The following writing examples are from previous Excellence in TBED award winners, reprinted with permission.

Example 1: Innovation Works Innovation Adoption Grant Fund – 2009 Winner of the Improving Competitiveness of Existing Industries category

Project Overview

Abstract

Until the 1980s, the Pittsburgh region prospered from the presence of heavy industry – the production of steel, aluminum and glass made the region one of the richest and most important industrial hubs in the world. But an economic death spiral took place almost overnight. In a period of less than a decade, our community lost that industry and that economic engine in one of the most severe disappearing acts ever felt by a region. In the course of 10 years, almost every mill closed down and the population left in droves, clearing out half of the city's population.

Fast forward 25 years. Pittsburgh is now seen as a case study in how to successfully utilize economic stimulation and proper resources to build a healthy and sustainable economy. Innovation Works and the Ben Franklin Technology Partners have spent that 25 years creating programs that diversify the economy into a variety of technology sectors, stimulate business formation and business growth, and help established companies become more competitive.

Specifically, Innovation Works' Innovation Adoption Grant Fund was established to support manufacturing companies in southwestern Pennsylvania's rural counties and distressed communities, and to support the non-profit organizations that provide research and development to these companies.

In brief, the IAG Fund pairs small manufacturing companies (with less than 250 employees) with non-profit centers of excellence. The centers help the companies develop new products or create new and better manufacturing processes, on a fee-for-service basis. Grants of up to $50,000 (matched by the companies) are awarded to manufacturers that have research and development needs but don't have robust R&D departments that will allow the companies to compete effectively in the global market and in difficult economic times. These grants go to offset the cost of the outsourced R&D.

In five years of operation, the IAG Fund has:

- Demonstrated strong community support and dedication by awarding more than $1.5 million to over 100 companies in all nine counties of southwestern Pennsylvania (these numbers include both grants and smaller microgrants for smaller projects);
- Generated an additional $2 million in matching investment in research and development from private industry;
- Created or retained more than 800 jobs (at a cost of $1,875 per job) that pay an average annual salary of $45,000;
- Helped to design, prototype, test and commercialize more than 20 new products that are expected to generate tens of millions of dollars in new revenue in the next three years for recipient companies;
- Helped to implement at least 50 new manufacturing processes that bring operating efficiencies and higher profitability to the participating companies;
- Been replicated or studied by other technology-based economic development organizations in central Pennsylvania, Oklahoma, Ohio, West Virginia and elsewhere.

Description and Background

Six years ago, IW conceptualized and outlined a new program that would seed technology development more effectively in rural counties and economically distressed communities. The eight rural counties of southwestern Pennsylvania – Armstrong, Beaver, Butler, Fayette, Greene, Lawrence, Washington and Westmoreland – have a much different economic base than Allegheny County (which is home to the city of Pittsburgh). Despite overwhelming economic distress in these regions, the manufacturing sector is still the largest base of jobs in these counties, accounting for roughly 17 percent of the economic base. Towns in these rural counties are supported by literally thousands of small manufacturing companies that are fighting to survive and prosper in a depressed global market.

IW saw an opportunity for a program that would grant money to those established manufacturers that are interested in utilizing or creating cutting-edge technology for new product development or manufacturing process development. Many of these companies face tremendous pricing pressures from overseas competitors, and they need to make products faster and more efficiently. They also need to continuously innovate new products to stay in front of their competition in their markets. But the problem is that many of these companies do not have the financial and technical wherewithal to build in-house research divisions to continually innovate.

A 2004 study of Pennsylvania's manufacturing sector by Deloitte Consulting found that our manufacturers "need help developing new long-term business strategies or ways to innovate and develop new products that bring higher margins and help move firms away from commoditization." According to the study, there was an opportunity to "build programs that link educational institutions with manufacturers to provide R&D resources or help develop more technology-intensive industries in the region."

That opportunity was fulfilled by the Innovation Adoption Grant Fund – a program that helps these companies work with the R&D centers of excellence to keep a competitive edge, retain important manufacturing jobs and create new jobs for the region. Until this program was created, industry had the need but largely didn't know about the non-profit centers of excellence or couldn't afford the services of the centers of excellence. At the same time, the centers of excellence had world-class research capabilities but were not effectively marketing their services and resources to the manufacturing community.

There are many types of projects undertaken through the IAG Fund, including: mechanical, chemical or electrical product engineering and design; rapid prototyping of product design; robotic assembly or machinery design for new manufacturing processes; industrial analysis and overhaul of existing manufacturing processes; and machine customization for specific product manufacturing.

Best Practices Implications

The Innovation Adoption Grant Fund has clearly established itself as a best-practice program in the region and nationally. Locally, the program been lauded by economic development professionals in the distressed and rural areas, and it has been publically recognized and trumpeted by a number of our centers of excellence. According to Diane Sheets, Executive Director of the Community Development Corporation of Butler County, "the IAG enables companies to access some of the best technology development centers in the world." And other TBEDs around the United States have either replicated the IAG Fund or studied the IAG Fund for custom implementation in central Pennsylvania, Ohio, West Virginia, Oklahoma and elsewhere. No other program for supporting the creation and retention of manufacturing jobs has demonstrated the ability to impact those jobs so efficiently – a cost of $1,875 to create or retain a job that pays a sustaining annual salary of $45,000. Most economic development programs recognize a payback on job creation and retention efforts measured in years, with most efforts taking at least two years to pay back the cost of creating a new job. The payback time for a job created through the IAG Fund is three weeks (time for a $45,000-per-year salaried employee to make $1,875)!

Lessons Learned

Four important lessons have been learned through the launch and operation of the Innovation Adoption Grant Fund over the past five years.

First, the importance of the grants is critical. In most cases, these small manufacturers are family owned businesses. The business owner looks at an R&D expense for new products or manufacturing processes as something more than just a line-item business expense. A business owner who is 10 years from retirement weighs investment options for a business – cash in hand from the company's profit that can be put away in a bank versus putting the cash back into the business to try to increase the value of their investment. By and large, these are frugal entrepreneurs who want to innovate but also feel reluctant to part with their money. In most cases, if not for the grant money by Innovation Works, these companies would not invest the necessary capital on new product and process R&D. Because the grants carry a one-to-one match requirement, the companies still have a vested interest in a project and still must view the project as an investment of their own capital. The grant simply softens the pain of investing in business growth and motivates the decision to invest in business growth.

Second, small business owners are only interested in the IAG Fund as long as the money comes to them in the form of a grant. These established business owners already have lines of credit with a bank – so they don't want another loan, even if it carries low interest. And these owners are not about to dilute their ownership of their businesses by taking in outside investment to help fund R&D. So, structuring the program as an investment or a loan program would not yield the same results and genuine interest on the part of small manufacturers.

Third, small manufacturers are key employers in small towns. These companies already have revenue, customers and market knowledge. The economic development cost of helping these companies grow and succeed is lower and the success rate is higher than would be the case if we were trying to start new companies from scratch in these smaller towns. In other words, it is more effective and efficient to nourish the vegetation that already exists in these markets than to rip out the existing vegetation and plant new seeds from scratch.

Fourth, like most economic development programs funded in part through public funds, an effort toward long-term sustainability of the program is important. While we have diversified funding for the IAG Fund over the past five years (in addition to current funding from state and foundation sources, we have also received and continue to pursue funding through the federal government), certain of these funding sources do not like to fund initiatives in perpetuity. In an effort to make the IAG Fund more evergreen, Innovation Works has added a "home-run provision" to our contracts. If companies that receive grants are very successful with their project, and if that project results in a predetermined increase in annual revenue, the company repays the grant back to IW. This makes certain projects become interest-free loans, but only in instances where the companies have an increase in cash flow and can afford to repay the amount. As long as companies are comfortable with the repayment provision, it does not scare them away from participating in the program.

Relationship to Other Economic Development Efforts

Southwestern Pennsylvania is fortunate to have a wide variety of economic development organizations that fulfill many of the needs within the region. When new TBED initiatives are launched in SWPA, it is important for the launching organization to work with other TBED groups to ensure that unmet needs are being met and that economic development efforts are optimized and not duplicative. In addition to working with other TBED groups, Innovation Works partners closely with 13 county economic development groups in our nine-county region to help market our program and find companies that are in need of our services.

According to Linda Nitch, the Executive Director of the Lawrence County Economic Development Corporation, "The IAG program helps small manufacturers gain the engineering and research expertise they would not have otherwise, allowing them to create better products and bring them to market faster."

Many of the 15 non-profit centers of excellence tapped for IAG projects to date are part of larger economic development efforts in the region. Catalyst Connection, a local industrial resource center that is part of a statewide initiative, is a center of excellence that has worked with Innovation Works on a number of IAG projects. Catalyst Connection has staff members who are experienced industrial engineers and other technical experts, and these individuals prove valuable on many projects. Aside from Catalyst Connection, most of the centers of excellence engaged on IAG projects have an affiliation with colleges or universities within Pennsylvania. Most of these schools recognize their economic impact on our region and see themselves as economic stewards as well as educators. Because of this motive, the schools appreciate that IW can bring project work to their centers of excellence – raising awareness of their capabilities and providing important projects for students and researchers to work on. In fact, Robert Morris University's Engineering Department hosted a luncheon in 2008 to recognize Innovation Works as the partner that has most significantly helped in the success of the school's outreach to the commercial sector.

Impact

Metrics

The Innovation Adoption Grant Fund receives financial support from two entities currently – Pennsylvania's Department of Community and Economic Development and the Claude Worthington Benedum Foundation. (Innovation Works also is currently seeking support for the program from the Economic Development Administration.) Although the two entities provide different types of funding and have different missions, both are interested in measuring the impact of their funding.
Innovation Works conducts an annual impact survey process with all companies for two to five years after those companies receive funding from IW. This survey process is instituted in accordance with strict guidelines set by the Commonwealth of Pennsylvania, and the results of the impact surveys are independently audited.

There are a number of key metrics measured through the impact survey process that are recognized as concrete indicators of the impact of an IAG project. These metrics include:

- Job creation that is attributable to the project;
- Job retention that is attributable to the project;
- Revenue increases that are attributable to the project;
- Average employee wage of created or retained jobs;
- New products created and commercialized that are attributable to the project;
- New manufacturing processes or improved manufacturing processes implemented that are attributable to the project;
- Additional outside investment or other funding secured because of Innovation Works support.

Impact to Date

The Innovation Adoption Grant Fund has been a significant win-win situation for everyone involved.
The companies benefit by cost-effectively bringing new products to market or making existing products better, faster and cheaper. The centers of excellence benefit because, in most cases, their services and capabilities were not well known in the commercial sector until IW began to play matchmaker. And the region benefits by leveraging one of the most effective (in terms of job creation and retention) and sought-after economic development programs for established manufacturing companies in Pennsylvania.

The program results are compelling. In five years, $1.5 million of IAG grants has:

- Provided product development and manufacturing process development support to more than 100 companies;
- Created or retained over 800 jobs that pay an average salary of $45,000 per year;

- Created and retained those jobs at a cost of $1,875 per job ($1.5 million divided by 800 jobs) – an economic development payback period of three weeks (time it takes for someone earning $45,000 per year to make $1,875);
- Generated $2 million in additional R&D investment from the private sector;
- Assisted in bringing more than 20 new products to the market that collectively generate more than $10 million in additional annual revenue;
- Assisted in implementing over 50 new manufacturing processes that have helped companies make their products faster, cheaper and better. Improved product pricing, quicker manufacturing turnaround and better product quality have led some companies to report more than a 20 percent increase in annual revenue, even without the introduction of a new product.

As previously discussed, the results of the annual Innovation Works impact survey are independently audited by a third party.

Communication of Impact

Because Innovation Works seeks additional funding each year from various funding sources, our organization goes to great lengths to communicate our program impact to the Pennsylvania Department of Community and Economic Development and the Benedum Foundation, as well as other sources of funding and other partners and stakeholders.

We submit progress and final reports to DCED and Benedum so that they can track our program progress. But just as importantly, we reach out to legislators and other elected officials, economic development leaders, business leaders, academic leaders and the general public to communicate the success of our programs. We do this through published annual reports, targeted public relations (letters, blogs, newsletters), press conferences, hosting of informational and networking tours and events, participation in conferences and panel discussions and a variety of other outlets.

Example 2: Oregon Nanoscience and Microtechnologies Institute (ONAMI) – 2012 Winner for Commercializing Research

ONAMI NARRATIVE FOR SSTI EXCELLENCE IN TBED AWARD 2012

(Category: Commercialized Research)

PROJECT OVERVIEW

ONAMI —Oregon Nanoscience and Microtechnologies Institute—is widely and increasingly cited as a national model for state and regional innovation-based economic development. ONAMI was the first Signature Research Center (SRC) created and funded by the State of Oregon in 2005.

Although Oregon boasts a leading high-tech industry cluster (Silicon Forest), it is not a wealthy state overall and has until recently underperformed in basic research volume and venture-backed start-ups. Accordingly, ONAMI's funding since 2005 has been comparatively modest: $20M capital, matched by industry, and $27M operating funds (including $5.0M appropriated for FY12-13).

ONAMI's fundamental purpose is sustainable high-wage job creation in Oregon. ONAMI-assisted start-ups currently employ 112 FTE and leveraged investment in these companies is $108M to-date. Research funding to ONAMI members has grown 4X including major Center Awards. This impact has been accomplished via three main programs:

1. Matching Grants for collaborative and industry-funded research awards to ONAMI members at Oregon's four research universities.
2. ONAMI's High Tech Extension" connects a network of university-owned shared/open user facilities to start-up and established industry researchers on a simple fee-for-service basis.
3. The Commercialization Gap Fund provides critical financial and entrepreneurial support to early-stage technology-based companies arising from ONAMI members' research and industry partners.

The key to ONAMI's success is connecting a themed, multi-institutional research collaboration and infrastructure network with a locally and professionally managed commercialization fund whose purpose is to position companies for growth and capital investment. ONAMI's model has been replicated by the second and third SRCs in Oregon.

ONAMI'S BEST PRACTICES

Collaboration and Quantitative Goals Focused on Action

ONAMI's founding vision was to unite promising but "siloed" and underdeveloped university assets for economic development relevant to high-tech manufacturing, which remains Oregon's highest-wage and largest major employment sector. Oregon had a weak track record of venture funding, declining public university funding, and very few major corporate headquarters. It did, however, have some of the world's leading micro/nanotechnology industry research and development and advanced manufacturing sites (e.g. FEI Company, Intel's lead site, HP's top technology site, Life Technologies' nanotechnology site). Even though these assets make the Silicon Forest a recognized high-tech region, the lack of significant investment associated with corporate headquarters made related cluster identity and development elusive.

An early ONAMI observation was that no single Oregon university had critical mass sufficient for success in competition for a significant signature research initiative . ONAMI's multi-institution model became the first notable and nationally recognized TBED success in Oregon. This collaborative breakthrough was enabled by exceptional leadership among both faculty and executives at Oregon's research universities, together with the nearby multi-program research powerhouse, the Pacific Northwest National Laboratory. As anticipated, the collaboration has become a deeply connected community involving facility sharing, joint faculty appointments, increasingly competitive multi-institution proposals, student sharing/recruiting/internships, and greatly accelerated commercialization – with an emphasis on startup companies and organic growth.

Lessons Learned

ONAMI programs have grown and evolved since 2005, but 5 key lessons remain central to our success.

1. **Make funding programs competitive, requiring recipient initiative.** At the outset we considered allocating funds by campus and by technical focus area. With good board and campus leadership advice, we settled on a competitive proposal-based structure for most of our programs, available to all ONAMI members. We have gradually eliminated all "predetermined" funding. Our programs are now 100% competitive and 100% tied to measurable results.
2. **Enable and support company access to public research infrastructure.** ONAMI provides funding and incentives for the statewide sharing of core university research facilities as "High Tech Extension" resources. The model for the High Tech Extension is fast/easy business access to instrumentation and services on a fee-for-service basis, especially for start-ups that are commercializing research results. Establishment of shared user facilities at the universities required cultural and managerial adjustments, since business clients have different needs and sensitivities than researchers. However, doing this well is crucial for having a vibrant community of capital-efficient technology start-ups. Even if it were feasible, it should be unnecessary for private sources to duplicate the enormous capital investment that has been made in university analytical measurement and prototype fabrication facilities. ONAMI's affiliated network of shared user facilities now includes five campus core facilities. In addition to shared access to major tools, these facilities also offer company tenant lab space.
3. **Collaborate with tech transfer offices on pre-commercialization funding.** In Oregon, a relatively recent tax credit mechanism (University Venture Development Fund) provides earliest-stage funding for ideas that may have commercial potential. The ONAMI Commercialization Gap Fund, which works with all of the state's research universities, often co-funds projects with the UVDF or funds UVDF successes. This mechanism contributes to a campus culture that values commercialization.
4. **Make commercialization funding multi-institutional and regional in scope.** **S**uccessful TBED is less likely to be generated from "all the interesting technologies at University X" than from "all the interesting technologies at all the regional universities related to Industrial Sector Y." Gap funding that is competitive and open to multiple institutions in a state or region increases the quantity and quality of deal flow and also enables the possibility of multi-campus contributions to a company's success. This

approach is consistent with ONAMI's mission of supporting commercialization of micro- and nano-scale technology across the State of Oregon. In addition, the wider base of deal flow increases the appeal to industry and investor partners, and the likelihood of successful collaborations.

5. **Student Work Experience.** ONAMI has actively promoted undergraduate and graduate student internships in major industry, as well as employment experience with small and start-up companies. Matching Grant and Gap grant funds have been authorized for support of students at startup companies. Internships and student employment benefits all parties:
   - Universities develop insight into industry talent requirements.
   - Companies gain access to young talent and develop deeper relationships with faculty.
   - Students (and faculty) benefit by their exposure to the real-world business environment and current technology challenges, increasing their productivity in research and industry settings.
   - An increasing number of advanced degree graduates go directly to startups following degree completion, many as an extension of student work experience.

Transferability

ONAMI was one of four case studies presented in a nation -wide survey on innovative regional economic development initiatives in *Innovation Begins in the States: Promising Effects to Bootstrap Innovation Ecosystems*, a forthcoming report from the National Governors Association Center for Best Practices. As pointed out in that publication, the state of Oregon has used the successful ONAMI model to launch two additional Signature Research Centers (biotech, cleantech). ONAMI, OTRADI and Oregon BEST formed the Oregon Innovation Cluster which was selected by the U.S. EDA as the single Seattle Region winner of an i6 Challenge grant. ONAMI has used i6 funding to hire (Oct. 2011) 3 Entrepreneurs-In-Residence and launch (2012) 6 new Proof of Concept projects in collaboration with high-potential startups.

ONAMI President Skip Rung is a frequent invited speaker and report co-author for NSF (NSE Grantees Conferences, 2010 Nano II Report), NNCO (Regional State and Local Initiatives Conferences - 2012 host and 2009 report co-author, 2012 US -Korea Nanoforum), NGA Center for Best Practices (5 workshops since 2009),and other organizations assisting TBED practitioners around the U.S.

IMPACT

ONAMI has exceeded expectations in delivering on our performance metrics since our founding in 2004. The following snapshot summarizes program impacts since 2004:

1. **Federal and private research dollars leveraged—$268 Million**
   Net nanoscience and microtechnology research awards to ONAMI members from federal and private sources have risen from $9M in FY2004 before ONAMI was incorporated, to a projected $40M in FY2012. The total net research awards total $268M from FY05 through 3rd Quarter of FY12.
2. **Business start-ups—31, $108M funding to date**
   The ONAMI Gap Grants program matches university technology and/or shared facility usage with entrepreneurial expertise and potentially investable business plans. We have made 31 Gap Grants to date, and the gap portfolio companies have garnered over $98M in private capital funding plus $10M in related SBIR/STTR funding.

3. **Number of people employed**: **112 + 1640**
   Our gap fund companies currently employ 112 Full-time-equivalent employees in Oregon and 30+ more in other states. We expect to end the current biennium with 125 jobs and to see even more rapid growth in 2014. In addition, $40M in annual research awards to ONAMI Research members represents approximately 1640 jobs (U.S. DoC heuristic: 41 jobs/$1M research).
4. **Total leveraged revenue and investment to date - $411M**

Federal and Private Research Awards to ONAMI members	$268M
Private capital and federal grants to Gap Grant companies	$108M
Major Corporate Gifts (equipment, facilities and services)	>$35M

5. **Patents—39** Since 2005, ONAMI Member Researchers have been issued 39 U.S. Patents related to nanoscience or microtechnology. Related licensing and patent expense recovery revenue (details confidential) during the same period has totaled $1.6M, including an estimated $1.1M in the current biennium.

Performance Measures

The program's formal performance measures are rigorous and quantifiable, and align well with ONAMI's mission. The metrics are negotiated biannually with the Oregon Business Development Department and audited quarterly by the Oregon Innovation Council (Oregon InC.).

The performance metrics (and actual results) for the biennium concluded on June 30, 2011 were:

1. $60M in federal, private or foundation research awards to ONAMI Members ($74M **Ahead)**
2. Advance up to 10 new technologies, developed by companies assisted by Gap Grants or other ONAMI programs, to enable those companies to seek customer or private capital funding by July 2011. (8 funded; 4 in Gap Grant contract negotiations. **On Track**)
3. Assist Oregon companies in raising at least $20 million in external (i.e., non-State of Oregon) funding from federal, customer, or private investment sources. ($83M. **Ahead**)
4. Generate between $200K and $500K in licensing revenue or equity value to Universities from Gap companies. ($655K in licensing revenue. **Ahead)**
5. ONAMI's High Tech Extension service will market and measure external (off-campus) billed client services for measurement, materials analysis, and product prototyping at ONAMI-affiliated Shared User Facilities. The 2009-2011 goal for external billings is $1.5 million. ($1.504M **On Track**)

Three quarters into the FY12-13 biennium, we are on track to meet or exceed similar goals for research awards and Gap company funding.

Communicating Success

ONAMI communication vehicles include quarterly reporting to OR InC, the annual ONAMI Greener Nano conferences and the ONAMI website, including a section specifically dedicated to Economic Impacts. ONAMI President Skip Rung has been an active and effective advocate and communicator for ONAMI, the ONAMI model and of ONAMI's impacts around the state, nationally[1] and internationally[2]; as a conference chair[3], workshop organizer; keynote speaker and

session moderator; as an advisory board member of the Nanobusiness Commercialization Alliance; and on Capitol Hill in occasional invited testimony. Earlier in ONAMI's history, we hosted and managed the annual Micro Nano Breakthrough Conference. This conference served a critical purpose in bringing the ONAMI research community together with industry partners, and was the impetus for collaboration in research and commercialization. Recent outreach includes hosting the 2012 National Nanotechnology Initiative Regional, State, and Local Initiatives Workshop in Portland, Oregon.

[1] ONAMI is prominently featured in two NGA reports expected to issue in 2012 "Innovation Begins in the States" and "Growing State Economies: 12 for Action" from the National Governor's Association Center for Best Practices (based on ONAMI participation in 5 workshops since 2009) [2] Invited speaker and participant, 9th US-Korea Nanoforum (June, 2012). [3] "Regional, State and Local Initiatives" from the National Nanotechnology Initiative (ONAMI chosen to host the very successful May, 2012 RSL workshop in Portland OR).

INNOVATION AND EFFECTIVENESS

ONAMI's program strategies have undergone continual refinement and innovation, while our purpose and focus have not. We have narrowed our grant criteria to strategic collaborative and industry supported projects. We are focusing much more heavily on spin-out company management teams and financing strategies to increase the potential for technical success and commercial funding. Examples of these refinements to ONAMI programs are described below.

Strategic Research Proposal Matching Program. ONAMI FY12 matching grants will no longer be available for single-PI or single institution federal proposals. Multi- institutional federal proposals will be eligible for a 5% maximum match rate; industry-funded research is eligible for up to 10%; acquisition of equipment for shared user facilities is eligible for up to 8%.

One big success, and the culmination of many years' investment in our extensive Green Nanoscience initiative, is the $20M NSF Phase II CCI: Center for Sustainable Materials Chemistry, which began operations in October, 2011 and already has two spinout companies (Inpria, Amorphyx). ONAMI is funding the CSMC's innovation program (with educational content provided by NCIIA) and will be funding graduate student internships in gap fund startup companies.

"High Tech Extension" Program. ONAMI recently launched a new first-time user matching grant program to attract new private clients to our network of shared user facilities: CAMCOR at the University of Oregon; CEMN at Portland State University; and the Microproducts Breakthrough Institute, Linus Pauling Science Center analytical labs and Owen Cleanroom at Oregon State University. This program has seen success and will be continued. Young companies nevertheless still find it difficult to afford the commercial market rates the shared user facilities must charge, so ONAMI is planning a performance-based expansion of this grant program targeted at young companies.

Because of our success in promoting shared user facilities and supporting companies in them, ONAMI was a participant in the small, invitation-only NSF Next Generation Nanotechnology Infrastructure planning workshop (April, 2012) intended to guide the future of this strategic

federal investment.

Commercialization Gap Fund (including EIRs). The ONAMI review process for new gap company funding remains systematic and rigorous (e.g. professional investor-advised; milestone-based tranche funding; hands-on review and mentoring). In addition, with assistance from our recent EDA grant and recently hired EIRs ONAMI is looking for promising deals outside the "tech heavy" Portland Metro and Willamette Valley regions. One EIR and industry-advised effort, SupraSensor, LLC, a Eugene, Oregon company collaborating with Eastern Oregon precision agriculture firms on technology to monitor soil nitrate levels, won the NSF I-Corps Best in Show (May 23, Stanford) award. One current and one prospective ONAMI Gap company are located in Central Oregon.

ONAMI's effectiveness is a result of our growing collaborative network, and the value that network brings to its members. The ONAMI NWNanoNet community includes more than 250 researchers from five Oregon research universities, 160+ industry users of shared facilities, ten active investors/VC partners serving on our Commercialization Advisory Council, a growing number of successful small businesses, state Business Development Officers, and representation on our Board of Directors by leading companies (Intel, Hewlett-Packard, FEI Company, CH2M Hill, Life Technologies, Sharp Laboratories, and Battelle Memorial Institute). The results for fundable R&D partnerships (national and global) and investable companies is a testament to the high level of collaboration within the ONAMI community.

CONCLUSION – WHY WE ARE THE BEST

ONAMI Inc. is a uniquely effective alliance of outstanding academic, industry, and government leaders committed to growing multi- institutional research capacity, an infrastructure network, and commercialization deal flow in a state with modest resources. With a locally and professionally managed commercialization fund, ONAMI has succeeded in positioning companies for growth and capital investment. We have effectively implemented a few simple principles (the power of innovation, collaboration to build strong teams, open/shared resources, goal/metric focus, nurture of inventors and small companies) and garnered impressive results. ONAMI programs compare well to those in top-tier states, but for Oregon they are unprecedented and transformative. In addition to taking pride in ONAMI's accomplishments, we take great satisfaction that the state and communities we love are now significantly better positioned to compete in the global innovation economy. We look forward to sharing our model with other TBED initiatives across the nation.

Example 3: NorTech Regional Innovation Cluster Model – 2011 Winner in the Most Promising TBED Initiative Category

NorTech Regional Innovation Cluster Model

Project Overview

As a catalyst for growing emerging technology industries in Northeast Ohio, NorTech - a regional nonprofit economic development organization – helps to build regional innovation clusters that create jobs, attract capital and have a long-term, positive economic impact. To this end, the organization has created a comprehensive cluster development model that can be applied to multiple technology-based industries. The model incorporates the creation of industry roadmaps; a disciplined metrics approach; revenue, funding and market opportunities for companies; and connecting, convening and educating cluster organizations. The model serves all organizations in the value chain and those that support the value chain, such as small, medium and large companies; research institutions; universities; public, private and philanthropic funding sources; regional, state and federal government; industry associations; and other economic development organizations. While traditional cluster development can be theoretical and often hard to implement, NorTech is taking a grassroots, "bottom up" approach to regional cluster development and putting theory into practice. To date, NorTech's cluster development model has created 160 jobs, attracted $16,591,781 in capital and generated $9,945,746 in payroll in Northeast Ohio's advanced energy and flexible electronics industry clusters.

1. Tell us what you did

Northeast Ohio encompasses 21 counties and is the largest region in the state by far with a regional economy of over $130 billion, accounting for over 36% of the GDP, population, and workforce of Ohio. The region has been facing an uphill economic battle for many years, suffering from a declining population, low unemployment and educational attainment rates as well as a significant decline within traditional manufacturing industries, mainly auto and steel. Recent data from Cleveland State University shows that employment in Northeast Ohio declined substantially between 2000 and 2009. Moreover, employment in Northeast Ohio has declined at a greater rate between 2000 and 2010 than the rest of the Midwest and the United States.

NorTech, a catalyst for growing emerging technology industries in Northeast Ohio, has taken on the challenge of creating a more diversified economy based on technology and innovation. The organization helps to build regional innovation clusters that create jobs, attract capital and have a long-term, positive economic impact. NorTech has adopted the Brookings Institution definition of a cluster, which states that clusters are "geographic concentrations of interconnected businesses, suppliers, service providers, and associated institutions in a particular sector." NorTech's goal is to develop industry clusters in Northeast Ohio based on the region's unique strengths and assets in order to address global market opportunities.

Once a regional technology industry cluster and its potential is defined, NorTech develops cluster initiatives, which are formally organized efforts to promote cluster growth and competitiveness through collaborative activities among cluster participants and other public and private sector supporters. NorTech has successfully created and sustained a series of cluster initiatives that have become the backbone of the region's economic development infrastructure and been instrumental in developing new companies and creating new jobs.

Those initiatives have spawned the creation of JumpStart; OneCommunity; Ohio Fuel Cell Coalition; PolymerOhio; and Nano-Network.

To this end, the organization has created a comprehensive **cluster development model** that incorporates the creation of industry roadmaps; a disciplined metrics approach; revenue, funding and market opportunities for companies; and connecting, convening and educating cluster organizations. NorTech is currently applying its cluster development model to two industries – advanced energy and flexible electronics – to diversify Northeast Ohio's economy and accelerate growth.

Cluster development has proven to be effective in spurring jobs growth in regional economics. A recent study by the Brookings' Metropolitan Policy Program, entitled, *Sizing the Clean Economy* highlighted that clustered establishments grew at a rate that was 1.4 percentage points faster than non-clustered (more isolated) establishments from 2003 – 2010. These findings are consistent with volumes of academic work showing that clusters benefit economic performance in a variety of industries.

According to the U.S. Economic Development Administration, clusters are important to diversify regional economies in order to:

- Transition from unemployment or underemployment to high-skilled jobs.
- Create new, higher wage job opportunities.
- Develop regional business opportunities that are less susceptible to off-shoring.
- Engage and stabilize diverse communities by re-purposing idle assets and human capital.
- Manufacture products in region for export to other markets, driving revenue back to the region.

2. Tell us how you do it

In an effort to reinvigorate Northeast Ohio's struggling economy, NorTech's cluster development model serves and involves a wide range of organizations including: small, medium and large companies; research institutions; universities; public, private and philanthropic funding sources; regional, state and federal government; industry associations; workforce system and other economic development organizations.

Based on the region's unique strengths and assets, NorTech drives the development of regional innovation clusters by deploying the following model:

- **Attracting new members to the cluster by promoting Northeast Ohio's technology story to audiences inside and outside the region.** Increasing awareness of the region's industry clusters, successes, existing assets and skilled workforce, helps to position Northeast Ohio as a formidable technology industry leader.

- **Building relationships among cluster members for funding, research, and business opportunities.** To that end, NorTech connects and convenes public, private and academic partners in a variety of forums. Through its programs and workshops, NorTech

provides a venue for the dissemination of information on technology, industry, research and development, investment, partnerships and collaborations, as well as the opportunity for dialogue that helps to create, expand and retain business opportunities.

Creating market-driven roadmaps with regional partners that define a vision and path to execution for Northeast Ohio's efforts to generate economic growth and jobs in multiple technology industry sectors. A roadmap answers the questions "Where do we want to be and how do we get there?" A cluster roadmap provides strategies and action plans to best achieve a vision of the future shared by a critical mass of industry-related organizations. The strategies and action plans are developed according to the unique strengths of the cluster and region ascompared to a global market opportunity. Because industry roadmaps provide strategic guidance for economic development efforts to accelerate commercial activity and create economic progress and jobs, they can be a dynamic tool for setting priorities, allocating resources, aligning stakeholders and focusing efforts. NorTech has developed roadmaps for advanced energy and flexible electronics clusters, each addressing a high-potential sector or sectors within each cluster. To this end, we have developed a roadmap methodology unique to growing technology industries.

NorTech's roadmap methodology consists of several phases initiated in sequential order to create the initial strategy. They include:

- Phase 1: Identify cluster members, sectors and SWOT analysis
- Phase 2: Research global markets to assess competition
- Phase 3: Create a shared vision and measurable objectives
- Phase 4: Define strategies and action plans to achieve the shared vision
- Phase 5: Specify methods to measure, track and report progress

The execution of the five phases provides a comprehensive roadmap action plan that guides the initial activities of the cluster. However, the execution of each phase continues indefinitely allowing the initial roadmap and cluster to dynamically adapt to changing technology and market influences. By monitoring cluster metrics and the external factors that influence cluster growth, NorTech is able to continually optimize strategies and action plans to best compete for public/private funding and global market opportunities. In other words, the cluster is always one step ahead of its competition. NorTech's methodology of creating and executing dynamic roadmaps helps us emerge as a leader in catalyzing the growth of technology industries.

- **Engaging with federal and state government** and policy leaders to develop strategies that enhance cluster growth. NorTech engages with government officials to expand state and federal funding for technology-based economic development initiatives in Northeast Ohio. The organization participates in national policy discussions in support of Northeast Ohio's cluster goals, serves in an advisory capacity on national committees and positions the region as a leader to attract resources to the cluster.

One of NorTech's major goals in this area is to increase the amount of federal funding in the region. Based on Northeast Ohio's strengths and assets, NorTech has identified specific federal funding opportunities in which cluster members could participate, including: advanced energy, innovation and entrepreneurship, manufacturers in transition, and support for incubators. Once opportunities are identified NorTech shares information with cluster members and partner organizations to help pull together proposal teams to solicit federal funds. Essentially NorTech serves as the quarterback by disseminating information to cluster members, finding unique opportunities, pulling together collaborations for proposals, interacting with administration officials and actively tracking and reporting all activity. From a state perspective, Ohio Third Frontier has been and will continue to be an important program for NorTech and its cluster members to utilize for state funds, when appropriate. NorTech hosts regular workshops to help companies prepare competitive proposal submissions for the Third Frontier program.

- **Collecting, reporting and utilizing data that creates and influences cluster growth.** NorTech collects, reports and utilizes data that creates, describes and influences cluster growth. Through the development of the concept for Registered Cluster Organizations, NorTech has created a portfolio approach to its cluster model. Registered organizations are those that execute a Memorandum of Understanding with NorTech acknowledging their obligations to the cluster as well as the potential benefits provided by NorTech to registered cluster organizations. NorTech has an active role with a subset of companies within the overall cluster, creating revenue and funding opportunities which will be attributed to NorTech's impact.

  NorTech collects data in the following three categories:

  1. Cluster Opportunities: describes specific funding, revenue, collaboration or miscellaneous opportunities that NorTech staff is engaged in and lists contacts and organizations participating in each opportunity.
  2. Cluster Outreach: describes NorTech events, media placements, regional outreach activities and speaking engagements. We have begun entering Cluster Opportunity information and will begin entering Cluster Outreach information shortly.
  3. Cluster Reporting Data: describes organizational information from cluster companies such as employment, payroll, average wage, capital attracted, cluster, industry, subsector, line of business, and intellectual property information. This data will be collected via quarterly surveys and interviews as well as self-reporting when registering for NorTech events or signing up for cluster membership.

  NorTech implemented its cluster development approach in July 2010 and is currently being deployed to advanced energy and flexible electronics industries in Northeast

Ohio. Since July 2010, NorTech has achieved the following results:

Flexible Electronics Cluster: $11,411,060 capital attracted, 77 jobs created, and $4,439,000 payroll generated

Advanced Energy Cluster: $5,180,721 capital attracted, 83 jobs created, and $5,506,746 payroll generated

TOTAL: $16,591,781 capital attracted, 160 jobs created, and $9,945,746 payroll generated

3. **Tell us how it is funded**

NorTech is a 501 c3 organization and is funded by public and private partners in Northeast Ohio's business and philanthropic community as well as support from the US Department of Commerce. Specific funders include: The Burton D. Morgan Foundation; Council of Smaller Enterprises; FirstEnergy; Greater Akron Chamber; Greater Cleveland Partnership; The Cleveland Foundation; The Fred A. Lennon Charitable Trust; The GAR Foundation; U.S. Economic Development Administration; and U.S. Small Business Administration and The Fund for Our Economic Future and its members.

4. **Tell us how it works**

NorTech accomplishes its mission through the efforts of top talent on staff with board members, community leaders and many other regional stakeholders deeply engaged with the organization. NorTech staff engages on three levels – with cluster companies and projects, regionally and nationally. The NorTech President and CEO focuses on the strategic direction for the organization, as well as state and federal government engagement and national policy work. The organization's senior staff leads the industry cluster work in advanced energy and flexible electronics as well as strategic outreach. Additional staff supports the implementation and day to day work of cluster development activities within NorTech's industry focus areas.

NorTech collaborates with other organizations in Northeast Ohio's economic development ecosystem to deliver programs that support cluster development. For example, NorTech is currently partnering with the Manufacturing Advocacy & Growth Network (MAGNET), its local MEP center, on a NIST funded project to assist small-to-mid-sized manufacturers that want to grow their business by entering the advanced energy value chain. NorTech's advanced energy roadmaps complement the project and inform manufacturers where growth opportunities exist within the energy storage, smart grid, biomass/waste-to-energy, and transportation electrification sectors. In addition, NorTech partners with Team Northeast Ohio (Team NEO), the region's business attraction organization, to provide industry knowledge and expertise (within advanced energy and flexible electronics) for business attraction and retention deals. These are just a few examples of how NorTech works with other intermediary organizations in the region to accelerate technology-based economic development via its cluster development model.

5. Tell us why you should be recognized

NorTech's cluster development model is unique because it provides a comprehensive approach to building a cluster that cuts across the entire value chain including large and small industry, universities, manufacturing supply chain and workforce development. While some cluster development strategies may be theoretical in nature, NorTech's approach puts theory into practice via a grassroots or "bottoms up" approach that can be applied to various industries throughout regions across the country. Over the past year, NorTech has received grants from the Economic Development Administration and Small Business Administration to support the execution of its cluster development activities for advanced energy and flexible electronics. NorTech has received praise for its cluster development efforts from the federal government, including President Obama. At the first Winning the Future Forum on Small Business in Cleveland in February 2011, President Obama said, "NorTech is building regional innovation clusters, small business incubators made up of universities and suppliers and manufacturers and more – basically a self-contained supply chain that covers everything from attracting that initial capital to shipping that final product. And this cluster concept is so important." In addition, the Brookings Institution featured NorTech's cluster development model and advanced energy roadmap process in the *Sizing the Clean Economy* report, recently published by the Brookings' Metropolitan Policy Program.

We believe NorTech's cluster development model should win the *2011 Most Promising TBED Initiative* award because it has achieved great success for only being deployed and in existence for one year. NorTech has taken an innovative approach to measuring its impact through its portfolio of Registered Cluster Organizations. NorTech plays an active role with a subset of registered organizations, creating revenue, funding and visibility opportunities for the portfolio organizations. Based on the organizations in which NorTech has direct involvement with, NorTech measures new jobs created, payroll from those jobs, and capital attracted by the registered organizations. Those outcome metrics are then attributed to NorTech's impact. Since July 2010, NorTech has generated a total of $16,591,781 in capital attracted, 160 jobs created, and $9,945,746 in payroll.

NorTech will continue to scan the Northeast Ohio region for opportunities to develop new technology industry clusters in which it can apply its cluster model and generate economic impact in the region.