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FOUR STRATEGIES FOR WISCONSIN'S HIGH-GROWTH ECONOMY

>>> Improve technology
development, delivery
and transfer

>>> Build Wisconsin's
supply of human capital

>>> Improve access to
capital for Wisconsin
entrepreneurs


>>> Enhance Wisconsin's
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The role of the » Tech Council



Tom Still, President



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The Wisconsin Technology Council is the bipartisan, non-profit science and technology policy adviser to the

governor and the Legislature, as reaffirmed through Executive Order 51. The Tech Council periodically issues “white papers” and special reports to assist those policymakers.

The ideas offered in the Wisconsin Technology Council’s 2012-13 white papers are intended to set the table for a renewed public discussion about improving the state’s tech-based economy.

They include emerging priorities as well as restatements and updates from previous white papers, legislative proposals or executive branch proposals. Some are based on our knowledge of innovative programs in other states. And some are ideas brought forward throughout the course of the year by entrepreneurs, researchers, investors and others who deal daily with issues affecting the tech-based economy in Wisconsin.

Some would suggest bold ideas won’t fly in Wisconsin for various political reasons. But that’s what some observers said about Wisconsin’s Act 255 investor tax credits program, which was enacted in 2005 and amended in 2009. That program is today cited as a national model for targeting tax credits around emerging tech sectors.

2012 WHITE PAPERS

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WISCONSIN TECHNOLOGY COUNCIL

How past white papers have contributed

Past white papers have contributed to a number of executive and legislative branch actions:

- Passage of the Act 255 investor tax credits
- Creation of the Wisconsin Angel Network
- Expansion of the scope of allowable bonding projects for the Wisconsin Health and Educational Facilities Authority
- Repeal of the shareholder wage lien law
- Improvements in laws governing entrepreneurial activity by University of Wisconsin faculty
- Improvements in processes and regulations vital to expanding broadband availability
- Extension of the “single-sales factor” sales apportionment for corporate income to technology and service firms in Wisconsin
- Support for the “Emerging Technology Centers” concept within the UW System, which was first envisioned as Centers of Excellence in the Tech Council’s *Vision 2020* report
- Support for an Interdisciplinary Research Center, also through *Vision 2020*, which became a policy underpinning for the Wisconsin Institutes for Discovery and Morgridge Institute for Research
- Broader recognition of the economic value of academic research and development in Wisconsin

- Deferral of capital gains taxes related to certain investments
- Creation of the I-Q Corridor branding concept and evolving multi-state relationships
- Creation of an Education Tax Credit for employers who want employees to further their education or training

Our four areas of priority

The 2012-2013 ideas are organized within key subject areas. Our broad priorities:

» **Improve technology development, delivery and transfer**

» **Build Wisconsin’s supply of human capital**

» **Improve access to capital for Wisconsin entrepreneurs**

» **Enhance Wisconsin’s startup and business climate**

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TECHNOLOGY DEVELOPMENT



TECHNOLOGY DEVELOPMENT

Proposals in this category fall under these broad categories:

- Build upon interdisciplinary clusters and “centers of excellence” first highlighted in *Vision 2020: A Model Wisconsin Economy*
- Support the creation of enhanced cyberstructure for Wisconsin, including but not limited to broadband development
- Work with the state’s congressional delegation to identify ways that Wisconsin companies and research institutions can help meet national science and technology priorities
- Work with partners, such as the Wisconsin Economic Development Corp., on building relationships between regional economic centers and emerging technology clusters

Clusters and centers of excellence

The technology “centers of excellence” identified by *Vision 2020: A Model Wisconsin Economy* have served as a compelling blueprint since unveiled in late 2002. These centers were envisioned as virtual or real centers in which different research disciplines would be leveraged to create opportunities and to transfer technology to the marketplace.



Potential research centers of excellence identified by *Vision 2020* were tissue regeneration, personalized medicine, error-free hospitals, genetically modified organisms, zoonotic disease control, small molecule pharmaceuticals, intelligent networks, mass data storage, nanotechnology systems, extreme materials, computing and communications and homeland security.

Over time, other interdisciplinary clusters have emerged in addition to those identified a decade ago. They include advanced manufacturing; biomanufacturing; water technologies; and energy conservation and generation technologies.

Wisconsin's manufacturing expertise is well known. On a per capita basis, Wisconsin is usually ranked No. 1 or 2 among all states in the percentage of its non-farm workforce engaged in manufacturing. However, the number of jobs in manufacturing in Wisconsin and nationally has fallen steadily over the past decade. There are sector-based exceptions to the rule. Companies engaged in power electronics, energy efficiency, building retrofitting, alternative energy production and deployment, fabricated

metal manufacturing, materials and composites, batteries and controls are examples of sectors that can buck the trend.

Biomanufacturing is another growth area that fits well within the Wisconsin economy. It is generally defined as the use of living genetically modified organisms or living genetically modified cells to manufacture a product. A variety of living genetically modified organisms, such as bacteria, fungi, algae, plants and animals, can be used for biomanufacturing.

Biomanufacturing can address critical processes in the manufacture of biopharmaceuticals as well as non-health related products. Examples of biomanufacturing processes includes those that could be used to manufacture products such as recombinant proteins when used as vaccines, therapeutics or as molecular probes for diagnostics; cell- or tissue-based biopharmaceuticals such as engineered cells and engineered tissues as therapies, including complex structures involving cells, scaffolds and/or signaling molecules; and small molecule pharmaceuticals such as antibiotics, vitamins, and biopolymers.

TECHNOLOGY DEVELOPMENT

Continued

Another developing cluster in Wisconsin is tied to production, storage and conservation of energy. Overall, 500,000 jobs in those sectors were added to the U.S. economy between 2003 and 2010, at an annual growth rate of 3.4 percent, according to a recent report by the Wisconsin Sustainable Business Council and Cool Choices.

More than a quarter of those jobs (26 percent) were classified as manufacturing. The report also noted that renewable electricity generation is expected to grow by 40 percent over the next five years, and that Wisconsin can help lead the nation in the development of biogas as a viable fuel alternative. There are enough corn stalks, wood chips and switchgrass in Wisconsin to replace 40 percent of the state's gasoline consumption and half its coal use while putting \$14 billion back into the state economy.

Wisconsin already has more anaerobic bio-digesters than any state, with 22 on-farm and 31 total systems. Wisconsin also has more than 12,000 people employed in supplying the solar or wind sector. That includes 300 companies that produce, sell or install wind power components. The report noted that 135 Wisconsin companies are part of the solar photovoltaic industry.

Cyberstructure Defined

The term "cyberstructure" connotes more than networking. It includes energy-efficient data centers, a wide range of computer and storage systems, applications, libraries and system management software, operations and maintenance staffing, credentialing, security procedures and much more. Cyberstructure resources can serve both public and private users. Such a system would allow Wisconsin to better compete for federal research funding, better attract and retain businesses and foster interdisciplinary centers of excellence statewide.

Water technologies have a strong presence in Wisconsin's academic and corporate sectors. The Milwaukee Water Council, led by local business leaders, includes 130 companies that are involved in water treatment, pumping systems or other technologies.

Because Wisconsin has natural strengths in the area of energy and water technology jobs, Wisconsin should support the development of clear state and federal energy policies, which are essential to the long-term development of commercially viable technologies and companies.

Cyberstructure

By any standard, the Internet ranks as one of the leading innovations of our time. It has revolutionized everything from commerce to medicine to entertainment, all within the confines of a generation.

Too bad it's getting a bit long of tooth.

Although a spry 30-something in appearances, the Internet is prematurely aging. In part because of how it was built decades ago, the Internet is losing its ability to adapt. Many of the features that made the Internet a game-changer were baked into its infrastructure, making it difficult for today's engineers and computer scientists to innovate. The Internet was born in a mainframe world and now lives in a mobile society.

The need to essentially re-invent the Internet is behind a trend called "software defined networking," or open source. One type of software defined networking is Open Flow, which has drawn the attention of the industry's biggest names, academic researchers, major telecommunication providers and the White House.

Among the leaders in the movement is the UW-Madison, which recently announced its partnership with

Cisco Systems – which developed the first commercially successful router – to create Open Flow capabilities for Cisco networking switches. It’s a two-way street that means UW-Madison computer scientists will work with Cisco scientists on other applications. The UW-Madison also is working through the National Science Foundation on the Global Environment for Innovation Network, a test bed that will bind other major universities and cities through use of software defined networking. The result could be a fully programmable virtual network.

Because of those relationships, Wisconsin is poised to become one of the first states to embrace the Internet’s trend toward software defined networking, especially if the public and private sectors continue to work together.

There are other examples of cooperation. Wisconsin’s BadgerNet consolidated voice, data and video network is a public-private partnership serving more than 2,100 sites statewide while improving the state’s broadband infrastructure. There are similar examples in Ohio, Florida, Tennessee and other states. These states understand that a comprehensive economic growth strategy includes building a high-speed network to serve researchers, businesses and communities alike. Public-private partnerships promote risk-sharing and avoidance of stranded investments that can occur under other models.

These public-private partnerships allow for cost-effective and timely migration to needed bandwidth with an eye toward improving networks, providing speeds up to 100 gigabits per second.

How fast is 100 gigabits? Imagine an electronic “pipe” large enough to transmit 8.5 million medical records in one minute. One hundred gigabits is 50,000 times faster than current smartphone data speeds and large enough for all of Wisconsin K-12 students to download an electronic textbook simultaneously in about two minutes. Another

factor driving bandwidth consumption is the migration of data applications and programs to the “cloud,” or Internet-based storage and computational services.



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TECHNOLOGY DEVELOPMENT

Continued

In the Milwaukee area, the push for a more vibrant cyberstructure is being led by the non-profit Milwaukee Institute. The institute's leadership believes Milwaukee's economic development groups must face up to the need for regional computing and data transfer capacity, and has urged a doubling or tripling in order to leverage existing R&D assets and stimulate economic growth. In Milwaukee, where leading research institutions are striving to work together on major research goals, those rich data connections are all the more important.

The debate is not confined to southeast Wisconsin, however. Similar needs for high-capacity networks exist throughout the state, and there are tensions among some telecommunications providers and other networks that exist primarily to connect academic and private researchers with Internet2 and other national pipelines.

The policy challenge appears to revolve around building data networks that are large enough to serve Wisconsin's needs – without competing with private carriers who fear having their largest data customers “cherry-picked” by networks that have public funding. The solution may be shared high-end networks that can be used by large and small data customers alike, thus avoiding duplication and stranded resources.

For example, the future of WiscNet may revolve around providing services when a case for private-sector business (i.e., price, access or reliability) cannot be reasonably made. WiscNet could become the backbone for a statewide research network.

Any discussion of cyberstructure would not be complete without addressing the explosion of wireless technology and mobile Internet access. There are now more wireless subscriber connections in the United States than there are people, according to industry sources. This phenomenon is not limited to individual consumers. By 2015, half of the devices on corporate networks will be wireless. A recent survey by the Cellular Telecommunications Industry Association disclosed that 45 percent of C-level executives believe wireless applications are important or vital to remaining competitive. This business surge in wireless applications is expected to create jobs and economic growth.

Wisconsin is faced with challenges in terms of providing complete broadband and mobile coverage, and not just in rural areas. Those can be addressed by a focused, public-private approach to building the right cyberstructure. Examples of such would include tax incentives for greater investment in broadband deployment as well



as guidelines that encourage further deployment of wireless infrastructure. Wisconsin should also support the National Wireless Initiative and monitor the implementation of American Recovery and Reinvestment Act grants for broadband while supporting reform of the Universal Service Fund.

At stake is economic growth in some of Wisconsin's emerging business sectors. From genomics to medical imaging, from biotechnology to nanotechnology, almost all R&D today is inexorably linked to high-end computing and network connections. Those networks should be developed, wherever possible, in a way that leverages public and private resources.

Federal science and technology priorities

The National Academy of Sciences has outlined 14 “grand challenges” for engineering in the 21st century – any one of which, if met, would improve how we live. Wisconsin scientists, researchers and companies are positioned to help with all of those challenges, especially if existing resources are properly tapped. Those challenges are:

- Make solar energy affordable
- Provide energy from fusion
- Develop carbon sequestration methods
- Manage the nitrogen cycle
- Provide access to clean water
- Restore and improve urban infrastructure
- Advance health informatics
- Engineer better medicines
- Reverse-engineer the brain
- Prevent nuclear terror
- Secure cyberspace
- Enhance virtual reality
- Advance personalized learning
- Engineer the tools for scientific discovery

In many ways, these challenges already align with emerging or proposed centers of excellence in Wisconsin. As the state builds its tech-based clusters and centers of excellence, however, it should measure progress against those challenges. One reason is practical: Federal and private support for research will likely be driven by established priorities, especially in an era of tight budgets.

Here are a few ways in which Wisconsin's resources and research base are consistent with the National Academy's grand challenges:

TECHNOLOGY DEVELOPMENT

Continued

Engineering physics programs at the UW-Madison are providing leadership in nuclear fission and fusion research, from safe disposal of waste to next-generation fission reactors to helium-3 as a potential fusion source. The state is also a leader in emerging technologies for the production of molybdenum 99. This medical isotope, which is used 50,000 times each day in the United States alone, will become scarce as existing nuclear reactors age and eventually close. Two Wisconsin companies are pursuing alternatives that have attracted the attention of the U.S. Department of Energy, which has among its goals preventing fissionable materials from falling into dangerous hands. The state's congressional delegation should support SB-99, which would enhance research funding related to the development of molybdenum 99 alternatives.

Health informatics programs at the Medical College of Wisconsin, Marquette University, the Marshfield Clinic and the UW-Madison, as well as major companies such as Epic Systems and Aurora Health Care, are combining R&D with clinical care.

Energy research tied to the Wisconsin Energy Initiative, the Wisconsin Energy Research Consortium and the Great Lakes Bioenergy Research Center, among others, is examining a full range of energy solutions. Those include solar energy, a sector that has a significant private-sector footprint in Wisconsin.

Research on carbon sequestration and the nitrogen cycle is being conducted through the UW-Madison, the U.S. Forest Products Laboratory and other UW System and private colleges. It parallels research interests in the state's agricultural and forestry sectors.

Milwaukee could become home to a National Institute of Freshwater Science and Technology, which would leverage the Milwaukee area's natural strengths in research,

environmental science and commercial applications. Clean water technology resources are not confined to the Milwaukee area, however, with significant research clusters in Madison and beyond.

Nanotechnology research will become a source of developing tomorrow's scientific tools of discovery, and Wisconsin has existing research and corporate strengths in that field. Many life sciences companies in Wisconsin are predominantly "toolkit" companies, meaning they make research tools as well as diagnostics.

Wisconsin should press to become a cybersecurity leader through its academic institutions and related private consortia. The Wisconsin Security Research Consortium and its Wisconsin Information Security Center will help attract research related to cybersecurity, a growing national concern from federal as well as corporate perspectives.

The UW-Madison Waisman Center has been a leader in research related to the brain and human development for nearly four decades, with a focus on the sources and potential cures for developmental disabilities as well as neurodegenerative diseases.

The Morgridge Institute for Research within the Wisconsin Institutes for Discovery has educational research among its core research areas, including methods that could enhance personal learning and virtual reality experiences.

Understanding the relationship between Wisconsin's R&D strength and the "grand challenges" is important because it could affect how the state attracts public and private support.

Wisconsin continues to under-perform the nation when it comes to attracting most forms of federal funding and jobs. The state is 50th in federal employees as a percentage

of the population and 48th in per capita federal spending. The number of federal employees in the state has fallen from 30,000 to 15,000 over the past decade. Wisconsin must compete more aggressively for opportunities to bring federal research facilities and contracts to the state. This is not a call for deficit spending. It is a call to compete for grants, contracts and programs that rise to the level of bipartisan federal priorities. That includes merit-based research and development dollars, such as national laboratories or research centers that will help to meet the NSA's "grand challenges."

Regional tech development

The Marshfield Clinic is emblematic of the quality of biomedical research and development throughout

Wisconsin – as well as the collaboration that takes place across institutional and geographic lines. It is an example of how partnerships can work, regardless of location.

Through its research foundation, labs and applied sciences arms, the Marshfield Clinic has expertise in genomics, bioinformatics, electronic health records, drug testing, epidemiology and even veterinary science. It routinely attracts federal and industry grants – and manages to lure top-flight researchers to its gleaming facilities in central Wisconsin, even if it's a bit off the beaten path.

Marshfield is a part of the Wisconsin Network for Health Research, which includes the UW-Madison School of Medicine and Public Health, Aurora Health Care and Gundersen Lutheran Medical Foundation. That coalition came together for the specific purpose of moving research



Wisconsin Health and Educational
Facilities Authority

WHEFA has been providing active capital financing assistance to Wisconsin health care institutions since 1979. From 1987-2009, WHEFA's charter has expanded to include the issuance of bonds for benefit of independent colleges and universities, certain continuing care facilities, private, non-profit elementary or secondary educational institutions, and non-profit research facilities.

During fiscal year 2012, six financings totaling approximately \$1.6 billion were successfully completed. Sixty-six percent of the bonds issued were used to refinance outstanding debt, thus substantially reducing debt service costs. One borrower used WHEFA for the first time.

As of June 30, 2012, WHEFA has cumulatively completed 682 bond issues totaling over \$18.18 billion.

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TECHNOLOGY DEVELOPMENT

Continued

results to the bedside more quickly and efficiently. The clinic is also a part of the Wisconsin Genomics Initiative, which includes the UW-Madison, the Medical College of Wisconsin and the UW-Milwaukee. That initiative works with Marshfield's personalized medicine database that includes about 20,000 genetic records, making it the largest of its type in the nation.


This kind of research excellence – and collaboration – is evident across Wisconsin. Some other examples:

- The UW-Madison Department of Radiology has established enduring partnerships with other research institutions as well as global leaders such as GE Healthcare, which has worked with UW scientists to speed the delivery of medical imaging innovations such as X-ray, computed tomography, magnetic resonance imaging, ultrasound, positron emission tomography and more. It is a major reason why Wisconsin has emerged as a medical imaging “cluster” with thousands of related jobs.
- In Milwaukee, the collaborations include the Clinical & Translational Science Institute, which is a project of the Medical College of Wisconsin, the BloodCenter of Wisconsin, the Children's Hospital of Wisconsin, Froedert Hospital, Marquette

University, UW-Milwaukee, the Milwaukee School of Engineering and the Zablocki VA Medical Center.

- In western Wisconsin, the La Crosse Medical Health Science Consortium is another example of applied research connecting with patient care. The consortium's Health Science Center is home to research and clinical programs involving Gundersen Lutheran, UW-La Crosse, Western Technical College, and the UW-Madison School of Nursing.
- Other R&D collaborations in Wisconsin can reach far beyond its borders as well as within. The annual Stem Cell Symposium, held on the Promega Corp. campus near Madison, include researchers from a number of UW-Madison departments, leaders of emerging companies in Wisconsin and researchers from the Massachusetts Institute of Technology, the University of Cambridge, the University of California and the RIKEN Center of Developmental Biology in Japan. The symposium is symbolic of the research ties that can be traced, at least in part, to the UW-Madison's global leadership in regenerative medicine. This field of study has broad ties to human health, from engineering better medicines to study of the brain.

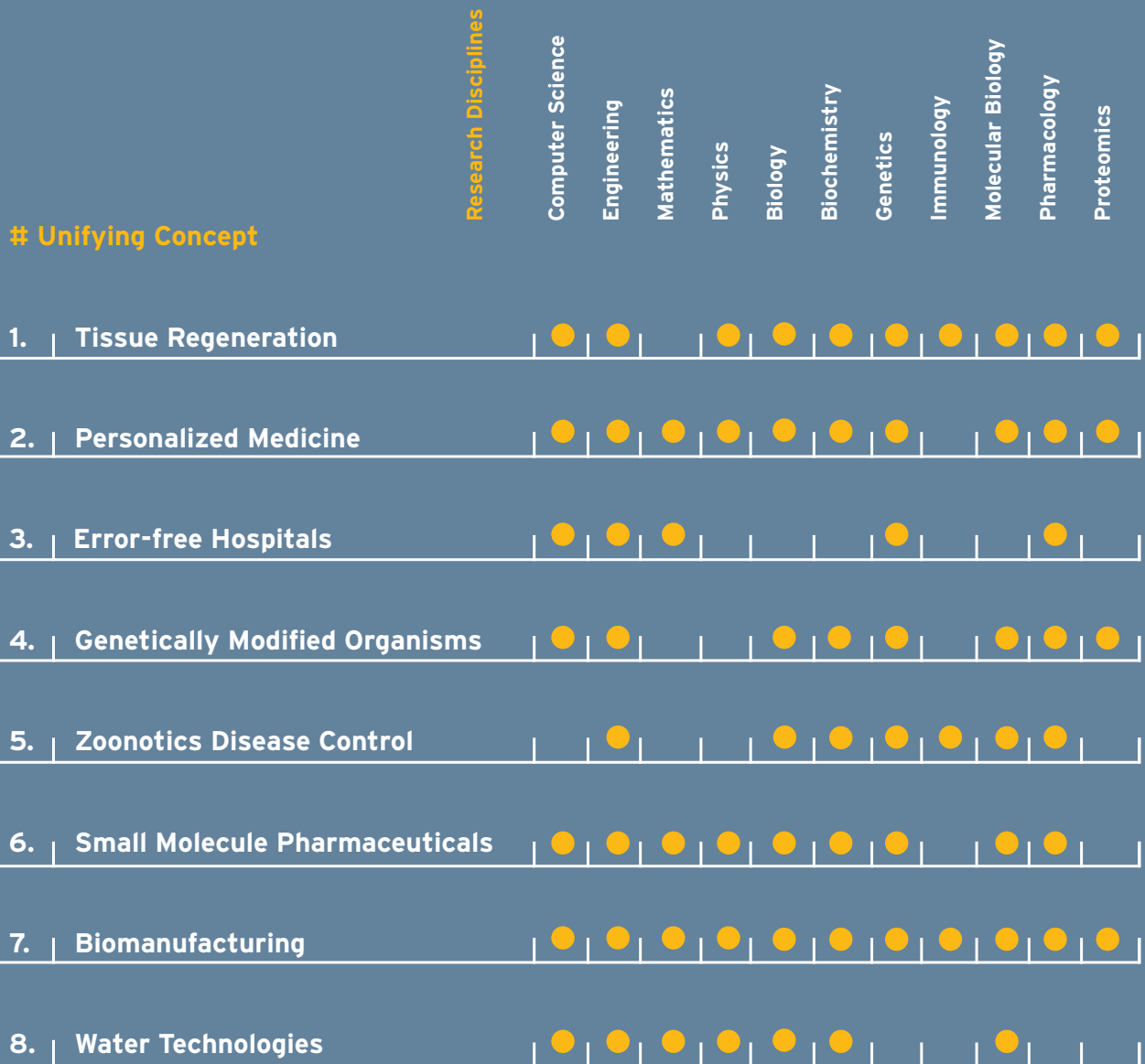
Wisconsin must continue to build regional and interdisciplinary partnerships that can strengthen tech-based development across the state. Specific ideas include:

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- Support regional and “I-Q Corridor” consortia in Wisconsin and surrounding states.
 - Have the Tech Council serve as a statewide resource on tech-based development for Wisconsin’s local and regional economic development entities.
 - Reinforce the efforts of the WiSys Technology Foundation to help the marketplace pull technology from UW System campuses outside Madison and Milwaukee.
 - Continue the streamlining of tech transfer processes and enhance the ability of state universities to attract and retain industrial R&D investments.
 - Use the Wisconsin Innovation Network and Wisconsin Angel Network as vehicles for networking and education on regional tech development issues.
 - Establish a UW System version of the UW-Madison Office of Corporate Relations to better connect businesses working with the non-doctoral campuses. This is similar to an approach recently adopted in Michigan.
 - Establish an “Entrepreneur-in-Residence” program to help capture the attention of CEO candidates with proven track records, especially in past venture-backed companies, to match them with emerging growth companies in need of seasoned leadership.
 - Establish a Tech Transfer CEO Placement Program to accelerate the process by which tech-based companies find qualified CEO talent. Such a program would assist high-potential companies with recruitment costs and/or initial salaries, thus helping new ideas and companies get to market faster.
 - Make low-cost financing options through the Wisconsin Health and Educational Finance Authority more broadly available to 501c3 organizations. Certain bonds or notes issued by WHEFA should be excluded from income under the individual income tax, corporate income and franchise tax and the income tax on insurance companies in situations where the same tax exclusions are available through another issuer.
 - Consider encouraging state matching grants or loans for companies that have won federal Small Business Innovation Research awards, which is the model in Massachusetts and some other states. Wisconsin’s performance in winning SBIR awards has improved in recent years, and the program has been extended. One proposal pending in Congress would create federal angel tax credits. Making those credits available for private investments in SBIR companies is a logical way to make use of an existing vetting system that can be tracked.

INTERDISCIPLINARY HIGH-TECH CENTERS OF EXCELLENCE



INTERDISCIPLINARY LIFE SCIENCE CENTERS OF EXCELLENCE



HUMAN CAPITAL



HUMAN CAPITAL

Proposals in this category fall under these broad categories:

- Improve access to higher education in order to place citizens of all ages on a path to earning certificates and degrees that will help them qualify for high-paying jobs, start their own businesses and become valuable members of the Wisconsin communities in which they live
- Increase Wisconsin's K-12 investment in science, technology, engineering and math education
- Focus on the needs of business when it comes to filling critical workforce voids, and develop sustainable business relationships between higher education and industry

Improving access to higher education

Demographics and empirical studies suggest workers who are better educated and trained are the most likely to compete for jobs in today's knowledge economy.

Occupations that require some postsecondary education are expected to experience higher rates of growth by 2020 than those that require a high school diploma or less, according to federal labor economists. Occupations



in the master's degree category are projected to grow the fastest, about 22 percent; occupations in the bachelor's and associate's degree categories are anticipated to grow by about 17 percent and 18 percent, respectively, and occupations in the doctoral or professional degree category are expected to grow by about 20 percent.

In contrast, occupations in the high school category are expected to grow by just 12 percent, while occupations in the less than high-school diploma or equivalent category are projected to grow by 14 percent. Of course, those occupations also rank among the lowest paid. Without access to some post-secondary education, citizens with a high-school degree or less are not likely to reach middle-class status during their lifetimes.

Improving access to higher education is vital, whether it is obtained through four-year colleges, technical colleges or certificate programs. This may include increasing the availability of need-based financial aid for low- and middle-income families. It may also require sustaining a level of funding for the K-20 system consistent with the state's need to stimulate economic development.

Access to higher education is no longer confined to traditional college-age students, fresh out of high school and in search of personal and career development. It also includes displaced workers who want to gain new skills and remain relevant in today's economy, as well as current workers who must stay abreast of the latest tools, systems and technologies.

One recent development is the announcement of a UW System flexible degree program. The program would be built as a flat-fee, at-your-own-pace online education alternative. While the UW is a relative latecomer to granting flexible online degrees, it already offers 4,600 online courses. It also has a huge advantage not possessed by most of its competitors – a quality brand that can be marketed well beyond the state's borders.

A flexible degree program will serve the UW and the state by creating more degree-holders and helping Wisconsin reach the U.S. average; attracting older, returning students who already have some college credits; affording promising high-school students a chance to earn college credits; helping businesses train workers faster for specific jobs; and becoming an export industry for Wisconsin.



HUMAN CAPITAL

Continued

Nearly 10 years ago, the Wisconsin Technology Council identified “workforce education” as a cluster poised for growth. In *Vision 2020: A Model Wisconsin Economy*, the Tech Council urged making Wisconsin a center for workforce education and retraining, including content development, delivery and credentialing. One recommendation called for “shared plans and strategies to increase the export of high-technology workforce education products to foreign markets and the import of foreign customers for high-technology workforce education services.”

Online education helps take geography out of that equation. It allows marketing of the UW brand to a world that already equates that brand with quality. Other specific proposals:

- Support the Career Pathways strategy to prepare high-school students and adult learners for employment and higher levels of post-secondary education and training.
- Support efforts to reduce the need for remedial education at the post-secondary level, which is a significant contributor to the cost of higher education.
- Encourage state funding for Wisconsin’s Youth Options program. Currently, funding for high school students taking college-level courses is



through the school district. In Minnesota the funding comes from the state. This approach would allow students to earn high-school and college credits simultaneously.

Focus on the needs of business

- Encourage the governor and Legislature to improve and clarify the education tax credit language adopted as part of SB-409 to help the marketplace fill critical voids in the supply of college-educated workers. This is particularly true for foreign-born workers who might obtain advanced degrees in the United States but who are unable to remain because of current immigration rules.
- Support current studies aimed at better aligning workforce development with employer needs to attract and retain workers. The so-called “Sullivan Report,” known formally as “The Road Ahead: Restoring Wisconsin Workforce Development,” offers a comprehensive list of recommendations.

Increase investment in STEM and related fields

- Support efforts to enhance science, technology, engineering and mathematics education, as outlined



in the Tech Council's report on Educating a Tech-Savvy Workforce for Wisconsin and another 2009 report by the Public Policy Forum. The Tech Council recently participated with a larger coalition in the publication of Wisconsin STEM: Navigators to the future.

- Support efforts to enhance early childhood education, which has a nationally proven cost-benefit ratio
- Encourage a global perspective on education at all levels, including greater emphasis on foreign language instruction and study-abroad experiences.
- Develop a plan to encourage youth to take part in entrepreneurial ventures through programs such as the Youth Entrepreneurs in Science (YES) business plan contest, business education classes, extracurricular clubs and other related efforts.
- Provide special scholarships and/or loan forgiveness programs for Wisconsin students pursuing careers in STEM-related fields, through which loans would be forgiven at a rate of 10 percent for each year that the student remains employed in a qualifying high-tech job in Wisconsin.

Other recent reports on human capital

In addition to the Tech Council's white papers reports, three other recent studies have called attention to Wisconsin's workforce needs:

"The Road Ahead: Restoring Wisconsin's Workforce Development." Otherwise known as the Sullivan report, it was a volunteer effort headed by Tim Sullivan, the former Bucyrus Erie executive who was appointed by Gov. Scott Walker in February to take a hard look at state workforce gaps.

doa.state.wi.us/documents/theroadahead.pdf

"Be Bold 2: Growing Wisconsin's Talent Pool." This report was issued by Competitive Wisconsin Inc., in partnership with the Manpower Group. www.competitivewi.com

"Wisconsin STEM: Navigators to the future" was produced by a group led by Bryan Albrecht, president of Gateway Technical College, and which included the Tech Council. www.stemforward.org

INVESTMENT CAPITAL



INVESTMENT CAPITAL

Proposals in this category fall under these broad categories:

- Expand investment capital in Wisconsin for high-growth, early stage and mid-stage companies
- Sustain and improve angel investing in Wisconsin
- Create a prominent and lasting infrastructure to support capital formation across the full financing continuum
- Modernize Wisconsin tax and securities codes to better attract and retain capital

The timing is right and the need is right now for Wisconsin to develop new sources of capital for high-growth, early stage companies.

Identifying the need for more early stage capital in Wisconsin didn't begin this year or last. It began well over a decade ago, when the rise of the state's innovation economy began to bump its head against the low ceiling of capital availability.

That is not to say that work has not been done. In 2005, a bipartisan effort led to the signing of Wisconsin Act 255. This legislation created a national model for developing, promoting and leveraging early stage investment capital. Numerous states have replicated these tax credits, including the Big



Ten Conference states of Minnesota, Illinois and Nebraska. This program, along with the creation of the Wisconsin Angel Network, has helped enhance early stage investing in Wisconsin – but largely at the angel capital level.

Since 2005, when angel network-only investments were pegged at \$5.39 million, there has been a more than 11-fold increase in angel group and individual investments reported through Wisconsin Angel Network and the Wisconsin Technology Council. Prior to the establishment of the investment tax credits, Wisconsin claimed only a handful of organized angel groups; today there are more than two dozen.

In 2009, a broad coalition of organizations, angel networks and funds came together to advocate for enhancements to the investment tax credits. With the help of the adopted enhancements, angel investments in Wisconsin, including angel groups and individual “super angels,” increased to \$61.1 million in 2011, up about 22 percent from 2010. This angel investment total is a record since WAN and the Tech Council began collecting data in the early 2000s.

The product of our success is a need for continued investing in our emerging companies as they enter the next stages of growth and job creation. Today, there is once again broad, bipartisan consensus that Wisconsin’s entrepreneurial ecosystem and overall economy need an accelerant. That accelerant is early stage capital.

Catalyze investments made across the full capital continuum, from seed to growth

To address the needs of Wisconsin job-creators at all stages of company development, a comprehensive early stage capital program must be established. While Wisconsin has built a strong foundation on research and angel capital, it has not fully participated in the venture economy. In fact, the Midwest is a net “exporter” of dollars for private equity. There is a growing sense of urgency about the ability of promising Wisconsin startups to raise follow-on rounds of financing.

A capital gap, which stalls young companies and kills the jobs they create, is emerging in the seed funding and startup phases on the investment capital continuum. A number of Wisconsin companies report hitting this “valley of death” as they seek to raise rounds of \$1.5 million to \$5 million. The national Angel Capital Association reports a similar funding gap at the \$1 million to \$5 million range. In 2011, the median venture capital investment round in Wisconsin was \$1.55 million, compared with the U.S. median of \$5 million.

INVESTMENT CAPITAL

Continued

Make the current investor tax credits refundable

Amend the Act 255 tax credit program to provide incentives for out-of-state individuals, corporations and non-profit investment funds, such as pension funds, to invest in Wisconsin-based startups and early stage capital funds. Half of all investment is made by entities such as corporations or pension funds, not by individuals. The vast majority of investors in venture capital do not have a State of Wisconsin tax liability. Providing an incentive for these investors brings fresh capital into Wisconsin that would not otherwise find its way into the state. Minnesota, after copying Wisconsin's law verbatim, enacted refundability for angel investors.

The Minnesota Angel Tax Credit Program has spurred substantial investment in Minnesota companies by non-Minnesotans. In 2011, non-Minnesotan investors accounted for 27 percent of overall investment, a 23 percent increase from 2010.

A refundable credit should not increase the cost of the investment tax credit program because the credits have a yearly cap. The 2009 program enhancements allow investment credits received by venture capital

funds to be transferable to a Wisconsin taxpaying party. This transferability is not available to angel investors. Additionally the sale/transfer is made at a discount to the full value of the credit, which requires fund managers to track the sale and includes an administrative fee. A refundable credit would be more efficient than a transferable credit.

Remove the program cap for angel investment

Current law provides that no more than \$47.5 million in credits may be claimed for all taxable years combined for angel investments. This is at odds with the legislative intent to expand the program to \$20 million per year and the 2009 repeal of the statutory cap for fund-based investments. This apparent oversight is nonsensical and diminishes the programmatic certainty needed to ensure uninterrupted investment in Wisconsin companies.

Build investment firewalls

The establishment of an independent authority and/or private management system is crucial to the program's success. It is important that a "firewall" be created to insulate the state from claims of "crony capitalism." It

VENTURE CAPITAL INVESTMENTS IN WISCONSIN



is also important to remember that early stage investing comes with significant risk. Mitigating that risk by limiting direct company investment by the government is not only strategic, it is a best practice. Professional, independent fund management should be competitively selected. This will bring experience, national perspective and existing co-investment relationships to Wisconsin's table.

Unused existing tax investor credits should be monetized, which could eliminate the state's need to incur direct debt to finance the program.

Establish an angel acceleration fund

Forward pressure on the state's deal-flow should be maintained by the creation of a manageable fund focused on angel and other early stage investments. This angel "sidecar" or co-investment fund would be used to match super-angel, angel network and fund investments in Wisconsin. Because Wisconsin's indigenous angel networks and funds are close to the action, they are able to invest money quickly through existing deal-flow pipelines. This would also enhance deal flow for venture funds later in the capital continuum and provide gap financing at critical junctures.

Create a modest "master" fund to invest in other venture capital funds over time

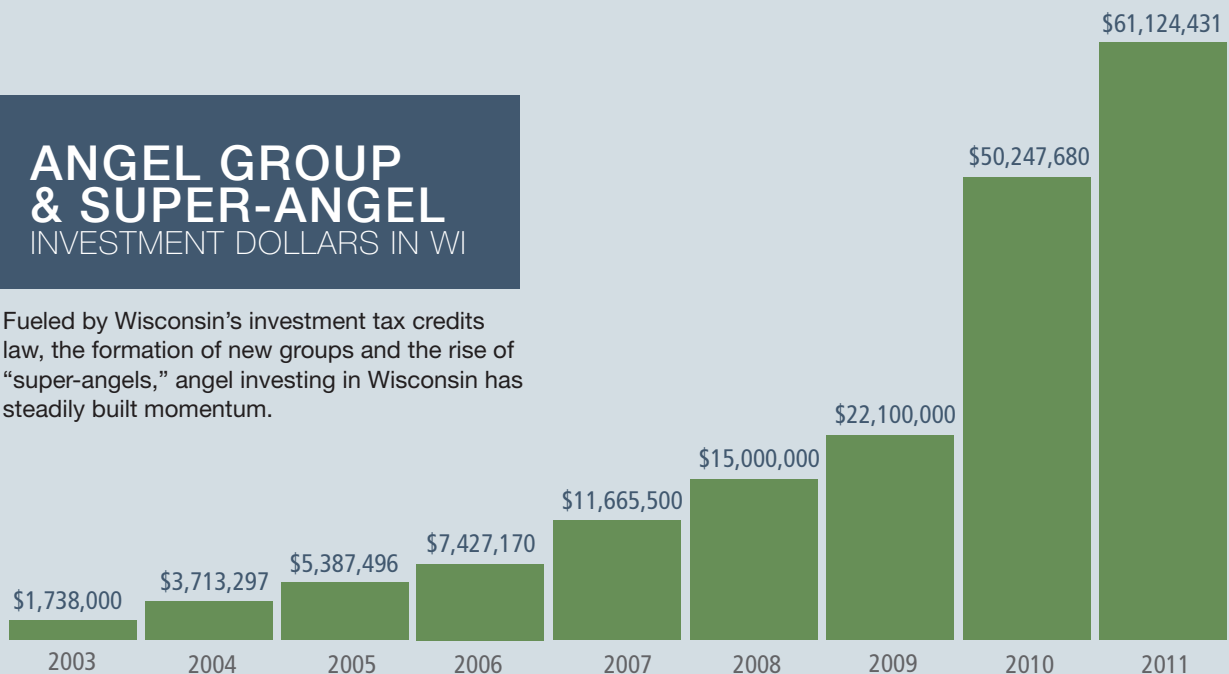
The creation of a state-leveraged, privately managed fund-of-funds would spur private co-investment at home and beyond. One of the best ways to create venture capital in Wisconsin is to increase the number of funds that are sourcing and competing for homegrown deals. Recipient funds should be required to raise an additional match and commit to offices, staff and investments in Wisconsin.

The advantage of a fund-of-funds model is the creation of a "diversified portfolio" of venture funds. It is important to note that the most important goal for a fund's investors, in this case the state, is to achieve an internal rate of return, or IRR, that outperforms its benchmarks. By investing the money into several top-tier funds across many stages, a greater probability of success is created, while risk is reduced through diversification.

Thirty-five years ago, the first state-leveraged early stage capital program was launched. Today, state-leveraged early stage capital programs have been deployed in more than 30 states, including many of Wisconsin's neighbors and

ANGEL GROUP & SUPER-ANGEL INVESTMENT DOLLARS IN WI

Fueled by Wisconsin's investment tax credits law, the formation of new groups and the rise of "super-angels," angel investing in Wisconsin has steadily built momentum.





INVESTMENT CAPITAL

Continued

economic peers. These programs have provided fuel to be ignited by the myriad entrepreneurial sparks in those states.

Year after year, early stage capital-backed companies outperform the overall economy in terms of creating jobs and growing revenue. Perhaps most important, early stage capital builds new industries nearly from scratch through investments in “disruptive” technologies and business models. Early stage capital-backed companies in the U.S. employed nearly 12 million people (11 percent of private-sector employment) and generated \$3.1 trillion in revenue (21 percent of gross domestic product). Wisconsin represents 1.84 percent of the nation’s population, 1.89 percent of the U.S. workforce and more than 2 percent of the nation’s employers, but only 0.25 percent of the venture capital investment. Worse yet, only 0.13 percent of that capital is indigenous.

If the state received just its proportional share of investment, that would mean 259,215 jobs today versus the 60,000 early stage capital-rooted jobs created over time in Wisconsin.

Create prominent and lasting organizational infrastructure

The comprehensive need in Wisconsin is not solely limited to the creation and deployment of capital. Wisconsin needs to further develop tactics that support the expansion of indigenous resources to effectively market investments made in Wisconsin and state’s efforts to attract those investments.

The Wisconsin Angel Network, launched alongside the investment tax credits and with an initial “seed investment” by the state, has proven to be a valuable component to fueling the growth of early stage capital in Wisconsin. WAN is recognized nationally and internationally as a model for efficiently assisting the early stage market. At present, WAN’s funding by the state averages about \$60,000, with the remaining program costs being supported by the Tech Council and sponsors. Recurring funding of \$100,000 per year for the program (\$200,000 per biennium) would allow the program to offer more services to small population sectors of Wisconsin and provide a stable foundation for its long-term existence.



Attract regional, national and international attention

Promoting regional cooperation and co-investment in the Midwest is key. The Great Lakes region is second only to California when it comes to angel investments. This is a competitive advantage that should be maximized.

In June 2012, Wisconsin hosted the regional meeting of the national Angel Capital Association. The relaunch of the long-dominant gathering was coordinated by WAN as a conference within a conference at the 10th annual Wisconsin Entrepreneurs' Conference in Milwaukee. The meeting attracted private-equity investors from about a half-dozen states across the Midwest and included a full-day investor-education component.

This important investor training led by the Angel Resource Institute should be initialized in Wisconsin as part of a Wisconsin investor "road show." The program not only assists active investors in understanding best practices, including valuations, due diligence and national trends, it also serves as a recruitment tool, bringing new capital off the sidelines in Wisconsin.

Foreign direct investment is another important source of outside capital. The Tech Council will work with WEDC and other partners on opportunities for such investment.

Modernize Wisconsin's tax and securities codes

While Wisconsin's tax burden per capita has dropped in recent years compared with other states, some targeted changes could make the state more attractive to investors at home and outside the state. Wisconsin's tax and securities system grew up around an economy that has changed dramatically, from one that was almost exclusively based on agriculture, raw resources and manufacturing to an economy that is defined by service, technology and exports.

Track implementation of the federal JOBS act

Wisconsin should monitor the development of administrative rules related to the Jumpstart Our Business Startups Act, or JOBS act, which changes federal rules related to "crowdfunding," general solicitation and initial public offerings. These rules could enhance investment activity.

STARTUP & BUSINESS CLIMATE



STARTUP & BUSINESS CLIMATE

Proposals in this category
fall under these broad categories:

- Focus on marketing Wisconsin's increasingly sophisticated "knowledge" economy through partners such as WEDC national press, peer organizations and premiere events
- Reaffirm support for the Tech Council's 2002/2009 policy statements on state-based research restrictions. Such restrictions could put the state at a competitive disadvantage
- Build an infrastructure that improves and creates the right pathways into the state, from safe roads and bridges to high-speed electronic commerce and telecommunications, to a cost-efficient and environmentally responsible energy portfolio

Marketing Wisconsin's knowledge economy

- Examine best practices in other states related to tech-based development, with emphasis on investment capital, human capital and regional cooperation. See a related section in this report for an analysis of key states.
- Build upon the Tech Council's "I-Q Corridor" branding efforts and encourage public and private entities in Wisconsin to adopt branding strategies that call out the state's innovation, entrepreneurial culture and quality of life.



- Work through national organizations such as TECNA and the State Science and Technology Institute to increase Wisconsin's exposure.
- Consider publication of an I-Q Corridor magazine that would highlight regional innovation and Wisconsin's innovative place in the Upper Midwest.
- Work with WEDC and other partners on marketing strategies that fit with Wisconsin's strengths in tech-based sectors. This would include identifying national rankings where Wisconsin has under-performed with an eye toward improving our position.

Reaffirm opposition to research restrictions

- Encourage policymakers and candidates to "first do no harm" when it comes to developing Wisconsin's tech-based economy. This begins with not rolling back policy gains and specific programs launched in recent years, ranging from investor tax credits to investments in the state's research and development infrastructure. Wisconsin should continue to invest in innovation and job creation.
- Use the Tech Council's revised "Future of Research in Wisconsin" statement to remind policy-makers of the dangers of regulating research and development activities in ways that go beyond existing federal and

academic efforts. This statement was adopted in 2002 to provide guidance during the debate over human embryonic stem cell research and revised in the fall of 2009 following a legislative hearing on nanotechnology.

Build the right infrastructure

- Maintain and improve the transportation infrastructure, including regional strategies that may address rail, air and highway needs.
- Encourage the state to lift its moratorium on the construction of new nuclear power generation plants in Wisconsin.
- Support efforts to increase Wisconsin's access to out-of-state electric power, especially wind power, and the safe and efficient transmission of in-state electric power.
- Support the efforts of the UW System and others to better connect the state's academic resources with foreign companies and investors, with the goal of increasing foreign direct investment.
- Express support for the environmentally responsible development of ferrous mining opportunities in northern Wisconsin, as well as the growth of "urban mining" technologies that reclaim valuable minerals from electronic waste streams.

LEVERAGING
NATIONAL TRENDS:

*The need for
a balanced
job creation
strategy for
Wisconsin*



LEVERAGING NATIONAL TRENDS:

**The need for a balanced job
creation strategy for Wisconsin**

Wisconsin's economy and its job creation goals will be best served in the near future by a balanced approach to supporting the state's major and emerging industry sectors.

While sectors such as manufacturing and agriculture will continue to fuel the Wisconsin economy in many ways, they will not necessarily lead the charge when it comes to creating net new jobs.

Policy decisions in Wisconsin have been driven over time by the assumption that manufacturing and agriculture are responsible for most employment growth in Wisconsin. That's no longer true. As the economy continues to transform itself nationally, globally and at home in Wisconsin, other sectors more in line with changing conditions are producing comparable if not greater numbers of jobs. Quite often, those emerging sectors are yielding the best-paying jobs, as well.

Wisconsin must recognize truly seismic changes in the national and global economies and understand how to make those changes work for Wisconsin. Here is the national forecast:



Total employment is expected to increase nationally by 14 percent from 2010 to 2020, according to the U.S. Bureau of Labor Statistics. That follows a 2 percent decline in 2000-2010. However, the 20.5 million jobs expected to be added by 2020 will not be evenly distributed across major industry and occupational groups. Changes in consumer demand, improvements in technology, and many other factors will contribute to the continually changing employment structure of the U.S. economy.

The Georgetown University Center on the Economy and Workforce has created state-specific analyses that help to understand Wisconsin's need for workers with post-secondary education and training. Between 2008 and 2018, the center predicts, the need for workers in that category will grow by 139,000 jobs in Wisconsin. Jobs for high-school graduates and dropouts will grow by 52,000. By 2018, 61 percent of all jobs in Wisconsin will require some post-secondary training.

Here is how that affects specific sectors:

Agriculture, down 96,100 jobs: According to the Bureau of Labor Statistics, overall employment in agriculture, forestry, fishing and hunting is expected to decrease by 4 percent. Employment is projected to continue to decline because of rising costs of production, more consolidation and increases in productivity. Within this sector, the only industry that is expected to add jobs is logging, a Wisconsin strength, which is anticipated to grow by 6 percent. However, this growth rate corresponds to an increase of only 2,800 new jobs, because logging accounts for such a small share of the sector as a whole. Agricultural employment has been on the decline for a century – even in Wisconsin – and there is no reason to expect that pattern to change. That's why employment in this category is expected to drop by another 96,100 jobs nationally by 2020.



LEVERAGING NATIONAL TRENDS:

The need for a balanced job creation strategy for Wisconsin

Continued

Manufacturing, down 73,000 jobs: Although output of manufactured goods is expected to increase, overall employment in this sector is projected to decline by 1 percent as productivity gains, automation and international competition reduce the demand for labor in most manufacturing industries. The decline continues a trend witnessed during the recession, when the industry shed 2.6 million jobs from 2006 to 2010. Some manufacturing sectors are projected to grow, however. Of importance to Wisconsin, employment in fabricated metal product manufacturing is expected to grow by 12 percent, creating 151,600 new jobs nationally. Wisconsin should compete for its share of those jobs. Other industries expected to add jobs are plastics and rubber products manufacturing and wood product manufacturing. While not traditionally considered a part of the manufacturing sector, construction employment is also projected to increase – but not so much so that all recession losses will be recovered by 2020.

The fastest-growing sectors in the BLS forecast revolve around technology and knowledge-based services. Here are leading examples:

Health care and social assistance, up 5.7 million jobs: The healthcare and social assistance industry is projected to yield about 28 percent of all new jobs created in the U.S. economy. This industry – which includes public and private hospitals, nursing and residential care facilities, and individual and family services – is expected to grow by 33 percent, or 5.7 million new jobs. Employment growth will be driven by an aging population and longer life expectancies, as well as new treatments and technologies. Wisconsin is well-positioned for growth in this sector.

Professional, scientific and technical services, up 2.1 million jobs: Employment in professional, scientific and technical services is projected to grow by 29 percent, adding about 2.1 million new jobs by 2020. Employment in computer systems design and related services is expected to increase by 47 percent, driven by growing demand for sophisticated computer network and mobile technologies. Employment in management, scientific and technical consulting services is anticipated to expand, at 58 percent. Demand for these services will be spurred by businesses' continued need for advice on planning and logistics, the implementation of



new technologies, and compliance with workplace safety, environmental and employment regulations. Combined, the two industries—computer systems design and related services and management, scientific and technical consulting services—will account for more than half of all new jobs in professional, scientific and technical services. Wisconsin can capture some of the growth in this sector.

Software, Internet publishing and telecom, up 140,000 jobs: Employment in the information sector is projected to increase by 5 percent, adding 140,300 jobs by 2020. The sector contains software publishing, which is expected to grow by 35 percent as organizations continue to adopt the newest software products. In addition, other information services, which includes Internet publishing and broadcasting, is expected to grow 16 percent as these services gain market share from newspapers and other, more traditional media. The information sector also includes the telecommunications industry, in which employment is projected to grow 8 percent because of an increase in wireless and satellite telecom services. Offsetting gains on the tech side will be employment in newspaper, periodical, book and directory publishing, which is expected to decline by 12 percent. That's a result of increased efficiency in production,

declining newspaper revenues, competition from Web publishers, and a trend toward using more freelance workers.

Architecture and engineering, up 252,800 jobs:

These occupations are projected to grow by roughly 10 percent. Much of the growth in this group will be due to recovery from the recession, with 149,800 jobs having been lost from 2006 to 2010. Growth among engineering occupations, especially civil engineers, is expected to be high, with the occupation adding 51,100 positions. As the nation's infrastructure ages, a greater emphasis will be placed on maintaining existing structures as well as designing and implementing new roads, water systems and pollution control systems. This is an emerging Wisconsin strength.

Arts and design, up 76,000 jobs:

Employment in arts and design occupations is projected to grow by 10 percent from 2010 to 2020, resulting in almost 76,100 new jobs. Nearly half of this growth is expected to occur among graphic designers. As more advertising is conducted over the Internet, a medium that generally includes many graphics, and as businesses increasingly seek professional design services, a greater number of graphic designers will be needed. This aligns with the Tech Council's *Vision 2020* study as well as later studies on the growth in this sector.



LEVERAGING NATIONAL TRENDS:

The need for a balanced job creation strategy for Wisconsin

Continued

Computer and information technology, up 758,800 jobs. These occupations are projected to grow by 22 percent by 2020. Demand for workers in these occupations will be driven by the continuing need for businesses, government agencies, and other organizations to adopt and use the latest technologies. Workers in these occupations will be needed to develop software, increase cybersecurity and update existing network infrastructure. Wisconsin has a foothold in the cybersecurity sector.

Life, physical and social science, up 190,800 jobs. Employment in life, physical and social science occupations is projected to increase by nearly 190,800 jobs from 2010 to 2020, a growth rate of 16 percent. Growth will be widespread throughout several occupations in this group. Employment in life science occupations will increase by 58,300, driven largely by the need for medical scientists to conduct research and to create new medical technologies, treatments and pharmaceuticals. Another 56,500 jobs are expected to be created in social science and related occupations, led by strong growth among clinical, counseling and school psychologists, who will be in greater demand as they provide psychological services in schools, hospitals, mental health centers and social services agencies.

Employment in math occupations is expected to grow by 17 percent, adding 19,500 jobs by 2020. About half of these positions (9,400) will be occupied by operations research analysts. Demand for these workers will increase as technology advances and companies need analysts to help them turn data into valuable information. This sector is attuned to significant parts of Wisconsin's R&D, health and educational sectors.

Business and financial operations, up 1.2 million jobs. Employment in business and financial operations occupations is projected to grow by 17 percent, resulting in 1.2 million new jobs. Some of these jobs make up for jobs lost during the recession. In addition, increasing financial regulations and the need for greater accountability and more oversight will drive demand for accountants and auditors, adding roughly 190,700 jobs to that occupation from 2010 to 2020. Further, as companies look for ways to control costs, demand will grow for management analysts, an occupation that is expected to add 157,200 jobs. Together, these two occupations are anticipated to account for 30 percent of new business and financial operations jobs. Historically, financial services have been a Wisconsin strength.



Finance and insurance, up 505,000 jobs. The finance and insurance industry is projected to increase by 9 percent from 2010 to 2020, resulting in 505,100 new jobs. Many of these jobs will stem from a recovery of the jobs lost during the recession. Employment in securities, commodity contracts and other financial investments and related activities is expected to expand 25 percent by 2020. Growth will be driven by the wide range of financial assets available for trade, the number of baby boomers reaching retirement age and therefore seeking advice on retirement options, and the globalization of securities markets. Employment in credit intermediation and related activities, an industry that includes banks, is projected to grow by about 3 percent. Employment in insurance carriers and related activities is expected to grow by 9 percent, adding 194,800 new jobs by 2020. Growth will stem from both the needs of an increasing population and new insurance products on the market. Again, this is an area in which Wisconsin has been among the national leaders.

In addition to its time-honored “bread and butter” sectors of manufacturing and agriculture, Wisconsin has strength in other business sectors that can be expected to produce jobs over the remainder of the decade. The question becomes what strategies should be followed to help capture those opportunities.

Learning from others: Recent trends and innovative state models

To learn more about what other states are doing to advance their tech-based economies, visit our website at wisconsintechcouncil.com/publications for a detailed analysis of trends from 18 different states.

WHAT'S WORKING
AND WHAT'S NOT:

The status of entrepreneurship in Wisconsin's tech sectors



WHAT'S WORKING AND WHAT'S NOT:


The status of entrepreneurship in Wisconsin's tech sectors

Wisconsin has a strong tradition of entrepreneurship. Think of the marquee companies, headquartered in Wisconsin, that are our economic “calling cards” – Oshkosh Corp., S.C. Johnson, Johnson Controls, Manitowoc Co., Harley-Davidson, Briggs & Stratton, Johnsonville, Kohler, Kohl's and Quad Graphics. These companies all have one thing in common: They were named after the Wisconsin community of their founding or the last names of their founders.

Today, a new generation of entrepreneurs and their partners are helping to build Wisconsin's 21st century “knowledge economy” on a solid foundation that has long included expertise in manufacturing, agriculture, medicine and more. It is still an organic process, born largely of people and communities in Wisconsin.

While the existence of an entrepreneurial ecosystem in Wisconsin isn't necessarily well known, even inside our borders, its growth over the past decade is a major reason why the state is steadily gaining a reputation for being friendly to startups. Some recent history:

Ten years ago, the entrepreneurial structure in Wisconsin was less than robust. Most of the formal assistance for entrepreneurs was clustered in the Madison area, with the Wisconsin Innovation Network, the Wisconsin Biotechnology Association (now BioForward), the Wisconsin Small Business Innovation Consortium and Accelerate Madison being among the early players. In Milwaukee, organizations such as eInnovate and the Wisconsin Venture Network (later merged into WIN) were most active.



The Wisconsin Early Stage Symposium did not exist under that name or structure, the Wisconsin Entrepreneurs' Conference was only an idea, and the Governor's Business Plan Contest had yet to be launched.

On Wisconsin campuses, there were relatively few formal entrepreneurship programs, with the Weinert Center for Entrepreneurship in the UW-Madison School of Business being a prominent exception. The current UW-Madison Office of Corporate Relations was known as University-Industry Relations, and there was virtually no focus on entrepreneurship. The Wisconsin Alumni Research Foundation began to work with startup companies in the late 1990s, but that process was a relatively slow evolution at the time because of WARF's structure and mission.

While the UW-Madison has long been a top-five research university in terms of dollars devoted to research, there was minimal R&D taking place on other UW System campuses. The entire R&D budget for all UW System campuses outside Madison was about \$30 million in 2002, according to federal figures.

The UW Small Business Development Centers were active and visible, but much of the work that took place inside the SBDCs was focused on more traditional startups – retail and other sectors – versus high-growth companies. The most notable exception was the UW-Madison SBDC, which had already built expertise on tech-based development.

The venture capital landscape included three major players – Mason Wells Private Equity, Baird Venture Partners and Venture Investors – but there were only five organized angel networks in place. Those were Wisconsin Investment Partners, Origin Investments, the Chippewa Valley Angel Network, Silicon Pastures and Golden Angels. The Wisconsin Angel Network had yet to be created. Likewise, the Act 255 investor tax credit law did not take effect until Jan. 1, 2005. The only state investment program in effect at that time was a CAPCo program, which has since proven to be costly and less efficient than hoped.

A larger and somewhat intangible problem was that entrepreneurs didn't know where to turn for help. The system for referring entrepreneurs to the right place was anecdotal, at best, and haphazard, at worst. The 2003 "Entrepreneurs' Toolkit" produced by the Tech Council and the former Wisconsin Department of Commerce was among the first efforts to map the ecosystem and provide a directory of assistance. The MGE High-Tech Directory, while primarily a company index, also provided some links to resources for entrepreneurs.

This is not intended to suggest entrepreneurs weren't accomplishing great things, especially in the tech sectors. Some of Wisconsin's leading companies today were getting off the ground about that time. But most were working independently or with help – and financing – they found outside Wisconsin's borders.

The status of entrepreneurship in Wisconsin's tech sectors

Continued

A related hurdle for entrepreneurs 10 or more years ago was a lack of storytelling about entrepreneurship, risk-taking and early stage investing. There was a good reason for that: Wisconsin's traditional economy was perking along just fine.

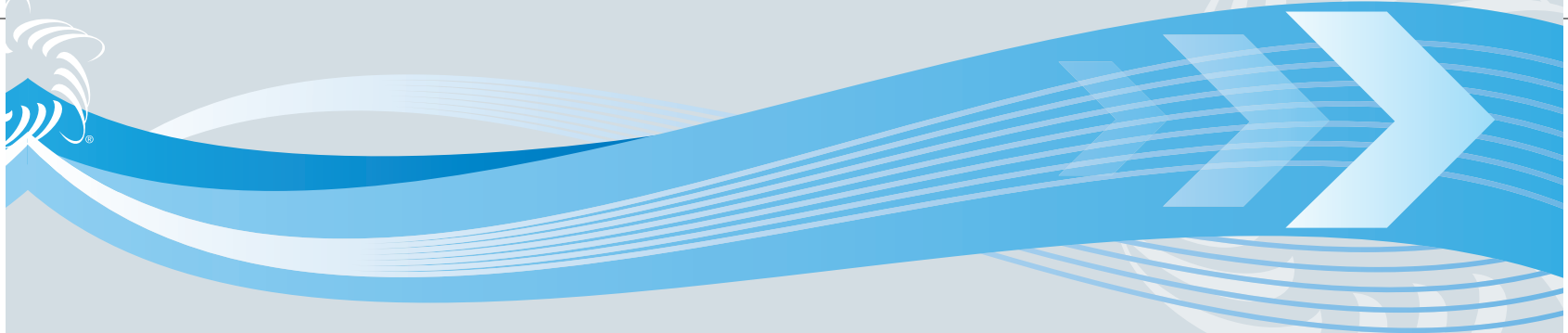
In March 2000, the peak month for manufacturing employment in Wisconsin, there were more than 600,000 workers engaged in high-wage production jobs. Today, there are about 450,000 workers in that class – meaning nearly 150,000 jobs were lost in the course of a decade. That slide was gradual, making it difficult to capture the attention of the public, press and policymakers around the idea that Wisconsin needed to grow a new “knowledge economy” to complement its more traditional sectors.

Even the terminology surrounding entrepreneurship was a tough sell. “Angel” investors were just as likely to be viewed as engaging in evangelism as entrepreneurial startups. As one skeptical Wisconsin banker noted at the time: “The word ‘entrepreneur’ is French for unemployed.”

Over time, the image of entrepreneurship was improved by news and communications strategies that helped brand entrepreneurs and early stage investors as pioneers – all with important stories to tell.

That brief history is intended to set the stage for a discussion of what's working today and where there are continued, or emerging, challenges. Here is what is working in Wisconsin:

- As the 2012 edition of The Entrepreneur's Toolkit documented, there is a much broader and deeper pool of resources available today for people engaged in early stage companies. See www.WIToolkit.com for details. These resources help entrepreneurs get started, find money, seek professional help, network and navigate regulations, among other vital first steps.
- News about startups, innovation and early stage investments matter. The statewide news media care about the story and recognize its importance. Those same reporters and editors have also developed the necessary expertise to cover the story.
- There is widespread knowledge about the job-creating role of small businesses and startups. The U.S. Small Business Administration has reported that small businesses employ half of all American workers, with about half of that total in “second stage” small businesses with 10 to 99 workers. Small businesses under 500 employees represent 99.7 percent of all employer firms, pay 44 percent of the U.S. private sector payroll and have generated two-thirds of the net new jobs created over the past 17 years. More than 40 percent of all high-tech workers, such as engineers, scientists and computer programmers, are hired by small businesses. In a separate study released in 2010, the Ewing Marion Kauffman Foundation concluded that virtually all net new jobs are created by companies five years old or younger.
- The entrepreneurial culture is no longer confined to Madison and Dane County, but has taken firm root in Milwaukee, the Fox Valley and most (but not all) regions of the state.
- While the UW-Madison is still the largest source of academic R&D in Wisconsin, other research universities are building solid foundations. Led by the UW-Milwaukee at roughly \$70 million per year, the UW System now exceeds \$100 million in total R&D activity, with centers of excellence statewide. The Medical College of Wisconsin alone conducts about \$160 million in R&D each year, while other private universities such as Marquette and Milwaukee School of Engineering have also grown in their commitment to research. That's important because R&D can translate into companies and jobs.
- Early stage investment by organized angel groups and “super-angels” continues to climb, thanks to one of the most innovative approaches in the country. The reported total was \$1.7



million in 2003 and climbed to \$61.1 million last year. That corresponds with a rise in the number of organized groups, from five to 25.

- Wisconsin's tech-based development has spread well beyond the life sciences, long a stronghold for innovation. Expertise is found in broad sectors such as information technology, nanotechnology, advanced manufacturing, "cleantech" and more.
- A significant number of Wisconsin startups seemed to be geared toward addressing 21st century "grand challenges" – safe and sufficient food, energy and conservation, cybersecurity, wise use of natural resources, water technology, regenerative medicine, manufacturing automation and the wireless revolution. That suggests these startups are attuned to market needs – and that Wisconsin has the expertise and resources to meet those needs.
- A string of recent reports suggest Wisconsin may be shedding its historic bottom-dweller status when it comes to company creation. Wisconsin ranked 40th among the 50 states in the latest business startup index published by the Kauffman Foundation, a national group that encourages entrepreneurial activity and education. Kauffman's figures for 2011 showed 232 of every 100,000 Wisconsin adults started new businesses in each month of the year, compared with 180 out of 100,000 each month in 2010. The increase moved Wisconsin up from a second-to-last place tie with Pennsylvania that year. While national rates of business start ups were higher – led, as usual, by California and other West Coast states – Wisconsin's performance pulled it even with the Midwest average for the first time. In fact, Wisconsin was one of only two states in the region to show an increase in startups while bucking the national trend of an overall decrease of 5.9 percent. An annual study by Boston's Suffolk University ranked Wisconsin 29th among the 50 states for its ability to incubate businesses, up from 43rd the previous year. Its overall competitiveness study ranked Wisconsin 22nd. Another report by the University of Nebraska showed Wisconsin moving up six spots in its entrepreneurial rankings.

- Wisconsin ranked sixth in 2010 among the 50 states in attracting Small Business Innovation Research grants for commercializing biomedical research, according to another recent report, with \$23.9 million in total grants. California was first with \$100.6 million, followed by Massachusetts, New York, Maryland and North Carolina – states that are larger than Wisconsin or otherwise centers of the U.S. biomedical industry. Wisconsin's ability to win SBIR grants is not confined to the biomedical industry. For the fiscal year that ended March 31, 2011, Wisconsin companies won a collective \$45.4 million in competitive grants across a broad spectrum of technologies. That dollar total and the total number of grants (96) were the largest in the history of the program for Wisconsin.

And yet, there are significant challenges:

- While angel investing is up, venture capital investment remains down. Some of that is indicative of a prolonged shake-out in the national venture industry. However, the biggest problem is that Wisconsin has never done well in attracting venture investment dollars, mainly because it has so few homegrown funds and provides so few incentives for out-of-state investors to take an interest in Wisconsin.
- There will be a very short policy "window" open in which to build upon Wisconsin's investor tax credits program. The political appetite to build upon Act 255, adopt an Angel and Seed Acceleration Program and/or a combined fund-of-funds programs will diminish unless a persuasive case for action is made early in the 2013 legislative session.
- Federal spending on R&D grants is likely to plateau or decline as a response to budget deficits. That could slow the rise of R&D spending statewide and hamper the UW-Madison, which has performed well in winning federal grants but poorly in attracting industrial research dollars. A report by the State Science and Technology Institute in 2011 revealed that Wisconsin's research universities rank 48th among the 50 states in their "share" of industry research



WHAT'S WORKING AND WHAT'S NOT:

The status of entrepreneurship in Wisconsin's tech sectors

Continued

as a percentage of the state's total academic R&D spending. The state ranked only 28th among total dollars spent, falling behind neighbors such as Illinois, Indiana, Michigan, Minnesota and Iowa.

- There is nagging disagreement over the right strategy to enhance Wisconsin's cyber-infrastructure. Groups such as The Milwaukee Institute have advocated for dramatic increases in shared computing and much more robust links to national systems such as Internet2 and Open Flow innovation. Organizations such as WiscNet agree with that approach, but there are concerns that a university-backed network would engage in a form of "mission creep" that would undercut private players such as BadgerNet and local telecoms. In the long run, Wisconsin needs more high-end storage and computing capacity, so gridlock on this vital issue will leave the state ill-prepared to compete.
- While many Wisconsin startups are tied to meeting the "grand challenges" of our time, some state policies are not always aligned. Lawmakers should be careful not to disrupt emerging markets for alternative energy, recycling strategies, regenerative medicine and cybersecurity technologies.
- Wisconsin's biotech sector is facing a perfect storm of financial challenges. Federal patent backlogs and long regulatory runways are part of the problem, but a lack of capital is particularly troublesome for a sector that needs more time for companies to mature and produce revenue. A significant number of Wisconsin's biotech startups could move or die unless more upstream capital becomes available.
- Wisconsin must confront a range of workforce problems that could limit startup activity and hiring by emerging companies. Wisconsin's workforce is older and less educated than those in many states. The state also has trouble attracting people from elsewhere

– whether it's Illinois or India – to fill high-skilled jobs. That is complicated by frightening high-school dropout rates in some parts of Wisconsin, most notably Milwaukee, and a generation of workers who are difficult to retrain because they spent their entire careers in manufacturing. While this is a national and even global problem, the situation is made worse in Wisconsin because the state's population tilts older. One long-term effect is what economists call "structural unemployment," meaning entire classes of people who are not equipped to find and hold a job.

- Barriers to economic development are often erected locally in Wisconsin because communities feel the need to compete with their immediate neighbors over projects that can expand the property tax base. In other parts of the country, with Denver and Indianapolis being prominent examples, a regional approach to economic development has produced results. Regionalism alone won't accomplish the goal, however, if the various local governments that are part of regional groups decline to find common interests. That is the story of Thrive's lack of traction in the Madison area, for example.
- There is a need to accurately measure both job creation and company creation. Just as raw job counts rarely tell an accurate story, basing company creation statistics on LLC filings is hardly the answer. Better ways of measuring job and company creation are essential, if only for the purpose of creating a more informed discussion.
- Better ways to work with individual entrepreneurs must emerge. Some state government experiments have paid off – others have not. The changes within the former Wisconsin Department of Commerce, now the WEDC, have created an opportunity to more effectively manage existing resources and to reorganize others.



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SUMMARY

Recommendations in the Wisconsin Technology Council's 2012-13 white papers fall into four major categories:

- Improve technology development, delivery and transfer
- Build Wisconsin's supply of human capital
- Improve access to capital for Wisconsin entrepreneurs
- Enhance Wisconsin's startup and business climate

Within those four broad categories, specific recommendations include:

- Build upon interdisciplinary clusters and "centers of excellence" first highlighted in *Vision 2020: A Model Wisconsin Economy*.
- Support the creation of enhanced cyberstructure for Wisconsin, including but not limited to broadband development.
- Work with the state's congressional delegation to identify ways that Wisconsin companies and research institutions can help meet national science and technology priorities.
- Work with partners, such as the Wisconsin Economic Development Corp., on building relationships between regional economic centers and emerging technology clusters.
- Improve access to higher education in order to place citizens of all ages on a path to earning certificates and degrees that will help them qualify for high-paying jobs, start their own businesses and become valuable members of the Wisconsin communities in which they live.

- Increase Wisconsin's K-12 investment in science, technology, engineering and math education.
- Focus on the needs of business when it comes to filling critical workforce voids, and develop sustainable business relationships between higher education and industry.
- Expand investment capital in Wisconsin for high-growth, early stage and mid-stage companies.
- Sustain and improve angel investing in Wisconsin.
- Create a prominent and lasting infrastructure to support capital formation across the full financing continuum.
- Modernize Wisconsin tax and securities codes to better attract and retain capital.
- Focus on marketing Wisconsin's increasingly sophisticated "knowledge" economy through partners such as WEDC, national press, peer organizations and premiere events.
- Reaffirm support for the Tech Council's 2002/2009 policy statements on state-based research restrictions. Such restrictions could put the state at a competitive disadvantage.
- Build an infrastructure that improves and creates the right pathways into the state, from safe roads and bridges to high-speed electronic commerce and telecommunications, to a cost-efficient and environmentally responsible energy portfolio.

More detailed recommendations are listed in the preceding pages.

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