

Establishment of the Biomedical Technology Alliance (BTA)

In this paper, we introduce the Biomedical Technology Alliance or BTA. The BTA was formed in 2004 to address the challenges of growing an interdisciplinary, collaborative research environment in Metro Milwaukee. An important observation of successful innovation economies, is that the most commercializable innovations result from interdisciplinary collaborations among talented researchers, who are in turn linked to hard-charging companies in that field. Academic R&D is an important contributor to the economic development continuum in metro areas. The BTA will serve as a framework for surveying our assets, tracking established collaborations, developing new research collaborations, establishing entrepreneurial forums, commercializing innovations, increasing research capacities in metro area universities and planning for a new campus for collaboration and development of biomedical technology.

A significant portion of the biomedical technology research and development done in the region is done collaboratively – between institutions and with industry. Regional strengths include public health, biomedical informatics, rehabilitation, biomechanics, biomedical imaging, cardio-pulmonary, genetics, proteomics and biochemistry. These strengths are used to address a wide range of health issues.

What is the BTA? The Biomedical Technology Alliance (BTA) is an organization that was formed to build collaborative bridges that increase academic research capacity in Southeastern Wisconsin and throughout the IQ corridor. Through partnership with the State of Wisconsin and the federal government and with the support of academic, community, business and government leaders, the BTA is taking important steps toward the goal of **increasing collaborative research in the Milwaukee Region**.

Regional and State Benefits: Fostering research collaboration will have significant benefits for the Milwaukee region and the State of Wisconsin. For instance, UW Madison collaborates with academic institutions from around the world. A stronger research enterprise in Metro Milwaukee will provide a strong incentive for more collaboration with UW Madison from within the State. For that reason, the BTA is complementary, not competitive to similar initiatives in Madison and will serve as an important pillar of the IQ corridor in Milwaukee. The benefits include:

- **A stronger economy in the Milwaukee Region.** The potential impact of greater collaboration fostered by the BTA could be in the hundreds of millions of dollars. Research helps to strengthen and diversify the economy of the Milwaukee region. According to a recent report by the Wisconsin Technology Council, 36 high-paying jobs are created for every \$1 million in R&D spending, and academic institutions in the region already account for over \$100 million in annual research funding. Economic impact projections for a similar program between Mayo Clinic and the University of Minnesota, which received a 5-year \$70 million state commitment, shows a \$290 million in overall new impact annually to the state of Minnesota by 2010.
- **More and better jobs and higher wages.** Data from other States shows that the economic activity generated by the collaboration could result in as many as 4,000 net new direct and indirect jobs. Moreover, these jobs are likely to pay more, involve “knowledge workers”

with more extensive education and training, and be less vulnerable to the whims of global outsourcing that has severely impacted the manufacturing economy of the region.

- **Broader tax base.** Wisconsinites enjoy the level of service they receive from the government; however, the costs of those services have exceeded the means to pay for them. Growing Southeastern Wisconsin is the only way to share the burden of the taxes to pay for the service we all come to know and expect.
- **Keeping our best and brightest at home – stop the brain drain.** Wisconsin has a first class system of higher education. Unfortunately, too often our most talented young people leave the state to take innovation economy jobs where they are more plentiful. We must foster an economy that provides opportunities for talented people, as well as a culture that rewards risk-taking and encourages entrepreneurship, especially when it comes to new high-tech business start-ups. The BTA seeks to foster the kinds of businesses that ultimately provide the high paying jobs which are desperately needed to keep our best and brightest people working in Wisconsin.
- **Leveraging federal grants.** The BTA will help researchers gain access to federal research funds, bringing new money to the region. More and more, the National Institute of Health and other federal funding programs are supporting interdisciplinary and inter-institutional research teams, because those teams have proven more effective in producing valuable scientific results and innovations. BTA's collaborative programs will make researchers more competitive for federal grants, and seed money for promising areas will help provide preliminary data that is critical for winning major federal research funds.
- **Increasing companies' access to academic research.** While it is an established fact that many new and successful innovation economy products and businesses have links to university research, it is also an established fact that universities are often difficult to engage and a puzzle to many business leaders. The BTA will help companies innovate and succeed in the global market place by connecting both existing and new companies to research being conducted in Wisconsin research universities. BTA functions as a neutral broker of R&D partnership, with an eye toward assisting successful biomedical companies that in turn will also help to fund future research innovations in the region.
- **Spin-off more companies.** Academic R&D spending and researchers are the key catalysts for starting new technology companies. The Milwaukee region has already shown its ability to spin out companies is among the best in the nation based on spin out companies per research dollar.

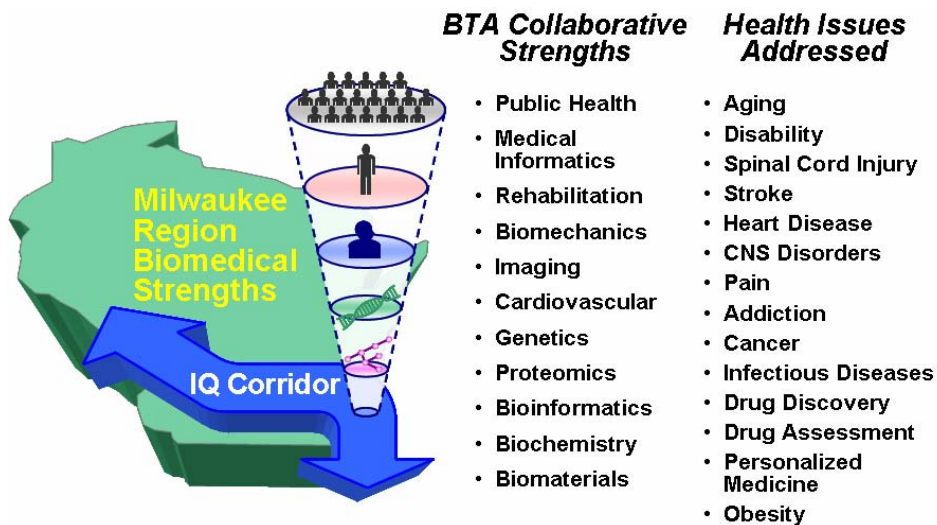
How is the BTA organized? The BTA established a steering committee to guide the initial efforts of the alliance. The steering committee is made up of academic, government, business and community leaders, and is co-chaired by Dr. William Hendee, President of the MCW Research Foundation and Cory Nettles, attorney with Quarles and Brady, LLP, and former Secretary of Commerce for the State of Wisconsin. The steering committee includes two subcommittees: the finance subcommittee, chaired by Tom Hefty; and the scientific subcommittee chaired by William Hendee.

The BTA was founded in 2004 by academic research institutions in the Milwaukee region – Marquette University, Medical College of Wisconsin, Milwaukee School of Engineering, UW-Milwaukee and UW-Parkside – along with the TechStar Foundation. It received its start when TechStar (a Milwaukee-based collaboration among the founding institutions that emphasizes research commercialization) received federal support of \$300,000 to begin organizing the alliance. These monies are likely to take the BTA through its initial planning and program development stage through the year 2006, but will not be sufficient to support planned program operations. The TechStar foundation board, consisting of representatives from each of the founding academic institutions, oversaw these initial efforts that included a series of collaborative seminars highlighting the region’s biomedical strengths.

Academic Participation.

The academic institutions in the Milwaukee Region are the founding members of the Biomedical Technology Alliance. These institutions include Marquette University, Medical College of Wisconsin, Milwaukee School of Engineering, University of Wisconsin-Milwaukee and University of Wisconsin-Parkside. These institutions are the core of much of the collaborative research done

regionally. In many cases, research centers at the institutions act as the collaborative bridges that bring together the resources of multiple institutions to address specific health issues.



Industry Collaborations. In addition to the academic institutions, industry plays a critical role in biomedical research in the Milwaukee region. In many cases, research is done collaboratively with academic institutions. Local industries also represent a significant opportunity for greater collaboration. Increasing the awareness of the research capabilities that exist in the academic institutions can lead to greater collaborations between industry and academia.

Strategic Plan: The BTA seeks to foster research collaboration by creating awareness, incentives and infrastructure. The long-term vision for development includes funds to seed early collaborative research and the establishment of a new campus of shared facilities.

- **Awareness.** The BTA has been organizing a series of collaborative conferences that highlight the Milwaukee region’s significant strengths in biomedical technology. These events have drawn together clinicians, researchers and business people as well as government and community leaders, and have grown to include over 200 participants. The programs have included Wisconsin Governor Jim Doyle, Milwaukee Mayor Tom Barrett, as well as leaders of the founding academic institutions.

- **Incentives.** Modeled on the successes of other states such as Minnesota, the BTA is seeking to provide incentives that will push researchers to build collaborative teams that reach across academic institutions and include industry. The State of Wisconsin recently committed \$500,000 in matching funds that will be used to foster this sort of collaborative research that includes multiple institutions. There is a bill currently in the legislature to expand the matching funds by \$2 million. This program, called the BTA Collaborative Grant Program is discussed in the next section.
- **Infrastructure.** The BTA is also working to provide infrastructure that allows researchers to work collaboratively. In the near term, the academic institutions have been creating inter-institutional agreements to make it easier to assemble collaborative teams. The BTA also supports initiatives such as a community institutional review board (IRB) that could streamline the process of gaining approval to perform clinical trials at the various clinical sites in the region. In the longer term, the BTA seeks to pursue several larger and more comprehensive initiatives that will help build an innovation economy in the region. These include a new biomedical campus where researchers from multiple institutions can share facilities and equipment, a program of endowed chairs to dramatically increase the research capacities of metro-area universities, and the promotion of startups in early stage funding to support technology commercialization. These efforts are discussed in more detail below.

New Initiatives and Future Visions

Previously, the authors tried to accomplish three objectives: (1) introduce and discuss the concept of a regional innovation economy and how it might benefit Metro Milwaukee; (2) examine Milwaukee's assets and shortcomings in becoming an innovation economy leader; and (3) present accomplishments to date in organizing and fielding various program initiatives aligned with an innovation economy vision.

In this section, we describe new proposed program initiatives that are significant in scope and vision. Taken together, if all of these efforts were launched over the next five to ten years, there is no doubt that the regional economy would be transformed. There is much that can be learned from the successes – and mistakes – of other regions as Metro Milwaukee goes forward. This section has been crafted to benefit from “best practices.”¹⁵

All of the proposed initiatives in this section could be linked and/or managed through the auspices of the Biomedical Technology Alliance. Over the previous two years the BTA has proven to be a worthy organizational vehicle for visioning and planning, as well as for program operations and management.

The following strategic initiatives are presented below:

- BTA Collaborative Grant Program
- BTA Academic Chairs Program
- Developing Technology Transfer Programs
- Developing Seed Stage Funding Sources
- A Collaborative Campus

For each of the initiatives the presentation will cover the following:

- Need and rationale
- Vision
- Operations and organization
- Costs and funding
- Implementation schedule

¹⁵ For example: Tornatzky, LG., Waugaman, P. G. and Gray D.O., *Innovation U: New University Roles in a Knowledge Economy*. Research Triangle Park, NC: Southern Growth Policies Board, 2002,

BTA Collaborative Grant Program

Need and Rationale. More and more, NIH and other federal funding programs are supporting interdisciplinary and inter-institutional research teams, since those teams are proving to be better in producing the kind of scientific results that lead to innovations that serve society. However, researchers must first establish proven interdisciplinary teams and have preliminary data that demonstrate the merit of their proposals to access federal funds. The BTA collaborative grant program will assist collaborative research teams in getting started, enabling them to write winning grants from federal sources, and ultimately develop successful commercial products.

Vision. The mission of the BTA collaborative grant program is to build collaborative relationships that increase academic research capacity in Metro Milwaukee and throughout the IQ corridor. We envision the region becoming national leaders in interdisciplinary research involving multiple collaborative research institutions and established companies. We envision developing a research culture that is a leader in directing the innovations of research into start-ups.

Operations and Organization. Initial funds will be used to fund collaborative applied research proposals – originated by researchers from Metro Milwaukee research institutions – that have potential to develop into promising products or services that could eventually be transferred into the commercial sector. Proposals will need to include investigators from at least two Metro Milwaukee research institutions. Project proposals will not be accepted from any companies or for-profit businesses. However, there will be a preference in the awards selection process for those projects that the private sector invests in or partners with to enhance their usefulness.

Proposals will be *reviewed and selected* by a joint committee of 12 individuals as agreed to by the academic institutions, representing scientists from the participating research institutions and outside industry professionals, including venture capitalists, corporate leaders, state agency representatives, entrepreneurs, or technology experts.

Qualification Criteria. Proposals will be reviewed and selected by a committee of 12 scientists and outside industry professionals. Project proposals must satisfy the following criteria:

1. Projects must be led by investigators from Metro Milwaukee research institutions, representing two or more institutions
2. A single institution may receive no more than 75% of the funds for any given project
3. Projects must be within the broad field of biomedical research
4. Projects must have a commitment of matching funds from the researcher's originating research institutions (see discussion of matching funds, below)
5. Funds will not be awarded to any individuals outside of the Metro Milwaukee research institutions or for-profit businesses

Selection Criteria. Project proposals will be judged and selected by the project selection committee on the following criteria:

1. Assessment of scientific merit and credibility of collaborative team
2. Ability to achieve key results in defined period of time

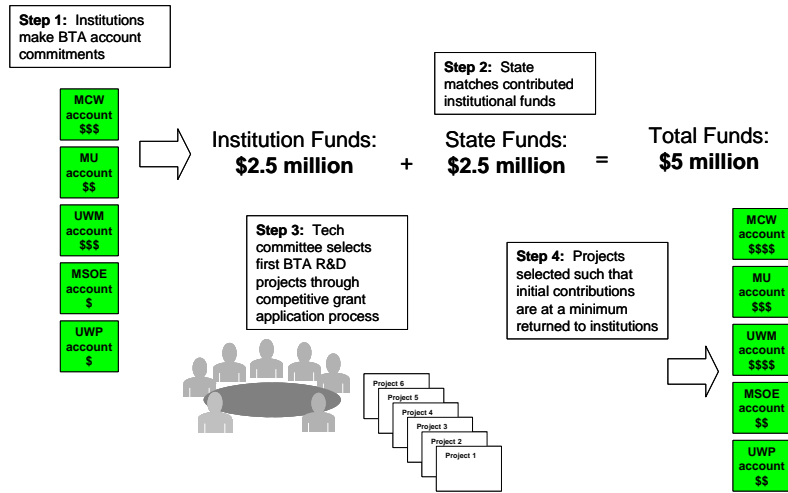
3. Projects that are budgeted appropriately and are cost effective
4. Ability to attract either additional funds or matching funds from the commercial collaborators or other sources
5. Results or milestones that would enable the collaborators to compete for follow-on grants from federal sources
6. Outcomes that could lead to innovative commercial products or services
7. Potential intellectual and economic value the project brings to biomedical cluster in Metro Milwaukee

The *size of grants* for individual projects (as represented by researchers from multiple institutions) would be between \$25,000 and \$250,000. Although it is envisioned that there would be a range of projects in various stages that would be funded, it would be left to the selection committee to select those projects that best grow the collaborative research infrastructure of Metro Milwaukee. The selection committee is only obliged to fund those projects deemed exceptional. Project proposal solicitation will occur semi-annually. Payments will be made on reaching pre-agreed project milestones. Funding of projects will occur so long as funds are available.

It is expected that an important outgrowth of the BTA Collaborative Grant Program will be research findings and associated intellectual property (e.g., patents) that will be commercialized. The preferred route for commercialization will be to license new technology to a new or existing company, preferably in the metro area, as soon as practical. However, new technology often requires additional investments in applied research and development before it has sufficient value to be an attractive license. For example, a new therapeutic agent might require preclinical testing (testing in an animal model of disease) or toxicological evaluation before it could be commercialized. The National Institutes of Health and foundations do not regularly fund this type of developmental work. Therefore, to prevent promising, but unproven, technology from languishing or never being commercially developed, the BTA collaborative grant program may apply some portion of the total funds in later grant cycles to this purpose. These development funds will not be used in lieu of outside investment of the technology, but only in instances where outside investment is premature.

Costs, Funding and Fiscal Management. In the first period of operation of the collaborative grant program, the State of Wisconsin will commit \$2.5 million, and these funds will be matched by funds from the academic institutions of Metro Milwaukee, creating a total initiation fund of \$5 million. The rules for matching funds from the research institutions shall be modeled after the rules for matching funds used by the National Institutes of Health (NIH). The academic institutions will cover any and all administrative costs associated with this initial operating phase of the BTA collaborative grant program.

Finance and Organization of the BTA Collaborative Grant Program



Projects will include individual budgets for direct project costs for the individual participating academic institutions. Indirect costs (e.g. facilities operations and administrative costs) of research of 20% are permitted. Incidental expenses (e.g., costs of the external review) will be recovered by the participating academic institutions. Project funding for direct capital costs will not be covered.

In terms of *matching funds*, no research institution is obliged to provide matching funds until a project is selected for funding that involves a faculty member from that institution. When a project is selected for funding, each institution is only obliged to match the portion of the cost of that project that is allocated to that institution. Once projects are selected, all funds (i.e., from the State and matching funds from the universities) will be accounted for based on procedures outlined by the NIH. The rules for matching funds must also meet the allowability and documentation requirements established by NIH. One potential exception to these rules is federal funds could be used as matching funds if the origin and purpose of those funds is fully described and deemed appropriate for matching by the selection committee.

Implementation Schedule. The rollout of the BTA collaborative grant program requires promotion among biomedical researchers in the Metro area and the establishment of a grant section committee. The basic infrastructure of the BTA collaborative grant program was established in the Fall of 2005 with project proposal solicitations beginning in February 2006.

BTA Academic Chairs Program

Need and Rationale. In order to accomplish the vision of a robust innovation economy in Metro Milwaukee, the scope of academic research should be double to triple where it is today within ten years, or between \$300 and \$450 million per year. Particular focus should be given to UWM, where we can best leverage state resources. Within ten years, UWM's research should be above \$100 million per year. While strategically we will use the collaborative framework of the BTA to grow research where it is strongest - in the field of biomedical technologies - there is also a need and an opportunity to insure that these ambitious goals are met via *tactical investment in people*. In effect, we can "leap frog" the normal growth in academic research by key academic appointments.

One little known fact of academic life is that a large percentage of important, funded research is done by a small fraction of faculty member. Some have estimated the ratio as high as 90 to 10, with upwards of 90% of key work being lead by 10% or less of the faculty. The important point is that key faculty appointments can be accelerated by targeted, generous funding programs.

The proposed program will adapt many of the lessons of the Georgia Research Alliance.¹⁶ Since the early 1990s, via an innovative partnership between state government, industry and the research universities of Georgia, over 40 endowed "Alliance" professorial chairs have been established, mostly in the Atlanta area. Virtually all of those have been in disciplines and technological areas that are deemed to be critical for continuing to build a technology-based economy in Georgia. The incumbents are typically very senior individuals who have distinguished themselves nationally in the quality and scope of their basic research. Importantly, a second criterion is the extent to which candidates have also distinguished themselves in creative industry partnerships and in the commercialization of technologies deriving from their research. Many have started companies in the past, or have spent parts of their careers in blue ribbon industrial labs. In order to reinforce these criteria, search committees tend to involve industry experts as well as academics.

Endowed chairs tend to rapidly accelerate the scope and excellence at their institutions. These individuals tend to become "walking franchises", bring in millions of research dollars, taking a leadership role in their departments or units, and being a force in the commercialization of technology. By promoting their efforts and successes, they also tend to be role models for other faculty members, particularly junior faculty, and contribute to changing the culture of the institution.

Vision. Within a decade the authors can visualize a cohort of upwards of 20 BTA Endowed Chairs in place in metro-Milwaukee research institutions. Collectively, these individuals would be bringing in \$25-50 million in sponsored research funding, as well as being actively involved in technology commercialization, graduate training, and entrepreneurial ventures.

¹⁶ Tornatzky, L.G. "Technology-based economic development in Atlanta and Georgia: The role of university partnerships." *Industry and Higher Education*, February, 19-26, 2002.

Operations and Organization. Several tasks would need to be addressed to make this vision a reality, both in planning and in execution:

Identifying Target Domains. While this whitepaper has identified biomedical technology and research as the substantive focus of building an innovation economy, to go about a recruitment process for endowed chairs this would need to be sharpened into target specialties. This would involve some more detailed analysis of the regional biomedical economy, looking at national trends and forecasts in the field, and mapping with emerging strengths in regional institution. Eventually a rank-ordered “menu” of potential chairs would be developed.

Developing a Funding Strategy. The practice in other regions has been to fund such chairs via a mix of institutional monies (e.g., through Development offices), state appropriations and industry support. The percentage mix of these sources is highly negotiable, and would need to be developed within the Wisconsin context.

Costing Chairs. Endowed chairs involve a semi-permanent endowment, with the annual salary and related expenses for an incumbent coming out of investment income from the endowment corpus. Theoretically, a well-managed endowment can go on indefinitely. However, the annual costs for an endowed chair can vary quite widely, given choices on non-salary expenses, such as startup costs, laboratory expenses, research assistants, and the like. This will all involve significant discussion.

Recruitment and Selection. Assuming that multiple endowed chairs will be created, a highly visible national recruiting approach needs to be developed. Ideally, this should all be managed locally, to reduce overhead costs paid to headhunters. Recruitment as well as selection processes should be conducted to insure that candidates are not traditional academic, devoid of industrial experience or interest. Recruitment and selection criteria will need to be developed and widely disseminated, and careful attention given to who will sit on review committees and/or manage the recruitment process.

Ongoing Management. Ideally, BTA Endowed Chairs, once hired, would not sink into a department or center and become invisible. Better, they would be actively involved with other endowed chairs and faculty members in helping to realize the goals of the BTA program. Some ongoing effort and staffing needs to be dedicated to fostering cooperation and involvement in various BTA initiatives. There is likely to be some turnover of Chair incumbents, and some management structure needs to be in place to insure continuity with the vision of the program.

Costs, Funding and Fiscal Management. Each endowed chair funded by this proposed program would involve a one-time investment of \$3 to \$5 million. Startup and ongoing management costs of an endowed chair program would be significantly less, but in the range of \$250-\$500K annually, which would be spread across the entire program.

Implementation Schedule. The major time-eaters in launching such a program would be involved in planning, scoping and getting agreements on funding. If those could be accomplished within 2006, the actual execution of the program could move out fairly rapidly. An initial cohort of BTA Chairs could be in place for the start of the Fall semester 2007.

Development of Technology Transfer Programs

Need and Rationale. Technology transfer programs at both MCW and UWM are in a state of active evolution and growth. Over the last five years, with the development of the MCW Research Foundation, one senses a perceptibly positive change in the community of researchers at MCW towards startup activities. The successes in startup activities are generating more interest from others to the same. At UWM, WiSys has been active in patenting innovative research. Startup activities at UWM are still in the formative stages, due in part to UWM's smaller research program and more established teaching culture. Tech Transfer programs at the other research institutions are less developed, again, commensurate with the size of their research programs.

Both tech transfer programs at MCW and UWM are under governance pressure to generate near-term cash revenues. In some cases, the pressure to generate near-term cash with a license competes with startup activities. For example, if IP can be licensed to an established out-of-state company for \$25k or more, it generally will be, rather than licensing the same IP to a startup for equity. The consequence of licensing IP to established companies out-of-state is continuing development of that IP is then limited and the economic development value of licensing IP to established companies out of the region is negligible.

On the other hand, a commitment from research institutions to push IP to startups, if possible, should be a focal point of a Metro Milwaukee economic development strategy. There are important benefits for researchers, institutions, and the local community in the establishing an institutional culture and capability to push academic research to startups, as summarized in the table below. With startups, technology development continues in the community through research grants, SBIR and STTR grants and equity investment. Startups create wealth in the community through equity appreciation. Startups provide supplemental wages for investigators and employment opportunities for graduates. Nearly 84 percent of university-linked start-ups set up shop in the state and/or community in which the university is located. Investment capital flows into the region, and new high skill, high paid jobs are created. Industry partnerships and investment in startups are more common. Successes beget more activity and an entrepreneurial culture grows around the research institutions and community.

While involving more specialized expertise and effort than straight licensing deals with established companies, commercializing new technologies via startups has the potential for much greater benefits to all involved: the community, the researchers, and the university. These are summarized below.

Benefits of Startups to Researchers, Institutions, and Community

Economic Development Benefits	Startup	Licensing
License royalties	yes	yes
Founders equity	yes	no
SBIR research grants	yes	no
Equity investment dollars	yes	no
Supplemental wages for investigators	yes	no
Employment for grads	yes	no
Control in development	yes	no
Feedback in development	yes	no
Follow-on development	yes	no
Assurance to develop	yes	no
Local economic development	yes	no

The ability to push IP to startups at a research institution is heavily dependent on institutional leadership, an entrepreneurial culture and champions. Much of what TechStar has accomplished at MCW is a direct result of the advocacy of Bill Hendee. Chancellor Carlos Santiago brings new leadership to UWM, and we anticipate creative developments in the technology transfer program there. Institutional leaders can have a big impact on culture. Institutions that are successful in tech transfer provide rewards and incentives for faculty who participate in commercialization activities. This might involve such things as giving faculty credit toward tenure if they file a patent application, or providing relief from teaching obligations to make more time for supporting startups. Other incentives involve publicizing faculty successes through articles in newspapers, department or university award ceremonies, and similar recognition. Technology transfer and economic development should find its way into the mission statements and public speeches.

An institutional technology transfer program that establishes the capability to form companies is not intended to compete with angel investors or venture capitalists. In fact, it is just the opposite. This capability is intended to be complementary to the seed investor requirements of seeing validated technologies, clear business plans, an early management and technical team, first customers, and a founding corporate structure that is compatible with seed funding requirements.

What is needed across the technology transfer functions of the metro area institutions are continued funding of personnel assets to address issues of culture and rewards, and the incorporation of best practices in tech transfer via start-ups.

Vision. A five year initiative is proposed that will continue a more entrepreneurial approach to university technology transfer. It will include the following program components:

- Adding staff with *experiential* background in starting companies to institutional tech transfer programs. This would include new dedicated staff at UWM and MCW. The vision is to increase the university startups metric to 8 startups for every \$100 million in research in Metro Milwaukee through 2011.
- Creating an entrepreneurial culture, that is both bottoms-up and top-down, and is active within the participating institutions, as well as in the larger community. The former will include a re-thinking of reward systems and policies, and the latter a series of events and

forums for leadership from tech transfer offices, entrepreneur companies, venture capitalists, law firms, and industry professionals network.

- Maintaining an SBIR/STTR grant coach that is well-versed in both science and business, who can facilitate the maintenance of a pipeline of SBIR/STTR grant applications and increase the funding of SBIR/STTR grants for Metro Milwaukee, with a goal of \$15 million in new funding by 2011.

Operations and Organization. While this initiative would be community-wide in impact, its primary beneficiaries and the focus of most activities would be area universities. The technology transfer staff should be closely aligned with the institutions where they are assigned.

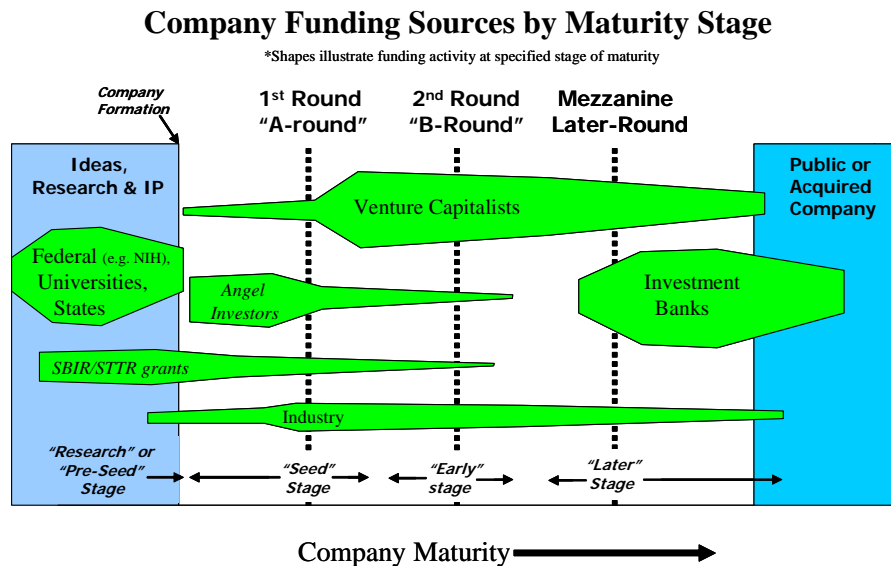
Costs, Funding and Fiscal Management. Six professional level positions are needed to staff and manage this initiative, at an annual cost approximating \$800K. The initiative would need to be funded by a combination of university cost-sharing, community fund-raising, appropriations and revenue.

Implementation Schedule. Contingent upon funding, this initiative could be operational by January 2007.

Establishing Metro Milwaukee Sources of Seed Capital

Need and Rationale. The State of Wisconsin is plagued with a dearth of venture capital investment, despite the fact that four institutional venture capital firms that have offices in the state. According to the goals published in 2020 Report, Wisconsin should move from \$111 million venture capital investment in 2000, to \$300 million in 2010, and \$500 million in 2020. Ironically, the amount of venture capital investment in Wisconsin has steadily decreased since 2000 to just over \$57 million in 2004, and what is looking like a much smaller amount invested in 2005.¹⁷

Funds for companies with innovations are dispersed by different entities or organizations at different stages. Typically, an innovative company must succeed through one stage to get to the next. These stages along with the funding sources are illustrated below:



Need for Seed Stage Capital. In a healthy innovation economy, successful companies grow to maturity by accessing the appropriate funding sources at each successive stage of maturity. In Wisconsin, although our research institutions are exemplary in gaining access to academic research funding sources, our funding sources beyond the research stage are not well established. As a result, many promising companies are not formed, and those that are formed are not transitioning easily from research through seed stage. This is the beginning of the deal flow continuum – the stage where ideas become innovations and innovations become companies. In this stage, the first employees of the company are hired – in particular, a leading entrepreneur.

Seed stage capital sources are generally located close to the opportunities they invest in. Solving the deal flow issue in Metro Milwaukee requires us to establish new sources of seed stage capital, in Metro Milwaukee.

¹⁷ http://www.ventureeconomics.com/vec/stats/2005q2/state_WI.html

To fill the seed capital gap in Pennsylvania, the state seeded three private, seed-stage funds to meet the needs of startups associated with the Life Science Greenhouses. More than \$100 million was invested from its state pension fund. In Indiana, the Indiana Future Fund was capitalized with \$75 million from multiple investors including the state pension fund. This fund-of-funds is privately managed and is aimed at seed- and early-stage biotech companies in the state.

Other states have leveraged investments from private sources. New York, for example, created a separate state agency – New York office of Science, Technology and Academic Research – to provide seed funding for research programs that will drive economic development. This investment has led to multi-billion investments in both industry funded academic research and high tech manufacturing. The New York office of Science, Technology and Academic Research provided seed stage funding for Centers of Excellence at academic institutions from across the State.

Exemplary universities not only have linkages to private seed and venture capital funds, but many also establish their own seed-stage funds for university researchers. Purdue's Office of Technology Commercialization offers two investment vehicles for inventions originating at the University. Purdue's Trask Innovation Fund provides faculty with "gap funding" to validate proof-of-concept, and the Trask Pre-Seed Venture Fund invests in start-ups that are commercializing Purdue-licensed technology. Georgia Tech's VentureLab provides seed capital and through their Fellows program, matches funded faculty members with successful entrepreneurs who assist them in developing commercialization and investment strategies. At a recent NASVF conference, it was noted that there are now over 80 university-oriented seed funds.

Vision. Metro Milwaukee should have sufficient sources of seed stage capital such that half of all research institution startups are capitalized with at least \$250,000 in seed funding. Anticipating growth in annual research spending, along with a metric goal of 8 spinouts for every \$100 million in research, we would expect 90 spinouts in the period of 2007 to 2011. Capitalizing half of those with \$250,000 would require an additional \$10 million in seed funds to be invested in Metro Milwaukee.

To achieve this goal, Metro Milwaukee needs to establish local sources. Governor Doyle's focus on developing angel networks and tax incentives for angel investment is to be applauded. It is not clear that more can be done with the angels. Other possibilities include the following:

- *Venture Capital Funds.* Our state institutional venture capital funds are early-stage, but not typically seed stage. What are the best ways to engage the state VCs to invest in seed?
- *University Sources.* There are a variety of possibilities with university oriented funds:
 - *Translational funds.* Institutions can designate a portion of available research funds for translational research.
 - *Industry programs.* Institutions can develop specific programs, such as UWM's WIBHT Initiative, that involves industry in research programs.

- *Seed Funds.* Universities can establish seed funds using an institutional venture capital or other models.
- *BTA Collaborative Grant Program.* The CGP encourages translational research. It does not currently fund companies. The program could be expanded to be able to provide seed funds to university-based spinouts. This type of fund could be administered by the same, or a similar committee that selects projects for research funding.
- *New Seed Fund.* A \$5 to \$10 million seed stage fund that makes many smaller seed investments within a given community would be much more effective in stimulating the deal-flow pipeline than a \$75 million fund that makes very selective larger investments on a national scale. Such a fund could be raised by new general partners in a traditional venture capital structure or it could be established as a community managed ever-green fund.

Some may argue that seeds funds for university spinouts should only come when the market is capable of attracting them. However, the availability of seed funds also creates a market for startups. If the research community understands that one of the ways to continue research and realize its benefits is through commercial ventures, it will change the culture in our research institutions and create incentives to produce high quality startups. Clearly, not all these startups will succeed, but out of 90 startups over the next five years, a good percentage of them will.

Operations and Organization. TBD

Costs, Funding and Fiscal Management. TBD

Implementation Schedule. Operational by 2007.

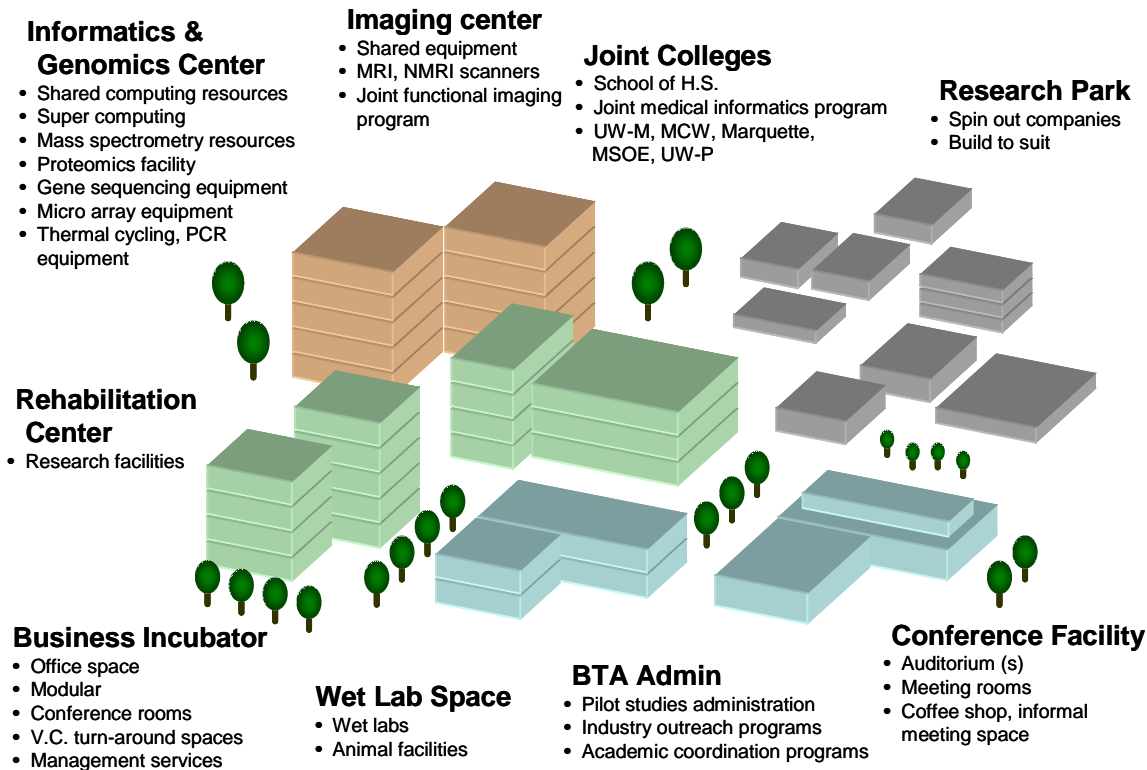
Collaborative Campus

Need and Rationale. As the various initiatives of the BTA become operational, two results are inevitable: a dramatic growth in the scope of collaborative research and development, and unfortunately, a huge need for expanded laboratory and technology commercialization facilities. The table below is a tool for estimating the capacity utilization of Metro Milwaukee’s existing research and incubation facilities. There are several existing facilities that will be able to provide space for research and development activities for several years to come, including: the Cozzens-Cudahy Center, CATI, the Milwaukee County Research Park, and MCW’s new biomedical building. However, research institutions, particularly UWM, and research spinouts will require new operational facilities in Metro Milwaukee by 2009. This is an opportunity for Metro Milwaukee to capitalize on evolving collaborative environment in biomedical technology and establish a new campus of shared infrastructure would facilitate new research collaborations and create an identity and anchor for the IQ corridor through Milwaukee. This shared campus is part of a long-term vision that would also serve an important role in stimulating new economic development for Metro Milwaukee.

Metro Milwaukee Research, Development, Incubation, and Commercialization Facilities Estimates

	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>
Research spending (\$ millions)	\$150	\$175	\$200	\$225	\$250	\$275	\$300	\$325	\$350	\$375	\$400
Total number of research FTEs (1 per \$100k)	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,250	3,500	3,750	4,000
Research startups (4 per \$100M in research)	6	7	8	9	10	11	12	13	14	15	16
Startup located in incubators (50%)	3	4	4	5	5	6	6	7	7	8	8
Yearly startup FTEs (3 per startup)	9	11	12	14	15	17	18	20	21	23	24
Summed FTEs (assuming 50% growth per yr)	9	24	48	86	143	231	365	567	872	1,330	2,019
Total growth in research and startup FTEs	9	274	548	836	1,143	1,481	1,865	2,317	2,872	3,580	4,519
Total sq ft of facilities reqd (250 sq ft/person)	2,250	68,500	137,000	208,875	285,813	370,344	466,266	579,273	717,910	894,990	1,129,735
Available (sq ft)	165,000	165,000	165,000	165,000	165,000	165,000	165,000	165,000	165,000	165,000	165,000
Deficit (sq ft)	0	0	0	43,875	120,813	205,344	301,266	414,273	552,910	729,990	964,735
<u>Estimated Available Expansion Capacity (sq ft):</u>											
Cudahy Center	10,000										
CATI	5,000										
Milwaukee County Research Park	30,000										
MCW Biomedical Building	<u>120,000</u>										
Total:	165,000										

Vision. A campus of shared infrastructure would include collaborative research labs in fields such as imaging and rehabilitation, genomics/informatics, and a business incubator with wet lab space, and a conference facility. All shared infrastructure would be located centrally in Metro Milwaukee on lands with expansion space available for joint colleges and a research park. The facilities would be managed by a consortium of research universities, or potentially by one lead university. The diagram below illustrates how the BTA infrastructure will look in eight to ten years with continued support. To a great extent, the physical layout and design will emulate features of other collaboration-oriented research parks elsewhere in the US. Of those, the Centennial Campus of North Carolina State University is a good model, with office and laboratory buildings that have both academic and industry tenants, and where there are “spaces” designed to encourage interaction and inter-organizational bridging.



Operations and Organization. The BTA campus location has yet to be established. The requirements for the site location include: a Metro Milwaukee location, 60 acres or more, freeway and parking access and development incentives. Prospective sites include:

- The Veterans Medical Center grounds next to Miller stadium in Milwaukee
- The Park East or Pabst City grounds in downtown Milwaukee
- Land across from MCW on Watertown Plank Road (contiguous to the Milwaukee County Research Park)

Land acquisition will be funded through a combination of the transfer or long-term lease of federal or local lands, and federal and local tax incentive programs

This first BTA building will be constructed as a modular and adaptable space that is consistent with the needs of collaborating biomedical researchers. It will serve as an open conference and meeting place for academic institutions and businesses. The initial tenants will come from the academic research institutions in SE Wisconsin. This facility will also be available for lease by companies in the biomedical industry. The intent is to develop a collaborative environment between biomedical technology researchers and business professionals. The business professionals may come from either early stage companies or established businesses, such as GE Medical. A facility of this type would not only help ensure that early stage biomedical companies have the resources necessary to get started but also aid in bringing in new biomedical businesses from outside the area.

The first BTA building will contain a biomedical incubator space (20,000 ASF), a conference and meeting space (8,000 ASF), and laboratories for collaborative biomedical research (28,000 ASF). The total size of the building will be approximately 56,000 ASF/88,000 GSF.

	ASF	GSF	Efficiency
Research Labs	28,000	46,667	60%
Incubator Wet labs	20,000	31,333	64%
Conference and Meeting Areas	8,000	10,000	80%
Total:	56,000	88,000	64%

Costs, Funding and Fiscal Management. As described above, the cost of the first building will be approximately \$32,000,000. Included in the cost will be an unfinished basement that can be adapted to hold larger biomedical equipment. As other components of the overall campus are articulated, more comprehensive cost estimates will become available. The cost of the overall campus will easily be in range of \$100 to \$250 million, depending upon design options. As such, the funding structure will need to be collaborative and creative, most likely involving a mix of state government, city and county government, and private development. Various examples of how to approach this challenge can be garnered from the experience of metro Atlanta, Research Triangle Park, and other venues.

Implementation Schedule. The overall campus development timeline will show a phased approach for the build-out of infrastructure and programs. The BTA is currently planning and investigating funding options. From a needs perspective, it is appropriate to begin development of the first building in 2007. Subsequent buildings will be established later.

Next Steps

There are three seemingly simple - but actually fraught with difficulty – steps that need to be taken in order to make the visions and strategies described in the document become reality. They include:

1. Mounting a metro-wide discussion and vetting of the arguments and proposals in this white paper. This needs both extensive and careful involvement of key “stakeholder” and a disciplined process to manage it. This would include small meetings, town hall type events, brainstorming sessions, prioritizing of alternatives, and many other approaches to gaining consensus.

Deliverable. A revised white paper, and more importantly agreement on an action agenda of projects and activities to be pursued over the next 5-10 years. Attaining this deliverable assumes that the heat of the discussion doesn’t incinerate the ideas of the white paper.

2. Identify and empower a core team of metro leaders that has the responsibility to provide ongoing oversight, work the local and state politics, and pull together the combination of state, industry and university funds necessary to launch the action agenda.

Deliverable. An organizational structure and funding commitments to execute the action agenda.

3. Implement, implement, implement.

Deliverable. A biomedical-based innovation economy in Metro Milwaukee that is robust, growing and transformative by 2016.

Accomplishing the objectives and deliverables of this white paper will also be extraordinarily important from a cultural and historical perspective. Since the early 19th century, when Milwaukee was founded and flourished, its story is one of risk-takers, entrepreneurs and civic leaders who have carved out a piece of the future. There are a large number of Milwaukee ghosts out there – Solomon Juneau, Morgan Martin, Mathilde Anneke, Alexander Mitchell, Eber Brock Ward, John Blankinton, Frederick Pabst, Edward Allis, Patrick Cudahy, Henry Harnischfeger, Victor Berger, Daniel Hoan, William Davidson, William Harley and Harry and Peg Bradley – whose memories need to be honored in what happens next. They accomplished great commercial or civic goals, and more often than not saw them supplanted by the next great thing. That is the nature of an entrepreneurial culture. Try something new in order to make something better, and let the chips fall where they may. And that spirit of entrepreneurialism has indeed been a characteristic of the region’s past¹⁸.

The last three decades have been difficult for Milwaukee, as well as for many of its sister cities in the industrial Midwest. However, this initiative can be part of the road back to national and

¹⁸ Gurda, John. *The Making of Milwaukee*. Milwaukee, WI: Milwaukee County Historical Society, 1999.

global prominence for Metro Milwaukee. Just as fur, wheat, steel, shipping, beer and machine tools have defined previous entrepreneurial eras, biomedical technologies and other leading lights of a new innovation economy will define the next several decades. Metro Milwaukee needs to move boldly into that future. It needs to reward risk taking, shrug off temporary setbacks, make investments today for a larger vision, summon its courage to do the right thing, and keep its collective eye on the prize of a productive, creative and entrepreneurial future. Its citizens – young and old, established and just starting out – deserve no less.