned to plug into regional supply chains and economies. They also feature cultural attractions and lifestyles that can attract young workers.
- Businesses seeking to diversify their risks are looking not only towards urban centers, but also rural areas that are located in good transportation corridors and have a strong broadband and cellular telephone infrastructure.
- The work force is productive, cost of living is moderate and operating expenses, including land and energy costs, are competitive.

Wisconsin is a state that can attract "creative class" workers of all ages, but the message of inclusiveness and cultural diversity must be repeatedly reinforced.

Wisconsin Technology Council