Economic Development America

COMPETING GLOBALLY ★ GROWING REGIONAL ECONOMIES ★ CREATING JOBS

WINTER 2005

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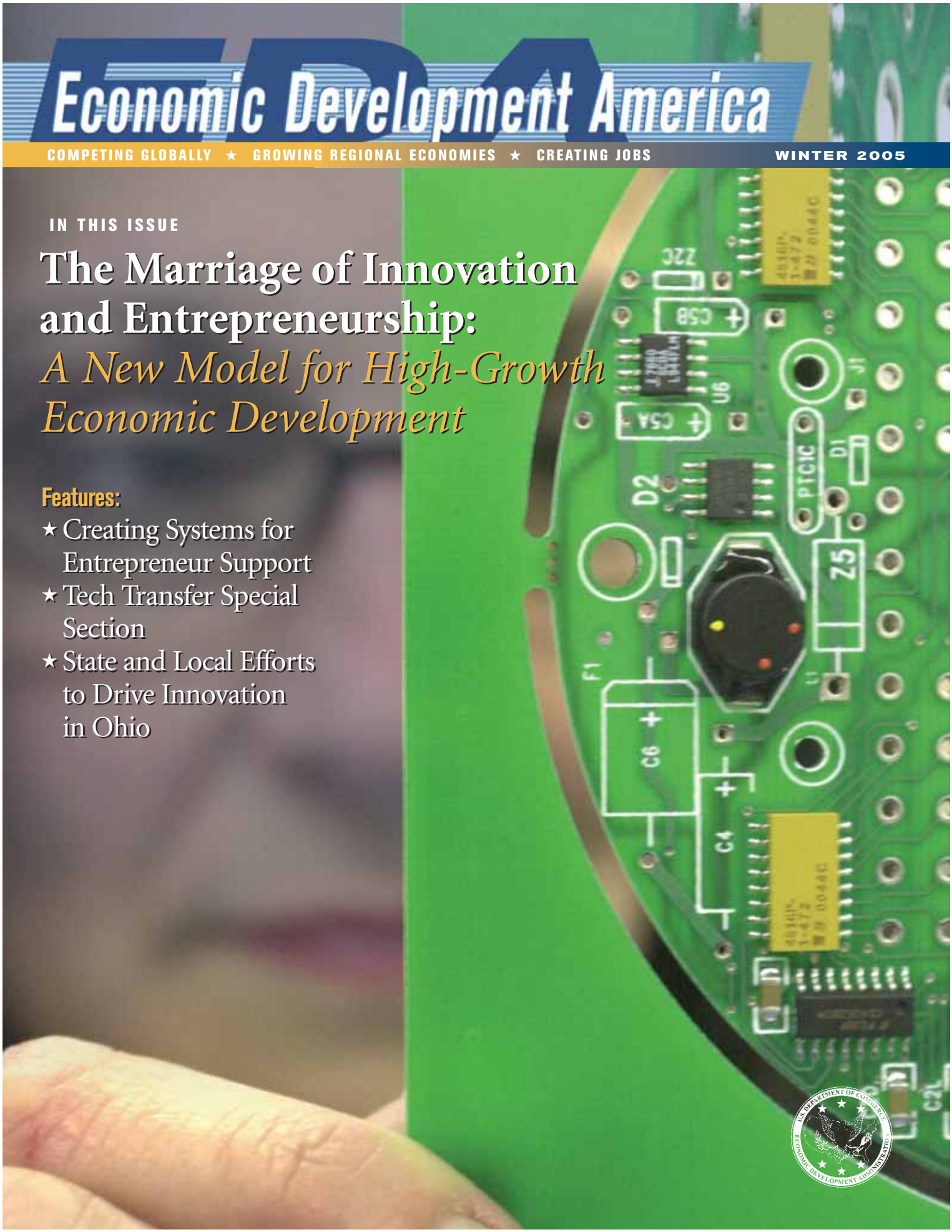

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Economic Development America is a quarterly production brought to you as a benefit of a partnership among the Economic Development Administration (EDA), the International Economic Development Council (IEDC) and the National Association of Regional Councils (NARC). The partnership is designed to provide information about economic development practices and programs to economic development practitioners who serve distressed communities throughout the United States. It also provides six telecasts and a monthly e-newsletter, EDA Update. For more information, visit the EDA Web site at www.eda.gov.

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Grant Reform Will Strengthen Communities

By Carlos Gutierrez

Secretary, U.S. Department of Commerce

America is the most dynamic and fastest-growing major economy in the world and we have an obligation to ensure opportunity for every community in America. President Bush believes one of the most important steps we could take would be to make economic development programs less bureaucratic so that opportunity can transform distressed neighborhoods. His budget is aimed at directing federal funds to those programs that are serving people in need. The federal government must ensure that community and economic development programs adapt to our evolving economy.

Under a major reform of our community development programs, President Bush is promoting a healthy and vibrant economic future for America's poorest communities. In his 2006 budget just submitted to the Congress, the President outlines a proposal that will help ensure that jobs are created in communities affected by changes in manufacturing, textile, and other industries.

President Bush took a number of steps during his first term to create economic growth in distressed communities. New job-training programs are helping displaced workers gain the skills for success. Communities are using tax incentives and other programs to redevelop abandoned industrial properties. The number of American homeowners has never been higher because people are using down-payment assistance and home construction incentives to achieve the American dream. The President's No Child Left Behind reform is raising accountability and effectiveness in America's schools by ensuring that children do not leave school without learning basic skills.

A changing world can present a great opportunity for all Americans to earn a better living, support their families and have rewarding careers. Government must take the side of hard-working Americans. Yet for many years, our community and economic development programs have been directed by old funding formulas and administrative rules that do not reflect the needs of struggling communities in a modern economy.

The $16 billion federal economic and community development effort is presently fragmented across seven cabinet agencies, overseeing 35 different grant, loan and tax incentive programs. Many programs overlap; some use inconsistent eligibility criteria and few programs track the way funds are spent. The unfortunate result is an absence of accountability; it is time for taxpayers to have an accurate means to measure results.

Detailed tracking information can help ensure that funds are allocated properly. One program at the Department of Housing and Urban Development, intended to help distressed communities, allocates less than two thirds of its budget to areas that are poorer than the average national poverty level. While prospering communities receive grants, many distressed areas are not receiving as much help as they need.

Making sure that the neediest areas are the focus of federal funds will require better management of existing programs. The President has announced a two-pronged effort to solve these deficiencies. Under the 2006 budget, we would create a new Strengthening America's Communities Grant Program. It would standardize eligibility requirements. Programs that are duplicative would be consolidated and housed at a single agency. New accountability guidelines would ensure that communities receiving grants make progress toward specific goals, such as job creation, boosting homeownership among first-time and minority buyers, and promoting private sector investment. Communities in greatest need would receive $3.7 billion in assistance.

The second part of the President's plan creates an incentive-based system called the Economic Development Challenge Account. This program would encourage local governments to revitalize their business climate. Local governments that make it easier to start a business, or communities that create the conditions for business success through achievements such as improved schools or lowered crime rates, will get a bonus.

President Bush has said, "We are entering a season of hope." These reforms will give distressed communities hope and the tools to cope with economic change by streamlining and modernizing the federal response. The President's goal is to ensure that all Americans have the skills and opportunity to provide for their families in our 21st century economy.

Building Systems for Entrepreneur Support

By Erik R. Pages

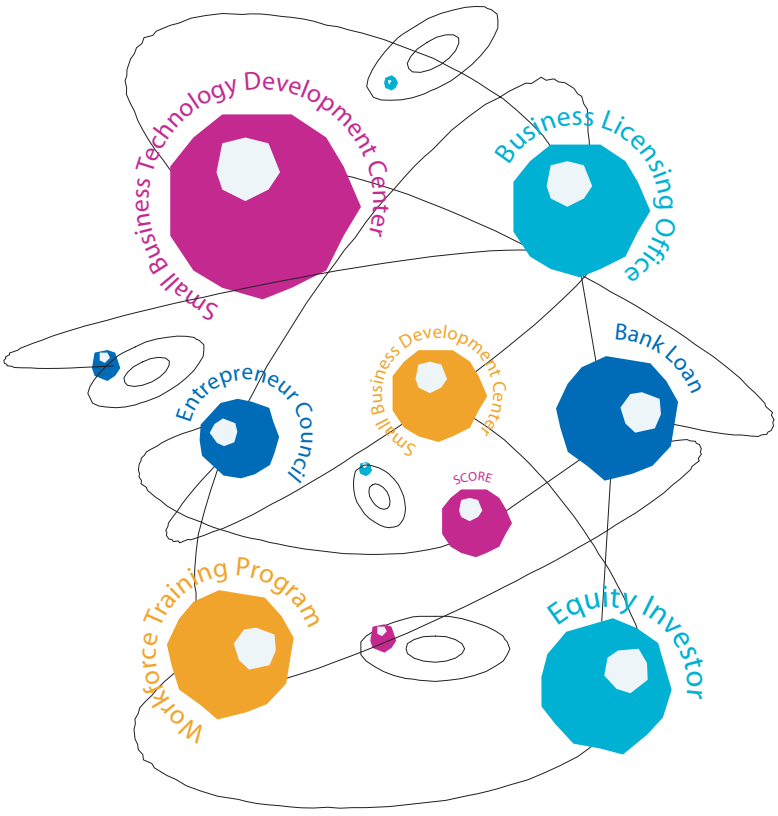
President, EntreWorks Consulting

Consider the following hypothetical phone conversation:

Aspiring Entrepreneur: "I'm interested in getting information and support for starting a new business."

Economic Developer: "Our program doesn't provide such support, but if you call this other office, they should be able to help you out."

This conversation occurs frequently in economic development offices. After concluding this call, most economic developers would be pleased that they were able to network the entrepreneur with a needed resource. But what really happens to the entrepreneur after this referral? In some cases, the referral works, but in most instances, the network breaks down. The entrepreneur fails to follow up, the suggested contact information is wrong, or, most commonly, the suggested organization also doesn't offer what the entrepreneur needs and she receives yet another referral. In most cases, the entrepreneur gives up and reports that "I tried to get help, but they just gave me the run-around."



This vignette captures one of the primary challenges facing entrepreneur support programs: how can service providers effectively target and serve the specific needs of a diverse group of local entrepreneurs? A whole range of small business and entrepreneur support programs are in place across the United States, yet entrepreneurs complain that such services are difficult to access and don't effectively meet their needs. What's the problem? It is not that specific programs (e.g. financing) aren't correctly designed; it is that such programs exist within a crazy quilt of programs, initiatives and support efforts. Entrepreneurs don't know how to access these programs, and the programs themselves are not user-friendly.

Existing support services could be significantly improved if their user-friendliness could be enhanced. One of the best means for doing so is to create local or regional systems of entrepreneur support. This essay offers suggestions on how to create such systems. It begins by reviewing shortcomings of the current system, and then suggests how regions can build a truly effective entrepreneur support system.

Current challenges: What do entrepreneurs want?

Most American communities do not suffer from a shortage of small business support providers. Indeed, most regions have dozens of such organizations, ranging from small business development centers to microloan programs to revolving loan funds to numerous private sector sources. When confronted with such a wide array of supports, entrepreneurs are often bewildered and uncertain where to begin. As a result, they often fail to access the type and depth of assistance they need. A recent study for the North Carolina Rural Economic Development Center summarizes the challenge:

> *(Support systems are) . . . opaque and too complicated for entrepreneurs. While public officials and service providers understand the differences between, say, a Small Business Center and a Small Business Technology Development Center and the services they offer, entrepreneurs do not. Nor should we expect entrepreneurs to understand these differences. Thus, when an entrepreneur seeks assistance and is referred to "some other office," her typical response is intense frustration.*

These problems emerge because most service providers focus – correctly – on market niches. Small business development centers (SBDCs) focus on growth businesses, the cooperative extension service focuses on agriculture, and microloan programs provide more general support to new entrepreneurs. While there are efficiencies that arise from this specialized approach, the system's specialization often gets lost in translation to the entrepreneur. Most entrepreneurs simply want help. They do not care which agency or program provides it.

These challenges of fragmentation are not new to economic development professionals. The traditional solution has been to create a "one-stop shop," where a whole host of services for small business can be accessed in one place. These one-stop shops can exist in physical space. For example, many incubators also house service providers like an SBDC or local SCORE office. More common is the virtual one-stop shop, a web-based information clearinghouse. Excellent examples include Minnesota Rural Partners' BizPathways (www.bizpathways.org), and Georgia's Entrepreneur and Small Business Network (www.georgia.org/esbd).

Creating a one-stop shop should be viewed as a first step, not the end of the process. Such sites offer user-friendly access to information, but they still require significant knowledge from the aspiring entrepreneur or business owner. Can the business owner find the right services and support that will "fix" his current problems? Research shows that many entrepreneurs cannot leap this hurdle. In many cases, they face difficulties simply identifying their own business challenges. For example, they may recognize that business is slowing, but may not know whether the slowdown is caused by marketing, financial or operational challenges. A more sophisticated diagnosis of the issues is needed. Then, a quality menu of support options can be developed.

From one-stop shop to no wrong door

This type of sophisticated business diagnosis system does not really exist today for most entrepreneurs. High-growth technology businesses can receive such support from venture investors and others, but most entrepreneurs make do with one-size-fits-all programs for training, financing, and the like. In practice, this means that business owners often receive the services that are available instead of the services that are needed. For example, a potential high-growth business may be referred to a loan program even though it really needs some form of equity financing.

A reformed systems approach is needed. At the outset, the system should offer an entry-level package of services that entrepreneurs receive no matter where they enter the system. The system would be defined by the concept of "no wrong door." Every part of a region's small business support network should provide an initial assessment of the entrepreneur's skills and needs and identification of the best place for the entrepreneur to receive services to address those needs. This new system would move the burden of understanding how best to access support services from the entrepreneur to the system itself. Upon completion of this initial diagnosis, more specialized services can be delivered.

A true entrepreneur support system links all relevant service providers, operates according to common procedures, and offers a customized and comprehensive set of public and private services.

In addition to improving services for the entrepreneur, this system also offers benefits to service providers. A systems approach allows service providers to "segment" their market. They can truly specialize in serving certain types of entrepreneurs, and feel assured that other providers are effectively serving other market segments. Their productivity and efficiency will improve as they can focus personnel and resources on their own market niche. Service providers can now focus on "quality" instead of "quantity" of services.

What does an entrepreneur support system look like?

Many regions claim that they have a small business support system in place, but, in most cases, these "systems" are simply a loose federation of non-profits and other support providers. A true system links all relevant service providers, operates according to common procedures, and offers a customized and comprehensive set of public and private services for local entrepreneurs. Several characteristics are essential:

- Common intake procedures: All local service providers are trained to perform a brief intake and diagnosis of an entrepreneur's issues and service needs. Thus, when an entrepreneur calls a service provider, she is not given an immediate referral. Instead, her basic information is obtained and entered into the system. At that point, she will be referred to the appropriate local service provider. For example, if her firm is looking for export opportunities, she will be referred to a local expert in that process.
- Clear referral systems: Referrals are the cornerstone of the system. The process must be clear to both entrepreneurs and service providers. This requires that service providers explicitly state their specific areas of expertise. They can no longer simply serve all entrepreneurs; they must focus on a specific set of issues or types of businesses. For example, a non-profit might identify its niche as "training entrepreneurs to work with institutional venture

capitalists." Effective referrals also mean that providers must understand the system and each organization's role within it.

- Clear guidelines for entrepreneurs: As noted above, the system must be understandable to entrepreneurs. They must understand the purpose of the initial diagnostic process and why they have been referred to a certain service provider. Finally, the type and level of support to be provided must be clearly understood.
- Regular collaboration: The system will work if the partners effectively collaborate with one another. They must meet on a regular basis, and regularly review how the system is serving local businesses. In addition, service providers must create a single "brand" for the system so that entrepreneurs are supported by the "system" and not by a single service provider. For example, North Carolina has created a single "Business Resource Alliance;" Georgia's service providers have united as the "Georgia Small Business and Entrepreneur Support Network."

Program offerings

Every region must develop its own set of program offerings targeted to the needs of local entrepreneurs. A recent study from the W.K. Kellogg Foundation highlighted some of the key program offerings to be found in comprehensive entrepreneur development systems:

- Entrepreneurship education – including the introduction of entrepreneurship concepts in K-12 and more advanced adult education and training in community colleges, colleges and universities.
- Access to capital – sources of capital to match the financing needs of entrepreneurs at various stages of development, from seed capital to loans to equity.
- Access to networks – opportunities for entrepreneurs to connect with peers and mentors and to form strategic alliances to benefit their businesses.
- Entrepreneurial culture – a culture that recognizes, embraces and celebrates entrepreneurs, creating a place where entrepreneurs choose to live, work and play.

Where are systems being built?

This systems-based approach to entrepreneurial development is a relatively new approach. Based in part on research from Gregg Lichtenstein, Tom Lyons, and others, the new model is being implemented in several regions of the country. In addition, the W.K. Kellogg Foundation will soon be awarding major grants to four rural regions that are in the process of building such systems. At present, examples of the systems-based approach can be found in North Carolina; Athens, Ohio; Huntington, West Virginia and Louisville, Kentucky.

The Advantage Valley Entrepreneurial League System (ELS) program that serves a region encompassing West Virginia, Kentucky, and Ohio is one of the most advanced applications of the systems approach. The program is recruiting 48 local entrepreneurs with varying business backgrounds and experience. Each of these business owners is assigned a mentor, and is then linked to local resources that are tailored to the business's needs. The ultimate goal of this effort is not only to generate traditional economic development outcomes, but to also improve the skills and knowledge of local business owners so that they can effectively grow their businesses.

In North Carolina, the NC Rural Economic Development Center is beginning to develop a coordinated program to support the state's rural entrepreneurs. The NC Business Resource Alliance links all of the state's business support providers in a powerful network. These key players are developing collaborative strategies and are now focused on a new program to improve business support services for underserved rural markets.

The benefits

Creating an effective entrepreneur support system can generate huge benefits for local business owners and aspiring entrepreneurs. It can also stimulate a transformation for economic developers. By promoting real collaboration, it improves productivity and program effectiveness while also generating improved outcomes in terms of jobs, new businesses and overall quality of life.

EntreWorks Consulting works with communities, organizations and civic leaders to design, implement, and promote innovative economic development strategies, policies and programs. More information is available at www.entreworks.net. ★★★

Suggested Web sites and readings:

- Brian Dabson et al., "Mapping Rural Entrepreneurship," Corporation for Enterprise Development, 2003. Available at www.cfed.org.
- Thomas S. Lyons, "The Entrepreneurial League System: Transforming Your Community's Economy through Enterprise Development," Appalachian Regional Commission, March 2002. Available at www.advantagevalleyels.com
- Erik R. Pages and Shari Garmise, "The Power of Entrepreneurial Networks," Economic Development Journal, Vol. 2, No. 3 (Summer 2003).
- Advantage Valley Entrepreneurial League System: www.advantagevalleyels.com
- Georgia Entrepreneur and Small Business Network: www.georgia.org/esbd
- Kansas City SourceLink: www.kcsourcelink.org
- Minnesota BizPathways: www.bizpathways.org
- North Carolina Institute for Rural Entrepreneurship: www.ncruralcenter.org/entrepreneurship/index.asp

Building Innovation-Driven Regional Economies in Small and Mid-Sized Metro Centers

By Walter H. Plosila

Vice President, Technology Partnership Practice, Battelle

Over the past 40 years, we have witnessed an evolution in thought about America's changing economic landscape. This evolution has included a shift regarding the role that innovation plays in the nation's overall economic prosperity. Today, it is widely understood that innovation is a means by which to overcome the seemingly unending tide of structural economic transitions that occur as various industrial sectors become obsolete or fundamentally change their products and processes – with some evaporating, others becoming reinvented and others moving their mass production facilities off shore in an attempt to gain competitive advantages.

Innovation in America is not a bicoastal phenomenon. Many small- and mid-sized U.S. regions are addressing the factors critical to innovation, namely technology, talent, and capital. Furthermore, these regions are diligently working to marry the private and public sectors through coalitions composed of industrial, academic, philanthropic and government leadership.

Some, but not all regions encompassed by the traditional "rust belt" image are emerging to show that their economic future is not based on their past, an economy of durable manufacturing, brawn-based aptitudes and skills, mass production, closed markets and decades-old products. Instead, these regions' economic futures will be based on their ability to capture and retain the required technology, talent and capital to fuel their emerging industrial sectors. The same is true of smaller metropolitan areas, such as Scranton-Wilkes Barre, Peoria, Des Moines and Wichita.

While these regions' efforts are not yet completed, early progress in a number of these communities shows innovation is driving the efforts to address their economic futures. For instance:

- Pittsburgh, whose downtown physical infrastructure, integration of waterways with the community, and rapidly blooming medical and research universities (Carnegie Mellon and the University of Pittsburgh), has become one of America's major rebirths. No longer a major player in steel and power supply industries, Pittsburgh already has transformed itself into an intellectual center in information and the biosciences through Digital and Life Sciences Greenhouses, capital mechanisms and workforce efforts.
- St. Louis, whose civic leadership has embraced a new sector for economic growth, the plant sciences, based on the recognition that it had underutilized assets (i.e., Botanical Gardens, Washington University) and new assets (i.e., Donald Danforth Plant Sciences Center) that have created a unique technology niche for the region. At the same time, there is increased recognition of its strengths in biomedical

In the field of biosciences alone, areas such as genomics, bioinformatics and proteomics present new research, technology and market opportunities for existing and startup firms.

St Louis Plant and Life Sciences Strategy:

- Raised $400 million in venture capital from private and philanthropic sources.
- Formed a technology commercialization vehicle – BioGenerator.
- Two plant/life sciences incubators (NIDUS and CET) filled at capacity.
- Initiated research park district and planning for private research space adjacent to Washington and St. Louis Universities (CORTEX).
- "Biobelt" brand name identity established.
- Completed building of Donald Danforth Plant Sciences Center.
- Broad community mobilization through St. Louis Coalition for Plant and Life Sciences and St. Louis Regional Chamber & Growth Association.

Hazelton-Scranton-Wilkes-Barre Great Valley Technology Alliance Activities:

- Regional cooperation across three historically competitive communities.
- Formation of the NE PA Technology Institute to aggregate capabilities across 11 higher education institutions for talent and technology.
- Establishment of POWER!, a young professionals group.
- Creation of a computer talent project for K-12 students.
- A host of networking functions and events to build connectivity among firms, education, and government.
- Building an entrepreneurial culture through business plan competitions, forming of an angel investor network, and an Entrepreneurship Institute.
- Approval of two Keystone Innovation Technology Zones and use of creative STAR teams.
- Formation of four Innovation Centers.

sciences that is helping to transform the region's universities-health services-community relations. At one time America's second largest city in automobile assembly manufacturing, today St. Louis is focusing on entrepreneurship by investing in infrastructure (i.e., BioGenerator, NIDUS, and the Center for Emerging Technology) and financial capital mechanisms, both of which are positioning the region for new knowledge industries while retaining and expanding its major ag/biotech, drug and pharmaceutical base.

- Hazelton-Wilkes Barre-Scranton, Pennsylvania is taking advantage of its close proximity to New York City and Washington, D.C. by capitalizing on assets in its 11 liberal arts colleges and a regional university to form a consortium. The region also is focusing building an entrepreneurial culture. Through these efforts, the region is diversifying its economy from its heritage in coal and apparel to one comprised of knowledge-based companies building on a skilled regional talent pool.
- Peoria, Illinois is building a knowledge innovation econo my; diversifying from an agricultural commodity base to value-added agricultural biotechnology and industrial processing; taking advantage of its regional medical center (UI-Peoria); and building on an underutilized federal asset, the National Center for Agriculture Utilization Research, as well as Bradley University and Caterpillar.

Visionary communities increasingly appear to be led by broadened civic leadership that includes higher education, philanthropic and health sectors; economic development professionals willing to think "out of the box" and concerned about results; industry; and finally, supportive state and local governments interested in partnering with, but unlike the past, not driving these agendas.

The elements that regions are focused on to help build an innovation-driven regional economy include:

- Research and Development Base
- Risk Capital
- Technically Skilled Workforce
- Entrepreneurial Culture
- Technology Infrastructure
- Mechanisms for Knowledge Transfer
- Quality of Life

Innovation Requires a Focus on Technology, Talent, and Capital

In a sense, innovation can be described as the combination of research turned into technology (otherwise it has no value), talent and capital. Others may call this entrepreneurship because you need smart people, ideas, and ways to turn the ideas into products or processes that someone will buy. Innovation economies, for purposes of this discussion, are focused on technology-related efforts. But that does not mean innovation economies cannot be based around tourism or other comparative advantages. Regardless of the terminology used, regions ultimately need three key ingredients to build innovation-driven economies: technology, talent and capital.

Technology

With the maturing of the digital revolution and the blossoming of the bio and nano revolutions, the pie of opportunities is not static for small and mid-size regions. In the field of biosciences alone, areas such as genomics, bioinformatics, and proteomics did not exist until just a few years ago. This presents not only new research and technology opportunities in terms of the research enterprise, but also opens up new market opportunities for existing and startup firms as well.

Many small- to mid-size regions of the country are beginning to explore how the applications of these new technologies can open up new markets for existing companies and lead to totally new industries. In Eddyville, Iowa, for example, where the economy traditionally has been based on the production of agricultural commodities (corn, soybeans, etc.), they now see opportunities in the areas of value-added biofluids, green manufacturing, biodiesel and yet to be discovered renewable resources.

Research by itself does not create this value-add in industrial sectors, but it is a necessary ingredient to developing and applying technology. Some small- and mid-sized metro regions have at least one national research university, as well as regional public universities, community colleges and core industries from which to develop and capture technology.

Smaller, regional research universities often contribute more to regional economic development than their larger counterparts, as they often have closer ties to area firms and leaders. They also are more likely to have faculty that are applications-oriented. Many smaller regions can take better advantage of their regional universities and health centers in association with industry to undertake proof of concept, applications development and problem solving roles. While it can present a challenge to work with firms such as small manufacturers that have no track record of collaborating with universities, the key is to take a region's intellectual capital from whatever source – faculty expertise, industrial base and build relationships to stimulate product innovation.

Each region must examine its research and applications core competencies in its private and public sectors to identify existing or emerging technology platforms and the industries and markets associated with them. A region can ensure better alignment of its institutions' research expertise with those of its existing and emerging industries through incentives and investments in higher education, and mechanisms to connect with industry. The emerging clusters and industries of tomorrow are not always captured by where the traditional segments of a cluster or the associated research is now located.

Talent

A second issue which America's small and medium-sized metropolitan regions must address is that of talent. Talent comes in many varieties but includes:

- Retaining graduates within the region as a knowledge base and competitive advantage for the future.
- Ensuring a technical workforce adaptive to changes in local industry products and processes.
- Creating or attracting a managerial "serial entrepreneurial" workforce with experience in managing, financing, marketing, sales, and regulatory issues facing the technology-focused startup enterprise.
- Having in place the courses and curriculum requisite for the workers needed by industry.

Regions vary in the degree to which these four interrelated talent issues affect them. For instance, some regions realize it makes more sense to retain the workforce it is creating rather than having to "regain" it once it migrates. Across the nation, the youngest age groups, particularly those with bachelor's degree or higher, are migrating upon graduation to where they would like to work based on quality of life considerations, and then seeking employment once they are settled in this new location. Central Indiana, with the support of its technology trade associations, philanthropic support, and higher education institutions, is attempting to stem this outflow and ensure that more information technology students remain in the state after graduation by initiating internship programs and college job fairs with the region's firms.

Some regions are giving more attention to forming a core of serial entrepreneurs. Two examples are the Pittsburgh Life Sciences Greenhouse's Enterprise Corps and the St. Louis BioGenerator's executive-in-residence program.

K-12 remains a challenge in many regions in trying to link its efforts to post-high school programs, but will be increasingly necessary if a region is to have both a sufficient talent pool and the ability to retain that pool.

Greater Peoria's Innovation Initiatives:

- Established medical technology district including research park/incubator with EDA support.
- Established Research Fund with NSF support.
- Increased access to NCAUR, a USDA ag research lab including pilot plant and spin-offs.
- Secured community as an Internet2 site.
- Monthly networking of capital sources and entrepreneurs and access to regional venture funds.
- Formation of an angel fund.
- Establishment of the Peoria Prize to reward creativity and collaboration.
- Project collaboration among Fed lab, Bradley University, and UI-Peoria Medical Center.
- Creation of PeoriaNext steering organization.

Capital

In many small- and mid-sized regions, the focus of economic development remains embedded in the traditional "tool kit" of bricks and mortar and associated debt instrument financing. Smart regions are realizing that entrepreneurial-driven technology firms are less interested in the physical structure of those facilities than with what is within those facilities. For example, emerging bioscience firms often need assistance with the financing of leasehold improvements such as laboratory, air and water systems. Most often, sources of financing for these firms to develop and introduce their products into the marketplace, or equity capital, is their single largest priority.

The problem small- and mid-sized regions face is not simply a lack of venture capital – equity financing once a

Small and mid-sized regions are actually in a better position to do a game plan for building an innovation-driven economy than America's largest regions, due to issues of scale, physical distances and institutional complexity.

firm has a product and is near going public or other otherwise exiting – but a paucity of risk equity capital needed prior to when more traditional venture capital is available.

Smart regions are finding solutions to this private sector funding gap, generally referred to as pre-seed to seed funding, through angel funds, private placement expertise, tax credits and other approaches. Angel networks are an important way to build private-public partnerships. In other cases, attracting a fund focused on small- to medium-sized regions is an avenue in which to focus, as Peoria has done. In other instances, the formation of a regional fund focused at this early stage has made a significant difference, as happened in Alabama.

Innovation-driven economies increasingly will need to help create privately managed risk pools that build on a track record of successful entrepreneurs – pools with sufficient funds to syndicate deals with the national venture funds that are still focused predominantly on investments on the coasts. Adjusting their economic tool kits to make equity investments, for example, to address leasehold improvement financing for wet labs, some states and regions purchase insurance, others offer tax credits, and some take equity for the improvements.

Getting Started: Lessons for Smaller Metro Regions in Building Innovation Economies

What finally makes a difference in a region or community's success is having local champions and leaders with a plan for the implementation tasks of catalyzing, brokering and connecting – day-to-day hard work.

This requires regions to address three key actions:

- A game plan or road map for the region. Hazelton-Scranton-Wilkes Barre, St. Louis, and Peoria all benefited from having gone through a four- to six-month process of self-diagnosis leading to a consensus game plan for building an innovation-driven economy. In each case, entrepreneurship components were front and center in communities historically characterized as focused on industrial recruitment. Small- and medium-sized regions are actually in a better position to do a game plan than America's largest regions, due to issues of scale, physical distances and institutional complexity.
- Identifying leaders and champions. Successful regions must have active, engaged leaders committed to an entre preneurial-driven knowledge economy. Too often, entrenched leadership looks at the future as the past – less driven by the issues of technology, capital, and talent and more driven simply by location, costs and real estate. While such issues remain important, they are ancillary to these new factors.
- A real implementation and investment plan. Successful regions don't just figure out what is missing. They put in place detailed implementation and investment plans at the operational level – work plans, priorities, resources, partners and steering groups – both to push actions and activities but also to measure accountability. Such coalitions or alliances must have a long-term commitment, and the perseverance to catalyze and mobilize the private and public sectors to achieve concrete results.

Groups diverse as PeoriaNext, St. Louis Coalition for Plant and Life Sciences, and Scranton-Wilkes Barre's Great Valley Technology Alliance are putting in place the elements necessary to establish entrepreneurial-driven, regional innovation economies. None yet are finished because they recognize that changing a regional economy is a long-term proposition. In each of these cases, new types of coalitions have emerged in which philanthropic organizations, higher education institutions, industry, economic development groups and government all sit together at the table.

Small- and mid-sized metropolitan regions can take advantage of their technology, talent and capital resources to build innovation-driven regional economies for the future. Leadership, a hard-nosed willingness to identify and address gaps, and an implementation plan are critical to these regions' success in encouraging entrepreneurship, technology commercialization, talent retention and attraction, and wealth generation. In contrast to the history of American regions of the past – built on what they were given in terms of natural resources, waterways, and related factors – future regional development can be positively affected by what a community does to create its own innovation base. ★★★

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Innovation and Entrepreneurship in Rural America

By Brian Dabson

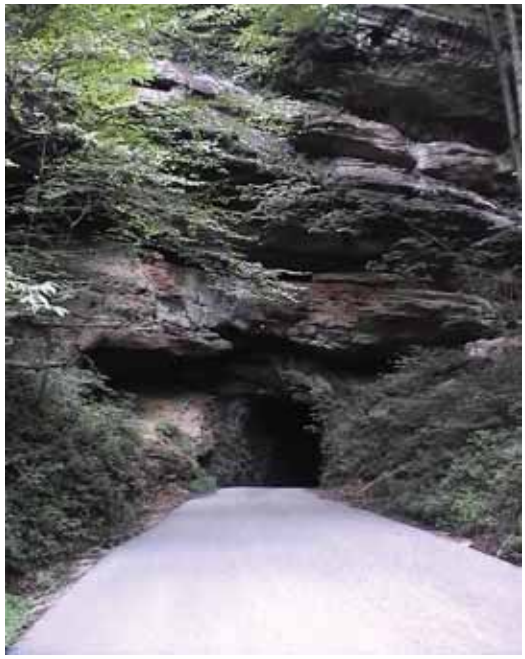
Rural Policy Research Institute

What do the following have in common? A syringe for delivering food to the feeding-tube dependent. A programmable handlebar for motorbikes. A computer-regulated medicine dispenser. A vacuum cleaner for horse grooming. A high efficiency canoe paddle. The answer may be unexpected. They are all innovations from entrepreneurs living and working in rural Kentucky.

Putting the words *innovation* and *entrepreneurship* in the same sentence as rural America may be to some an unlikely combination. Surely innovation is something associated with glossy high technology campuses in metropolitan suburbs, rather than sleepy small towns and remote counties? And anyway, don't successful entrepreneurs need a critical mass of skills, knowledge, markets and capital, attributes not usually found in the hills and hollows of rural America?

Of course there are significant challenges to entrepreneurship in rural America, but these do not seem to be preventing entrepreneurs coming forward with ideas and innovations in increasing numbers. Jim Clifton, executive director of Kentucky's Innovation Group, from whose investment portfolio the above examples come, acknowledges that often the quality of business ideas being generated by rural entrepreneurs lacks the sophistication of those coming from the universities and metropolitan areas of the state. However, he suggests that this is largely a function of their lack of experience of and exposure to commercial markets rather than any lack of creativity or inventiveness.

Innovation in a rural context may be as much to do with overcoming the obstacles created by geography and distance in accessing markets and resources as with the products themselves. The Appalachian Center for Economic Networks (ACEnet), based in Athens in southeast Ohio, works closely with partners to create an environment in which local entrepreneurs – particularly those in food-related businesses – can prosper. ACEnet joins with the Independent Restaurant Association to organize purchasing from these local businesses; with farmers markets to provide a market venue and to operate a café where residents can learn the benefits of buying local; and with local tourism bureaus to support specialty food festivals, such as a hot pepper festival. These and other examples are showcased in a publication by the Association for Enterprise Opportunity on innovations in rural microenterprise development.[1]



Innovation in a rural context may be as much to do with overcoming the obstacles created by geography and distance in accessing markets and resources as with the products themselves.

There has been a strong surge of interest in entrepreneurship development as a rural economic strategy in recent years. Two years ago, the Federal Reserve Bank of Kansas City convened a conference on growing and financing rural entrepreneurs at which Mark Drabenstott, the director of the Bank's Center for the Study of Rural America, described entrepreneurship as "the new focal point for rural development," and David Sampson, head of the U.S. Economic Development Administration, stated that "entrepreneurship is a cornerstone of the administration's economic policy."[2]

More recently, considerable momentum has been given by the Kellogg Foundation's major project with CFED on Entrepreneurship Development Systems in Rural America. Through a rigorous competitive process, this project sought to identify rural regions where collaborative systems have been or could be developed to promote and support entrepreneurship as a coherent rural economic development strategy. Almost 2,000 organizations and institutions spanning the public, private and nonprofit sectors came together in over 180 collaboratives to be part of the process. The Kellogg Foundation soon will be announcing which four of these will receive up to $2 million each to create and expand their systems.

The project was based on a number of principles, including:

- A singular focus on the needs, skills and capacities of entrepreneurs;
- A requirement that all the organizations and agencies that provide entrepreneurship education, technical assistance, training, capital access and networking work together to provide seamless systems of support and resources; and
- An expectation that these systems would be regional in scope, spanning administrative boundaries.

Many exciting ideas and approaches were generated by this project, including unusual partnerships among institutions that rarely, if ever, work together. Nearly 40 of the collaboratives were led by universities or community colleges reaching out to communities and other agencies to offer the possibility of the transfer of skills and technologies across rural regions. Some included major research and development facilities, such as NASA in New Mexico and the National Surface Warfare Center in Indiana. Others focused on facilitating entrepreneurship and innovation in specific sectors such as sustainable agriculture, life sciences or alternative energy. Still others saw new technologies as central to connecting entrepreneurs and their ideas to markets.

One state in which great interest was generated by the Kellogg project is Kentucky, where there are many groundbreaking institutions and programs designed to support entrepreneurs.[3] One of these is The Innovation Group, an initiative of the Kentucky Science and Technology Corporation based in Lexington. The Innovation Group, through a contract with the Kentucky Department of Innovation and Commercialization for a Knowledge Based Economy, manages a network of six Innovation and Commercialization Centers (ICCs) housed in universities across the state. Three ICCs serve primarily rural regions and assist entrepreneurs with refining business strategies and commercialization plans. ICCs in turn are supported by seven regional Innovation Centers (not administered by The Innovation Group). These Centers provide initial assistance to entrepreneurs that is geared to the special challenges faced by rural communities in the new economy.

The Innovation Centers are the first step in fostering entrepreneurial opportunities, by assisting with the application of appropriate technologies and providing access to a statewide network of capital, Web-based resources, and technical guidance. The four centers in the east of the state – one of the poorest regions in the country – are based in educational institutions, whereas the two in the west are collaboratives of local governments, development districts, small business development centers, chambers, banks and private companies. Each center is managed by a person with strong local ties and knowledge with a background in entrepreneurship, finance and business. An understanding of local institutions and local culture has been critical in gaining the trust of entrepreneurs who normally would not consider engaging with a public program.

Kentucky's entrepreneurship support system differs from small business centers in three respects: they focus on high-growth opportunities based on technology; they provide comprehensive stage-by-stage services from concept to prototype to commercialization and capital raising; and they embrace community involvement. One example of the latter has been the ability to stimulate the formation of four local venture capital groups across rural Kentucky to provide equity capital to businesses that progressed through their commercialization process.

The Innovation Group manages a Rural Innovation Fund designed to help small, rural firms convert their inventions and ideas into investment-quality ventures. The Fund has been active for just over three years and in that time has received 227 applications for funding in excess of $3.7 million. One hundred and nine awards have been made to the value of $1.6 million. The Fund makes investments in proof-of-concept development or early-stage prototypes at two levels: an initial level of up to $7,500 and a higher level of up to $100,000 over two years. So far, four of the awards have been at this higher level. As experience has grown about how the Fund operates and is used, the Innovation Group is now considering ways of raising the initial bar so the quality of applications increases and a higher proportion can be funded.

Jim Clifton believes that the purpose of the network of statewide, regional and local innovation supports is to provide the talent to make objective assessments of business needs and the capital by introducing entrepreneurs to the private equity markets. In this way, he sees the possibility of creating an entrepreneurial culture across the Kentucky landscape.

The manager of the Innovation and Commercialization Center in western Kentucky, Pat Powell, points to two examples of how this talent and capital strategy works in practice. Hoyt Choate and his wife Renee are farmers who have created a venture, AgForest Partners, Inc. in Murray. They have developed the hardware, software and information technology services to allow farmers and others in agriculture-related industries to keep track of soil preparation, crop treatments and harvesting using hand-held devices linked to a central server, and to prepare appropriate reports for a variety of federal and management purposes. As Powell notes, this is the 21st century version of the spiral notebook and shoebox approach to keeping tabs on what goes on down on the farm.

He describes the Choate's venture as "leveling the knowledge management playing field" for small farms and firms in rural America, and the same applies to Profile Systems Design Group based in Madisonville, Kentucky. Two brothers, Jon and Jim Love, started a software business that has developed a very sophisticated point-of-sale tracking system for hardware stores and other retail outlets with large or complex inventories. This brings affordable technology to smaller operations that enables them to better compete with the big box retailers.

In both cases, the entrepreneurs are working through an intensive protocol – "a continuous conversation" with innovation network staff – that builds their financial, marketing and technical skills to the point where they are confident and ready to seek significant equity investment.

Not every state may be able to have its equivalent of Kentucky's system to provide intensive venture engagement with rural entrepreneurs, but the Kellogg project has shown that there are significant institutional resources in rural America that can and need to be harnessed in the service of entrepreneurship development. It is true in rural America as it is in all places that only a very small proportion of ventures are concerned with commercialization of innovations; most are mundane businesses providing local services or replicating mature products. But it also is true that there are people across rural America who have ideas and inventions that – with the right help to overcome the inherent challenges of isolation – can create ventures that will create wealth and help revitalize their communities.

The Rural Policy Research Institute (RUPRI) conducts policy-relevant research and facilitates public dialogue to assist policymakers in understanding the rural impacts of public policies and programs. ★★★

[1] Natallie Keiser & Jennifer Hird (2003). *Innovations in Microenterprise Development from the Rural Experience: Guiding Practices for Entrepreneurial Development in the Food, Tourism, and Artisan Sectors.* Arlington VA: Association for Enterprise Opportunity.

[2] The proceedings of the conference can be found in: Center for the Study of Rural America (2003). *Main Streets of Tomorrow: Growing and Financing Rural Entrepreneurs.* Kansas City, MO: Federal Reserve Bank of Kansas City.

[3] For an overview of some of these programs in Kentucky and elsewhere across rural America see: Brian Dabson & Jennifer Malkin et al (2003). *Mapping Rural Entrepreneurship.* Battle Creek, MI: W.K. Kellogg Foundation and Washington DC: CFED.

Kentucky's Rural Innovation and Entrepreneurship Program: *An In-Depth Look at How It Works*

By Cheryl Stone and Mel White,

Eastern Kentucky University Center for Economic Development, Entrepreneurship and Technology

During the 2000 session of the General Assembly, the Kentucky legislature passed House Bill 572, the Kentucky Innovation Act. This act created a statewide system to support "new economy" business development, including rural entrepreneurship and private equity education and formation. After five years, these new economy programs have linked collaborative resources to foster research and development, commercialization funding and infrastructure development, along with technical assistance and support.

But most importantly, the programs have focused on new economy business development by seeding and supporting entrepreneurs in areas such as life sciences, homeland security technology, software development, and innovative patented products. The overall implementation of the state's new economy programming is based on a regional strategic planning process. The Kentucky Department of Innovation and Commercialization for a Knowledge-Based Economy, formerly the Office of the New Economy, oversees all new economy programs.

Eastern Kentucky is a region of great scenic beauty in the Appalachians, but also encompasses 46 economically distressed counties.

In eastern Kentucky, a region encompassing 46 rural, economically distressed counties and roughly 40 percent of the state's geography, the Center for Economic Development, Entrepreneurship and Technology (CEDET) serves as the area headquarters for the new economy programs. CEDET is an EDA University Center located on Eastern Kentucky

Creativity and innovation are not strangers to Appalachian Kentucky. Harnessing them into sustainable, growth-oriented, new economy businesses is the challenge.

University's main campus in Richmond. The CEDET office manages the Eastern Innovation Region and its four regional Innovation Centers, as well as one of six Innovation and Commercialization Centers (ICCs) throughout the state.

The ICC is a program administered by The Innovation Group, an initiative of the Kentucky Science and Technology Corporation (KSTC). Supporting the ICC in eastern Kentucky are regional Innovation Centers in Ashland, Pikeville, Paintsville and West Liberty, which operate through partnership contracts with other institutions of higher education. The regional Innovation Centers serve as a feeder system to the ICCs by working to develop new businesses and new economy capacity, supporting entrepreneurship education, serving as technology resources, and contributing to each educational institution's capacity and economic development mission.

In Kentucky, fostering rural new economy entrepreneurship is collaborative process. In the first step, entrepreneurs receive basic assistance tailored to their needs through the Innovation Centers, which help both startup and existing businesses by providing comprehensive entrepreneurship training, mentoring, access to capital and networking. (A total of 15 regional Innovation Centers are planned eventually to serve non-urban regions of the state.)

In the next step, the ICC program takes growth-ready businesses through a protocol that prepares them for venture capital funding. The ICC evaluates their potential and tailors a process to meet their needs, which may include detailed business plan reviews, comprehensive market assessments, valuation guidance and investor pitch critiques.

Last, funding is sought. These funds may come through state-supported funds administered through the Kentucky Science and Technology Corporation, or through local angel investors, SBIR funds, regional venture capital firms, or the entrepreneur's friends and family. For those entrepreneurs needing pre-seed capital to develop their prototype, conduct market feasibility research, pursue intellectual property protection, or develop their business plan and financials, Kentucky has a unique series of funds called the Commercialization Investment Funds (one of which, the Rural Innovation Fund, was discussed in the previous article). The Innovation Centers and the ICCs also have formed venture clubs with local private and public partners, providing investors with first-hand opportunities to hear about innovative new business ventures. In addition to urban venture clubs in Lexington and Louisville, there are rural region venture clubs in Pikeville, Ashland, Elizabethtown and Paducah.

CEDET, the Innovation Centers, and the ICC also partner with myriad business development assistance resource providers including the Small Business Development Centers, quasi-governmental agencies such as Kentucky Highlands Investment Corporation, and government offices. Operating in one of the nation's most economically distressed regions of our nation, these offices leverage all available resources to get more bang for the buck.

The Eastern Innovation Region's approach to developing new businesses is based in part on nine years' experience from CEDET's operation of the Jackson County Entrepreneurship Center. As part of Kentucky's Federal Rural Empowerment Zone Program, the center delivers entrepreneurship training, an array of business development services and helps foster an entrepreneurial business culture. The business closure/failure rate has hovered around 10 percent, indicating that the model produces viable new businesses.

Creativity and innovation are not strangers to Appalachian Kentucky. Harnessing them into sustainable, growth-oriented, new economy businesses is the challenge. Through the work of the networked new economy programs and business assistance partnerships, Kentucky is moving toward a healthier, more diversified rural economy. ★★★

For more information, contact Cheryl Stone, Director, Center for Economic Development, Entrepreneurship, and Technology (CEDET), at cheryl.stone@eku.edu or (859) 622-2383, or visit the Web site at /www.cbt.eku.edu/cedet/.

The Importance of Networks and Capacity Building in Technology Transfer and Commercialization

By Carl Schramm

President and Chief Executive Officer, The Ewing Marion Kauffman Foundation

The Ewing Marion Kauffman Foundation has studied the technology transfer process at universities and uncovered some interesting findings. The following is excerpted from a speech given by Carl J. Schramm, President and Chief Executive Officer of the Kauffman Foundation, at the IP Commercialization and Research Spinouts Conference in Boston on November 4, 2004.

We all have an interest in seeing that innovations are more efficiently brought to the marketplace. Universities want to more swiftly commercialize discoveries from their labs ... business and industry want to capitalize on the products and services that result from breakthrough research ... venture capitalists want to pluck the most promising investment opportunities ... and we at Kauffman want to see that entrepreneurship is cultivated to the greatest extent possible.

During the last two centuries, traditional economics recognized only two factors of production: labor and capital. Education, knowledge, and intellectual capital were believed to be outside of the system. Stanford economist Paul Romer's New Growth theory recognizes the tremendous role and impact of ideas. It shows that economic growth doesn't arise just from adding more labor to more capital. Rather growth is derived from new and better ideas expressed as technological progress. Romer believes that technology – and the knowledge on which it's based – is an intrinsic part of the economic system, and that knowledge has, indeed, become the third factor of production in leading economies.

A significant number of university innovations either are mired in the depths of bureaucracy or paralyzed by a lack of applied skills and resources.

We know well that university-based research plays a central role in the innovation process. Basic research that leads to fundamental discoveries provides the underpinning of more applied technologies. University researchers are active in both areas of scientific inquiry and, since the Bayh-Dole Act of 1980, have been commercializing technologies at an increasing pace.

The Kauffman Foundation's interest in propagating new knowledge and facilitating entrepreneurs' ability to commercialize it led us to begin studying the technology transfer process at universities early last year.

On the surface, the system appears to be humming along quite nicely. Yet, closer scrutiny offers a sobering realization. Preliminary research shows that, residing in universities are a significant number of innovations either mired in the depths of bureaucracy or paralyzed by a lack of applied skills and resources, slowly struggling their way to the commercial forefront. Worse, many never make it at all.

The process of recognizing the potential marketability of ideas and readying them for practical use is a huge task. Rarely can a university muster the resources to support the work of proactively identifying, evaluating, and developing all of its promising discoveries.

The main problem lies in a technology transfer system that was created years ago to encourage commercialization, but has since developed symptoms that greatly inhibit its ability to do so.

Bayh-Dole, through passing responsibility for ownership to universities, has had powerful effects. In return for identifying and patenting promising innovations made with federal funds, universities receive exclusive licenses and the income that goes along with them. The intent, or course, was to drive more innovations into the marketplace by delegating responsibility and providing broad-based incentives for success. And to a certain degree, it has worked. On one hand, innovation flow via patenting and licensing has increased dramatically, along with increases in federal research dollars.

While universities have been given the opportunity and obligation for commercialization, we are not seeing the full potential of this federally funded research. Instead, a much clearer result has been the ramp-up of university technology transfer offices with the expectation that the office, in and of itself, is a sufficient resource to meet the government's mandate to commercialize. The assumption being, "If we build it, they will commercialize."

We know that only a small number of universities receive the lion's share of licensing income. And a recent survey of engineering and science professors at eleven major universities found that only 30 percent of research faculty account for the great bulk of patenting and licensing.

There are elite universities that rank in the nation's top ten for research funding, but far lower in patenting and licensing. There are many small- to medium-sized universities that have well-regarded research faculty who, themselves, receive significant funding, but very few or no commercial activities result.

Admittedly, technology transfer as defined today is a complex business, for which many universities are poorly trained and equipped. The process of recognizing the potential marketability of ideas and readying them for practical use is a huge task. Rarely can a university muster the resources to support the work of proactively identifying, evaluating, and developing all of its promising discoveries. Yet in the present system, that is exactly what each of 280 or so institutions is expected to do.

Add to that the pressures universities often face to be economic development engines for their regions – profit centers whose primary goal is jump-starting new local companies and the job creation that goes with it – and the result can be just the opposite: a constricting of innovation flow. Also, faculty members who believe basic research is being threatened by the pressures of commercialism may be less inclined to come forward with promising ideas. And on both sides, there is a tendency to overly narrow the focus, which perpetuates the cycle of missed opportunities. Universities often concentrate their tech transfer resources on just a few innovations having the greatest potential payback. Similarly, VCs tend to focus on a few proven university relationships rather than casting a wider net that would likely uncover new and even more profitable discoveries.

All told, it's an environment that was, in theory, created to empower innovation flow to the market, but instead is under-supported, commercial-unfriendly, and in fact sets up universities, industry, and the capital community to be extremely limited in their success.

The Foundation is seeking solutions on several fronts. We're working with universities and others to identify current replicable best practices in technology transfer; there is little systematic knowledge in several key areas. We're also exploring how to improve technology transfer at universities with small- to medium-sized budgets and very limited resources.

In addition, we're piloting a new system designed to maximize innovation and deal flow, rather than merely maximize dollar flow per licensing deal, as is the case with the current system. Our goal is to enable the technology transfer offices to automate much of their transaction work so that they can spend more time developing opportunity recognition and marketing skills. We believe a part of this is opening up the system and creating a two-way thoroughfare: one in which faculty have the time and are trained to look outwardly at the possibilities, and at the same time private-sector parties who may be interested in faculty's work are able to look inside the universities and mine the multitude of latent ideas

and discoveries – one of which just may be the missing link needed for an emerging technology.

It's interesting to note that, for the most part, among the champions, there are no conclusive patterns that would be telling of the reasons for their success. However, there seems to be a common thread among the half dozen or so schools that do it well. Those university faculty located in a "cluster" of commercialization engage in a high level of industry consulting and collaboration. Because of their propinquity to a vast network of friends and colleagues who are entrepreneurs, venture capitalists, and other experts, their opportunity recognition skills are more keenly developed. That, coupled with a technology transfer office that is appropriately resourced to manage the incoming traffic, has good analytical skills, and fosters collaborative external relationships, provides a positive stream of commercialization for the university. Schools that are isolated from industry tend to have fewer industry relationships and, therefore, provide less robust input to the tech transfer office, causing it to be inwardly rather than outwardly focused.

What this tells us is, not only are industry-university relationships positive for innovation, but collaborations with other experts bode well for the process, too. For those who do not have the necessary established social networks, we must help create them.

It is said that there are really several types of knowledge. For example, "know-what," or mere knowledge of facts, has today become far less relevant and useful. "Know-how" refers to skills and the ability to do things on a practical level. Perhaps of most significance is "know-who," which refers to the world of social relations or networks and is knowledge of "who knows what" and "who can do what." Albert-Laszlo Barabasi, Notre Dame physicist and the nation's expert in the science of networks, believes that the power of networks, including social ones, governs our ability to succeed in virtually every aspect of science, business, and beyond.

Knowing key people may, indeed, be of greater importance to innovation than knowing scientific principles.

VCs are the first to recognize the human capital factor in the value and expertise they bring to entrepreneurs in advancing their enterprises. Similarly, successful entrepreneurs who understand relationships and proven methodologies have valuable skills they can bring to bear on the process.

Determining how to bring the "know who" parties together and apply the collective "know what" to build the skills of the innovation creators is our challenge. In other words, before we can transfer technology, we must effectively transfer knowledge from "those who know."

An interesting story last week in the New York Times illustrates this point and the fact that "those who know" may be found in somewhat unexpected places. Students from the University of Arizona's business school competed in a business idea competition called "Fame or Flame." Two students' initial idea was considered a "flame," and they had to go back to the drawing board. To help them, a professor gave them a catalog compiled by the university's tech transfer office containing dozens of technologies developed in the university's physics, engineering, and other science schools. The two students quickly identified a portable device developed by two medical school professors that allows you to peer into children's eyes and photograph the retinas to detect Shaken Baby Syndrome. In short order the two had conducted market research, developed a business plan, and incorporated the company as Optica Inc., complete with a detailed exit strategy. Of course, these students were trained in entrepreneurship. They had the opportunity recognition skills – and the time – that likely many of our tech transfer faculty lack.

Similarly, our Kauffman Campuses program is currently funding eight universities, all of which are focused on graduating students with entrepreneurial skills no matter what their discipline. This, we hope, will serve our future generations of faculty well. But it does not help us address the here and now.

Today, we must begin creating the social networks that will allow us to leverage knowledge from those who know. Our success in advancing the technology transfer process depends on it. The unintended consequence of Bayh-Dole has been undue pressure placed on a single "office" to solve the commercialization puzzle; the solutions we seek must look beyond. Faculty, university administration, government, and industry must all come together to apply resources – human and financial – and share knowledge in the name of opening the floodgates for innovation.

According to New Growth economics, a country's capacity to take advantage of the knowledge economy depends on how quickly it can become a "learning economy." In a learning economy, it is believed that individuals, firms, and countries are able to create wealth in proportion to their capacity to learn and share innovation. Part of the learning economy may well be our ability to create the social networks necessary for commercializing university research, learning from each other how to better recognize opportunities, evaluate them, and translate them into products and services that will transform society. ★★★

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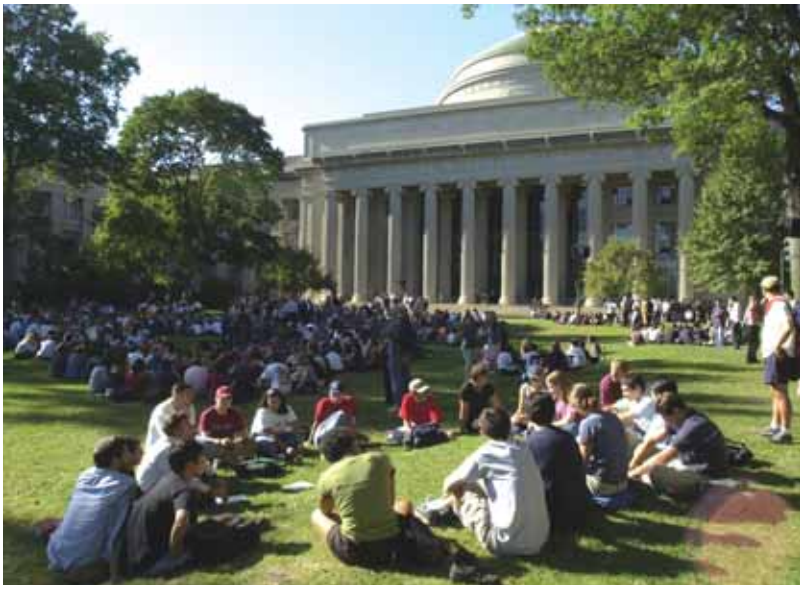
The Ewing Marion Kauffman Foundation works with partners to encourage entrepreneurship across America and improve the educational achievement of children and youth. The Kauffman Foundation was established in the mid-1960s by the late entrepreneur and philanthropist Ewing Marion Kauffman. More information about the Kauffman Foundation is available at www.kauffman.org.

Accelerating Economic Development Through University Technology Transfer

By Diane Palmintera
President, Innovation Associates

"Silicon Valley," "Rt. 128" and "North Carolina Triangle" have become familiar terms throughout the country and the world. For as long as these terms have been recognized, states and communities have been trying to replicate them. Universities have been at the center of these models and have provided a pipeline for science and technology innovation, generating thousands of technology patents and licenses and spinning off new technology enterprises.

There is no doubt that university technology transfer and commercialization activities are impacting local, state, and national economies. Stanford University alone filed more than 300 patents last year and it has spun off some familiar companies such as Google, Sun Microsystems, Silicon Graphics, Netscape, Cisco Systems, and Yahoo!. Each year, the Massachusetts Institute of Technology (MIT) executes almost 100 licenses and launches about 20 new technology firms. Moreover, about 150 new businesses every year are associated with MIT faculty, students and alumni. Other universities such as Washington University in St. Louis, Georgia Institute of Technology (Georgia Tech) in Atlanta, University of Wisconsin in Madison, and Carnegie Mellon University (CMU) in Pittsburgh also are making impressive strides and contributing to the diversification and growth of their regional economies.



MIT executes almost 100 licenses and launches about 20 new technology firms each year. About 150 new businesses every year are associated with MIT faculty, students and alumni. These future entrepreneurs are shown here as freshmen in MIT's Killian Court. Photo by Donna Coveney.

University technology transfer and commercialization

Starting in the late 1970s and early 1980s, technology transfer and commercialization of university and federal laboratory research and development (R&D) gained increasing attention and led to new federal legislation.[1] In 1980, the Bayh-Dole Act accelerated technology transfer from universities to the private sector by establishing a uniform federal invention policy that permitted universities to retain title to inventions developed through federally funded research. Subsequent acts provided additional incentives for university-industry collaboration.

University technology transfer is a complex process. It operates as part of the culture and environment within the university and as part of the larger external environment surrounding the university. There are many factors that affect the university's abili-

ty to transfer and commercialize its research. Internal factors include the strength and focus of the university research base; leadership, incentives and rewards; history and strength of corporate relations with the university and research units; and entrepreneurial climate. Other factors external to the university, such as the availability of angel and seed capital, laboratory and incubation space, legal assistance, management capacity-building resources and networking opportunities are just a few of the elements that form the infrastructure to support university technology transfer efforts.

Many public institutions – particularly the state land grant universities – view economic development as part of their mission, while private universities sometimes have a more tenuous link to economic development goals. Moreover, within some universities issues still remain about the role of technology transfer in regard to the university's primary academic mission of teaching and education. In addition, academia and corporations represent two very different environments with contrasting values and cultures. Issues concerning the use of faculty time to pursue commercial goals based on their university research, conflict between the academic need for unrestricted publishing versus the corporate need for commercial confidentiality, and concerns about conflict of interest are still being worked through in many institutions.

But other institutions such as MIT, Stanford, CMU, and Georgia Tech appear to have found a balance between achieving academic excellence and pursuing technology transfer and commercialization goals. Some institutions have found that by licensing and spinning off new technology enterprises they have enriched their academic environments, making them more attractive for "star" faculty and innovative-minded faculty and students. As a younger generation of faculty increasingly desires entrepreneurial opportunities, universities have had to embrace a more open entrepreneurial spirit. This has benefited the universities and the economies surrounding them.

Lessons from exemplary practices

In 2004, the Connecticut Technology Transfer and Commercialization Advisory Board of the Governor's Competitiveness Council began building a state agenda for science and technology leadership. As part of that effort, the Advisory Board contracted with Innovation Associates (IA) to examine national models of university-based initiatives and to provide the state with recommendations that would leverage its university resources and enhance its economic competitiveness. In a spirit of national cooperation, Governor M. Jodi Rell released parts of the original report, now entitled *Accelerating Economic Development Through University Technology Transfer.*[2]

Exemplary practices were examined at: Carnegie Mellon University (CMU), Georgia Institute of Technology (Georgia Tech), Massachusetts Institute of Technology (MIT), Purdue University (Purdue), Stanford University (Stanford), University of California, San Diego (UCSD), University of Pennsylvania (Penn), University of Wisconsin-Madison (UWM), Washington University (WU), and Cambridge University, United Kingdom (Cambridge). IA examined technology transfer and commercialization practices at these universities and, in some cases, also examined related university or community entrepreneurship programs, seed capital programs, incubators, research parks and cluster-driven innovation centers.

Some institutions have found that by licensing and spinning off new technology enterprises they have enriched their academic environments, making them more attractive for "star" faculty and innovative-minded faculty and students.

The exemplary universities and the environments in which they operate provide some consistent lessons to guide public and private decision makers:

- **A strong and focused university research base feeds the pipeline for commercialization:** Excellent university technology transfer is built on excellent research. This research provides the pipeline for commercialization of research results. Moreover, just as important as the absolute magnitude of a university's research portfolio is its strategic focus. In order for some model universities to build strong and focused research bases, they assess core competencies and develop strategic plans around those core competencies aimed at: (a) hiring "stars" in targeted fields, (b) targeting federal R&D funds, (c) increasing corporate sponsored research, and (d) promoting state initiatives that leverage federal and corporate funds. Examples are found at Stanford, CMU and Georgia Tech.

At universities such as Stanford, shown above, research funding from the federal government often accounts for three-fourths or more of total university R&D expenditures. Photo by Linda A. Cicero / Stanford News Service.

- **Federal R&D funding provides a critical base for technology transfer and commercialization efforts:** In most universities successful in technology transfer, there is substantial research funding from the federal government, often accounting for three-fourths or more of total university R&D expenditures. This is the case for MIT, Stanford, UW-Madison, Washington University and other major research universities. Federal research funding for universities comes mainly from the U.S. Department of Defense and the National Institutes of Health. The National Science Foundation also plays a significant role through its programs.
- **Champions catalyze most successful university-based economic development:** In virtually every region in which a major research university has played a strong role in fostering regional economic development, one can point to a champion, often a strong university president or chancellor. These university heads, such as UCSD's former Chancellor Atkinson and Washington University's former Chancellor Danforth, have the experience, vision and will to move their institutions into new roles, as well as the leadership to rally the community's corporate leaders and public decision makers.
- **The entrepreneurial culture of a university is key to its technology transfer success:** The entrepreneurial culture of a university is perhaps the strongest and most pervasive influence on its technology transfer and commercialization performance. Creating an entrepreneurial culture is both bottom-up and top-down – requiring a combination of leadership from the top and entrepreneurial drive from the bottom. Universities successful in transferring technologies often provide implicit or explicit rewards and incentives for faculty who participate in technology transfer and commercialization activities, and have hiring practices that favor industry and entrepreneurial experience. Often model universities also have strong entrepreneurship programs that offer entrepreneurial courses and activities for engineering and science students as well as business students. These activities include business plan competitions, practicum with start-ups and mentoring by successful entrepreneurs. Examples include MIT's Entrepreneurship Center and Stanford's Technology Ventures Program.
- **Networking is an integral part of the culture:** Part of the entrepreneurial culture inside and outside the university is networking. Opportunities for entrepreneurs to net work with potential investors, potential corporate clients or partners, service providers, and other entrepreneurs is a critical ingredient well known to Stanford students in Silicon Valley, MIT students in Boston, and Cambridge students in the United Kingdom. Often the university technology transfer and licensing offices also encourage and facilitate interaction with venture capitalists, law firms, and corporations early in the transfer process.
- **Early-stage capital is a critical ingredient in launching university start-ups:** Entrepreneurs from most universities successful in generating start-ups have access to angel and seed capital. In addition, universities and intermediary organizations assist entrepreneurs with business plan development and offer entrepreneurs opportunities to showcase and network with potential investors. Where early-stage capital does not exist, universities, public and private sectors step in to create it, often seeding private funds that leverage additional monies. Angel networks also play an increasingly important role in spawning early-stage firms. Some examples of "pre-seed"/seed funding vehicles are Georgia Tech's VentureLab, St. Louis's BioGenerator, Pittsburgh's Idea Foundry, and state "fund-to-fund" programs found in Indiana, Missouri, and Pennsylvania.
- **Innovation centers can provide a focal point for technology-based activities:** In some communities and states, innovation centers often are directly or indirectly linked to universities, involve corporate participation and provide a variety of services and linkages including pre-seed/seed capital, Executives-in-Residence programs and business assistance for technology start-ups. One example is Pennsylvania's Life Sciences Greenhouses.
- **Incubators and research parks can be important in areas not known for technology:** Many model universities have incubators and research parks. This is particularly important for universities that have had to build an entrepreneurial presence, such as UW-M and Purdue. Their research parks are now quite successful,

Research parks can be a boost for areas not known for technology. UW-M has helped build an entrepreneurial presence with its University Research Park, shown in this aerial view.

each employing several thousand high-tech workers and adding a technology presence where there once was none.

- **Private corporations and foundations can play a major role:** In many communities and states, private corporations and foundations have played a major role in stimulating science and technology research and promoting regional economic outcomes. Corporations play a role not only by endowing university chairs and funding collaborative R&D, but also by participating in entrepreneurial activities and funding technology-based initiatives in the community. In St. Louis, for example, the Danforth Foundation, Monsanto, and the McDonnell family have funded substantial initiatives, and in Pittsburgh, the Heinz Endowments and other corporate contributors have provided the majority of funding for the Pittsburgh Life Sciences Greenhouse.
- **No quick fixes:** Most technology transfer and commercialization efforts at successful universities and the resulting entrepreneurial and economic development phenomena that have grown around those universities have taken decades to accomplish. Moreover, the technology transfer field is still relatively new and evolving. Often, results – particularly short-term results – are difficult to demonstrate and to quantify. Academic, public and private decision-makers should be cognizant of these facts and build into programs the flexibility to experiment, as well as allow them the time to mature and evolve.

In regions benefiting from university technology transfer, academic and community leaders recognized that by leveraging R&D and entrepreneurial resources they could create new opportunities for both academic excellence and economic growth. Not every community has a Stanford and can create a Silicon Valley. But public and private leaders can work together to identify, strengthen and leverage their own resources that enhance innovation-based economic opportunities.

Innovation Associates provides economic development and technology transfer services, helping governments, organizations, universities and the private sector increase their productivity and growth by applying innovative techniques and best practices. ★★★

Note: Under a National Science Foundation grant, Innovation Associates also is examining technology and entrepreneurial related exemplary practices in smaller universities and community colleges, and related community initiatives. If you believe you have an exemplary practice, please contact Innovation Associates at ia@innovationassoc.com.

[1] For more on economic development activities at federal laboratories, see *Partners on a Mission: Federal Laboratory Practices Contributing to Economic Development* (OTP, November 2003) available at www.InnovationAssoc.com and www.Technology.gov.

[2] The original *Report to the Connecticut Technology Transfer and Commercialization Advisory Board* (November 2004) was funded under a grant to the State of Connecticut by the U.S. Economic Development Administration and is available at: http://www.youbelonginct.com, then by following the "Technology Hot Spot" link. *Accelerating Economic Development Through University Technology Transfer* can be downloaded from www.InnovationAssoc.com.

A 21st Century Model for Engineering Education

By C. L. Max Nikias

Dean, USC Viterbi School of Engineering

Every day, engineers in U.S. universities are solving problems. But society receives no benefit if their solutions never leave the laboratories or the pages of academic journals. While it is tempting to believe that good technologies always find their niche, that's no longer true, and maybe never was true.

As the pace of modern life continues to accelerate, engineers just can't afford to assume that people will recognize their clever ideas. And engineering schools can no longer be judged solely by the quality of their research and teaching. Of growing importance is how well those schools put the intellectual capital they are creating to the service of the greater good.

There has been growing concern recently about the erosion of the long-standing U.S. edge in science and engineering. In 1985, U.S. schools graduated more than 76,000 engineers, but that number had declined 20 percent by 2004 when less than 60,000 engineers graduated. Meanwhile, China, Japan, India, Russia and Europe now graduate substantially more engineers than we do. China and India together produce almost 320,000 engineers annually. Many of those engineers attend U.S. engineering graduate schools because this is where the big research programs are and in particular, it is where the new technologies that drive economies are being created.

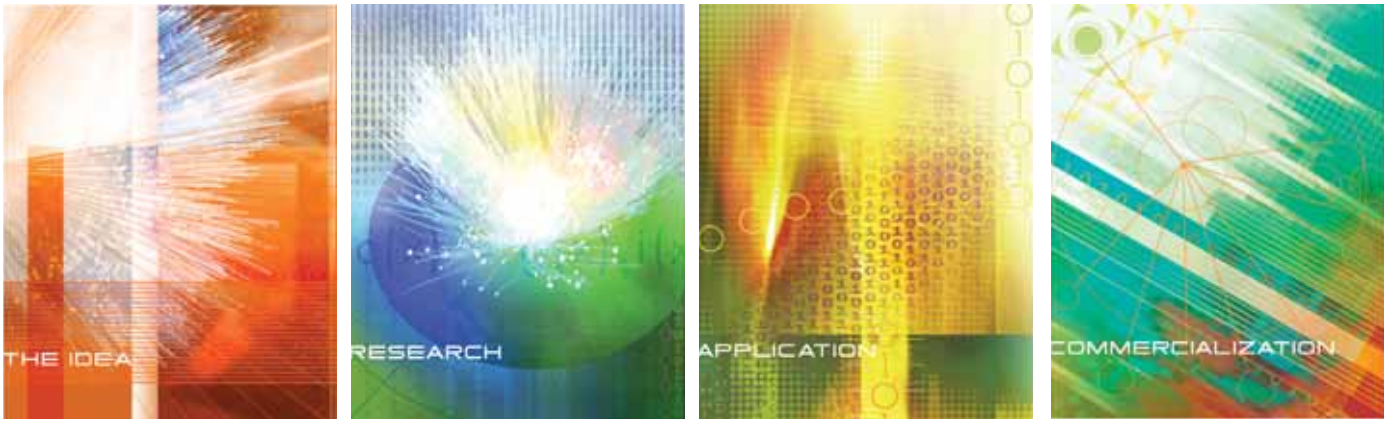
U.S. engineering schools, for their part, are glad to have these international students because there aren't enough domestic engineering students to staff university laboratories. In addition to engineering innovations, international students bring American values home with them when they return to their native countries.

It is vitally important that today's engineering students not only learn the traditional technical engineering skills, and learn them well, but that they be immersed in the process that ultimately determines engineering success – the commercialization of new technologies.

At the University of Southern California Viterbi School of Engineering, our singular response to this challenge is the Mark and Mary Stevens Institute for Technology Commercialization (SITeC).

Mark Stevens, right, holds a USC Trojans football helmet while Dean Nikias of the Viterbi School of Engineering, left, holds a jersey commemorating the $22 million that Stevens donated to create the Mark and Mary Stevens Institute for Technology Commercialization (SITeC).

While many research universities have technology transfer programs at the institutional level, it is an integral part of the overall learning experience at practically none of them. SITeC's location within the USC Viterbi School of engineering is also somewhat unique. There, it will support an academic program of comprehensive commercialization education and training for engineering students and for faculty. Engineering faculty today must effectively administer the technology innovations conceived in their research laboratories. And in the commercial world, professional engineers must be skilled in protecting and developing their companies' intellectual property resources.



The four steps to commercialization.

A Stevens education

The 21st century curriculum that SITeC is developing includes coursework in technological entrepreneurship, as well as optional minors at all levels. Classes will focus on three overarching areas:

- First are the technical aspects of technology transfer, encompassing methods for assessing how mature a discovery, or its market readiness.
- Second are the legal aspects including intellectual property protection, business plan formation, licensing and royalties.
- Finally, there are the operational aspects spanning economics, marketing, management, financial markets, valuation, feasibility analysis and hands-on business plan development.

Ethics, as they apply to commercialization, will also be an important part of this innovative curriculum.

The USC Viterbi School is collaborating with the USC Marshall School of Business and the USC Gould School of Law to create the new courses. The courses will be open for all USC students – not just engineering students – and all of them will have the option of taking a SITeC technology commercialization minor. The courses will be a fundamental part of the curriculum for both undergraduate and graduate engineering students and will eventually become the benchmark for a comprehensive engineering degree.

The courses will all be designed to work in a modern distance-learning environment. The Viterbi School currently has about a thousand graduate students studying in 26 different M.S. degree programs through its Distance Education Network (DEN). These students, who can be found in most U.S. states, use DEN's cutting-edge high-speed Internet interface to take the same courses taught by the same faculty that teach on-campus students. And their USC degrees are exactly the same as those who study on campus.

Industry relies heavily on private engineering schools to train working professional engineers in the latest technologies. So most private engineering schools graduate large numbers of masters students compared to the public schools, which are mandated by state legislatures to concentrate resources on undergraduate education. Because so many master's students are professional engineers already working in the commercial realm, the SITeC curriculum may be even more important for them.

A comprehensive resource

In addition to its educational mission, SITeC will be strengthening technology transfer capabilities university-wide as a resource for both faculty and students. SITeC is currently hiring a professional staff that will provide a dynamic interface between inventive USC academics and potential investors and corporate partners. SITeC will offer a full range of consulting services, from market analyses to third-party investor introductions. It will be building new links to industry as it assists faculty, and sometimes students, with ideas that have commercial potential. The result will be a more seamless technology transfer process. The goal isn't simply to raise individual competence, but to create a new culture and awareness of the value of commercialization. Technology transfer needs to become a natural, intuitive process for all.

Today, commercially successful innovations are likely to come not from traditional disciplines, but between disciplines, or among them. Most engineering research today is cross-disciplinary with engineers collaborating with a variety partners in the natural and health sciences. The USC Viterbi School's Integrated Media Systems Center has created a dazzling array of new Internet technologies at the intersection of engineering and creative content media. New industries such the video games are a spicy blend of engineering and art while Hollywood, which has a long history of technology

transformations is struggling with the digital revolution. That's why SITeC, though located within the Viterbi School, must work for all of USC.

SITeC will speed the transfer of USC inventions into the marketplace with the highest academic, business and ethical standards. It will provide a powerful tool for attracting and retaining the highest caliber students and faculty from around the world. SITeC will build corporate partnerships that advance applied research and strengthen education with hands-on commercialization training. And finally, as more innovations are commercialized, it will profoundly enrich the lives of people everywhere. ★★★

C. L. Max Nikias holds the Zohrab A. Kaprielian Chair in Engineering and is dean of the USC Viterbi School of Engineering.

Mark Stevens: Creating an Energetic Exchange

Venture capitalist Mark A. Stevens graduated from USC in 1981 with a double major in electrical engineering and economics and later completed his master's in computer engineering, also at USC. He joined what was then a lesser-known, mid-size company called Intel, initially in technical sales. "That was the next step in my career in terms of being on the commercialization side of technology," Stevens says. Later he went back to school again, this time for an MBA at Harvard University.

With Stevens' technology expertise, business intuition and marketing skill, the field of venture capital seemed like a natural. Stevens joined Sequoia Capital in Silicon Valley in the spring of 1989 and is now one of five voting partners jointly responsible for some of tech history's most spectacular investments: Google, Yahoo!, NVIDIA and others.

Following are excerpts from a recent interview with Stevens about technology transfer and the Mark and Mary Stevens Institute for Technology Commercialization (SITeC).

The term "technology transfer" or "technology commercialization" implies that the technology is first completed, then transferred. But that's not how it works, is it?

No. As venture capitalists we tend not to try to finance basic research. We'll finance a little bit but we're really focused on financing the development.

At Sequoia, we try to evaluate where on that spectrum the founders are. If you're a faculty member or a student and you're trying to start a company and there's a lot of research left to do, it may be tough raising money. The idea's not yet fully baked; you might fail.

What do you think the state of commercialization education and training is today?

It's fairly poor or nonexistent. Many engineers in industry know how to build a widget, but they have no idea how to build a company. I have a widget that I built in my garage. Now what do I do with it? How do I sell it? How do I market it? Who's going to build it for me? How do I file my patents so I can protect my invention? Engineers learn this by accident or by osmosis or just on their own. The learning's not very structured or formalized – and that's why we're doing SITeC.

How did you come up with the idea for SITeC?

For many of the big, successful companies Sequoia has financed over the years, the genesis has been faculty or graduate students at major universities. I thought, what can we do to make USC a bastion where a lot of startups get started? Look around USC – you've got leadership capabilities in multimedia technology and in biomedical technology, you have a great medical school, you've got a great cinema school and connections to the entertainment industry.

No other place in the country has a technology commercialization institute. SITeC will be a unique resource – not just for the Viterbi School of Engineering, but for the medical school, the business school, the cinema school and anybody on the USC campus who wants to commercialize a technology.

Can you describe the educational component of SITeC?

Especially for graduate students, we feel we must have courses available that give them exposure about filing patents and IP (intellectual property) protection, the basics of how to start a company, insights into how companies rollout over time. How did Yahoo! become Yahoo! and Intel become Intel? We're not trying to replace an MBA program. We're trying to give engineering students some added insight, based on experience.

Aren't there also people in business who don't understand the realities of academia? How will SITeC address that?

A lot of business people fail to see the potential of fundamental research and how it can help their company down the road. They're thinking about the next quarter when they should be thinking about five years out. Some executives view university research as a farm team, as a way to hire students. They sometimes don't appreciate the work that's been done [in the lab]. I envision a scenario where we have seminars or sessions for CEOs or for other business people to come in and learn about how USC does research and how things get from the laboratory out into the marketplace. So, there's an energetic exchange going on at all times. ★★★

Turning the Corner:

Trends in Angel Investing

By John May

Managing Partner, New Vantage Group and Vice Chairman, Angel Capital Association

In the United States, the United Kingdom, the European continent, Australia and New Zealand, a consensus has arisen that innovative, high-growth private companies are being confronted with a widening gap of growth capital available to entrepreneurs – after their friends and family and solo angel support, but before institutional, venture capitalists will touch them.

Startup companies, whether spinouts from universities or innovative new service models in this Internet age, are seeing their market penetration slowed by risk capital shortages. A little-known answer to the dilemma is arising throughout the world from the growth of second generation "structured angel groups" – groups of accredited investors who make personal investments of $10,000 and upward in non-family member enterprises, and mentor as well as create wealth. We are past the research and invention stage of structured angel group formation – best practices and sample documents are available on Web sites and from published research. Communities now need to encourage customized solutions for their unique economic environment executed by the best and most passionate local angels.

This article sets out to shine a light on the current state of the sophisticated, non-family provision of growth capital to struggling entrepreneurs. It is clear that individual business angels have been and will continue to be integral to funding the gap after exhaustion of start-up and proof of concept funding, and prior to venture, strategic or customer financing. However, a more effective market – a more transparent market – is evolving with the growth of several second-generation, structured angel groups. The dominance of structured angel groups on the two coasts, founded by successful high tech entrepreneurs and the Internet wealth generation, is giving way to varied groups being formed by business men and women of all types who are sadder but wiser after losing billions in the aftermath of the telecom and Internet crash.

What entrepreneurs should know about angels who were burned after the bubble

A mighty learning came out of four summit meetings held by leaders of existing investment groups and sponsored by the Kauffman Foundation of Kansas City in 2002 and 2003. Excessive enthusiasm and a 5,000 NASDAQ had blinded us to the common sense principals of growing businesses, rather than playing at financial engineering; of doing deep due diligence and mentoring entrepreneurs, instead of investing and hoping. Twenty million dollar pre-money valuations for common stock investments, with few protections, were not uncommon. What the heck, venture capitalists were obtaining buyouts of $900 million for $1 million-revenue e-commerce startups!

Ray Marvin, John May, Cal Simmons and TJ Jubeir network during a meeting of the Washington Dinner Club, an early stage venture fund administered by New Vantage Group.

After the crash, the decline in individual disposable investment capital impacted high-tech, service, lifestyle and family private businesses alike. Thus began the retrenchment of seed and early stage investment in 2001 that declined further in 2003, only showing signs of new life in 2004. Members of the Angel Capital Association (ACA) are reporting growth – more dollars are being invested and new investment groups are in formation than since the heady days of 1999-2001.

But this time, smart money is minimizing risk by benefiting from the brainpower and investments of group angel activity all over the country and learning from past mistakes. And the group process leads members to be more serious about the investment process, to research opportunities more thoroughly, to ask more reasonable shared-risk terms and to parcel out investments over time instead of all up front.

Hundreds of serious angels wanting to give back to their communities and support young entrepreneurs recently have formed dozens of new angel groups to share local deals, due

The group process leads members to be more serious about the investment process, to research opportunities more thoroughly, to ask more reasonable shared-risk terms and to parcel out investments over time instead of all up front.

diligence and risk. Angel groups encountered by today's entrepreneurs have the following characteristics:

- Risk minimization is as important as blue sky dreams.
- Muted exuberance has replaced giddy enthusiasm.
- More mature leadership of angel syndicates means more serious, hands-on help.
- Serious business concepts, not untested business models, are rewarded with successful financing.

Group growth seems to be centered outside major metropolitan areas and is spreading to medium-sized and smaller communities as well.

Types of angel groups

Entrepreneurs seeking strategic help and growth funding will find structured angel groups of three kinds.

- Non-profit networks: loose affiliations of angels meeting every month or two to see presentations by entrepreneurs seeking capital beyond "friends, families and fools." Many of these exist coast to coast in the United States and they represent a majority of angel groups in Europe. (Many belong to the European Business Angel Network, www.eban.org.) Presenters are not lifestyle small business owners; they are entrepreneurs seeking breakthrough and rapidly expanding opportunities to and are willing to part with dear equity to see their dreams come true.
- Pledge funds: groups of self-certifying, accredited investors who combine efforts under one banner are the majority of structured angel groups (SAG) in this country. These groups frequently have a Web site and small staff, pay dues, organize an efficient screening and outreach process, and negotiate common terms for pooled capital in subgroups of members. This more efficient process helps the entrepreneur raise more dollars through one negotiation and achieves the "value add" of a key spokesperson – representation of those SAG members who opt into this deal. These groups are easy to form, run and locate. Many belong to the Angel Capital Association and are identified on its Web site (www.angelcapitalassociation.org). Others have banded together through the Community Development Venture Capital Alliance (www.cdvca.org).
- LLCs: a growing number of groups are even more formal, with the benefits and attributes of pledge funds but with more formal organization. These manager-led and member-led limited liability companies aggregate a set amount of capital, like a venture fund or real estate partnership. They vote as a group, after screening and meeting the entrepreneur, to place $250,000-$500,000 or more from the angel group's contributed capital. Often members of the group will sit on a company board of directors or make side investments as well. We call this approach the pooled or "Dinner Club" model after our experience in the mid-Atlantic region over the last five years.

There is no one perfect method or means to support local entrepreneurs; all aspects of the private capital food chain should be sought by communities that want growth capital for innovative companies. Technology councils, state economic development organizations, and university incubators alike can support objective studies and subsequently encourage appropriate models with key, local angel leaders.

The crystal ball

Our crystal ball, though still cloudy, seems to indicate an expansion of publicly identified structured angel groups with defined market forms, regional basis and serious intent. Some will be formed by wealthy alumni around university technology and spinouts; some will concentrate on business "clusters" identified within a local economy. Some pledge funds will tap into investors through side car limited partnerships for passive investors and institutions that want to piggy-back on the "smart money" in angel syndicates. And, way off in the haze, we can see the advent of global structured angel communities, tying foreign angels to U.S. structured angel groups in order to share due diligence, portfolio company hiring, capital needs and best practices. Communication breakthroughs, the Internet and social networking tools will come together to shrink time and space, opening new doors for entrepreneurs and angels alike.

We've come a long way over the last 10 tumultuous years within the angel movement. Communities will do well to learn how to tap into emerging trends, so that in the next 10 years they can keep the best and brightest of their entrepreneurs and cashed-out business executives close to home.

★★★

New Vantage Group is a Vienna, Virginia-based angel group management firm that specializes in innovatively mobilizing private equity capital. The Angel Capital Association is the professional alliance of North American angel groups, supported by the Kauffman Foundation of Kansas City.

Growing Ohio's High Performance Economy

By Bruce Johnson

Lieutenant Governor, State of Ohio and Director, Ohio Department of Development

New products and innovations have been at the heart of Ohio's economic prowess for a century and a half. Thomas Edison, Orville and Wilbur Wright, Thomas Kettering, Charles Goodyear, Jonas Salk and Henry Timken are just a few of the Ohio inventors who shaped the world's economy over the last 100 years. Today, Ohio companies working in medical devices, fuel cells, liquid crystals, pharmaceuticals, super-efficient cooling systems and nanostructured materials are making the discoveries that will shape the world's economy for the next century.

Transforming Ohio's image from a "rust-belt" state to a center of technological innovation has taken a commitment to economic reform, program development and statewide collaboration among governmental, corporate and academic entities. Today, the state's long-term investments and commitment to technological innovation are bearing successes, as evidenced by some of the best practices we've learned along the way.

Identify core competencies

In order to build a world-class economy, it is critical first to understand one's core competencies – the strengths and opportunities that can serve as baselines for focusing investments and driving economic growth.

Ohio's Third Frontier Project is a 10-year, $1.1 billion initiative to fund world-class research, foster collaboration, promote company formation and encourage the commercialization of new technologies. Governor Bob Taft introduced the project based on a study the state had commissioned to determine Ohio's current economic position and what was needed to compete in the global marketplace. Conducted by Ohio-based Battelle Memorial Institute, the study revealed invaluable information regarding the outside world's perception of Ohio, its relative strengths and weaknesses and areas for action to cultivate a high performance economy.

Included within the Battelle study were data to support Ohio's strengths in five core technology competency areas: advanced materials, bioscience, power and propulsion, information technology, and instruments, controls and electronics. These five areas became the foundation upon which Ohio built the Third Frontier Project and established clearly defined goals for investing state funds.

Ohio continues to re-evaluate its positioning periodically, commissioning both statewide and industry-specific studies to determine if our strategies align with the realities of our industries. For example, earlier this year, the state released the Ohio Fuel Cell Roadmap, a five-year strategic guide to maximize Ohio companies' involvement in the fuel cell industry.

Technicians complete work on a fuel cell that will supply electricity to nearby homes. The Westerville, Ohio Fuel Cell Demonstration Project is the only known application of a fuel cell in which the electricity produced is patched in to the power grid for general consumption.

The Genome Research Institute is a partnership among the Cincinnati Children's Hospital Research Foundation, Procter & Gamble, Wright State University and the Air Force Research Laboratory to further genetic research and develop new medical therapies.

Encourage collaborations

Identifying core competencies also shows where collaborations among varying research institutions, organizations and corporations can drive technological advancement. In Ohio, programs such as the Edison Technology Centers and the Third Frontier Project have helped establish unprecedented partnerships among universities, research organizations and private industries. Together, these collaborations are working on innovative research, the development of scientific discoveries into applicable technologies and product commercialization.

In the mid 1980s, Ohio created the Edison Technology Center Program to strengthen industrial competitiveness. Funded by industrial, state and federal sources, the Edison Technology Centers help companies by providing consulting services on industry best practices, solving manufacturing problems, introducing new technological advances, educating and training management and fostering the growth of emerging industry sectors. By tailoring services to the needs of companies in industries such as advanced manufacturing, materials and processes, welding and materials joining, and biotechnology, the Edison Technology Centers translate their industry expertise into competitive advantages for Ohio companies.

The Third Frontier Project allows Ohio universities, research institutions and corporate entities to pool their expertise and join forces to propose multi-disciplinary research initiatives for state funding. These proposals are submitted to the state and undergo a rigorous evaluation process by third-party entities such as the National Academy of Sciences, to score and rank them by feasibility, likelihood to succeed and job creation. A governor-appointed board of officials approves the recommended proposals and awards the funds.

Often, these state funds are the catalyst the research initiatives need to attract additional funding, validating them as viable projects to federal agencies and private investment sources. In 2003, the Third Frontier Project helped the University of Cincinnati establish the Genome Research Institute (GRI) – a partnership that includes the Cincinnati Children's Hospital Research Foundation, Procter & Gamble, Wright State University and the Air Force Research Laboratory – to further genetic research and develop new medical therapies. The state awarded GRI $9 million, which the institute then was able to leverage in attracting federal, nonprofit and industrial funding of more than three times that of the state's investment. This additional money enables GRI to fund more research, create jobs and recruit some of the world's preeminent scholars in genetic research, including Dr. George Thomas, a Swiss professor who discovered an enzyme that could unlock the mystery to understanding and curing obesity.

Advance commercialization

The private sector has been reticent to collaborate with universities because sharing trade secrets often has meant surrendering control of intellectual property rights on any product advancements. However, by encouraging private industry to come to the table with universities on jointly proposed research, both parties agree to their roles from the onset and benefit from the melding of expertise. New companies can be formed from the research, providing investment and ownership of the technologies by all parties.

The Third Frontier Project demonstrates how successful collaborations between research institutions and the private industry can be. In 2003, Case Western Reserve University in Cleveland was awarded more than $19.5 million in Third Frontier Project funds to create the Center for Stem Cell and Regenerative Medicine. The partnership, which includes the Cleveland Clinic, Ohio State University and private industry specialist Athersys, is currently working with stem cells to develop treatments for musculoskeletal disorders, cardiovascular disease, cancers and other degenerative diseases such as

Lou Gehrig's disease and multiple sclerosis. Already, the research has yielded a method to regenerate blood vessels in human tissue and restore blood flow in blocked arteries, and has resulted in the creation of a spin-off company, Arteriocyte, to commercialize the technology.

Promote entrepreneurship

Incubators provide ever-evolving business development, managerial and technical assistance, as well as affordable office space and shared office services to provide an environment conducive to small business growth. Early on, Ohio recognized incubators as critical components to achieving an advanced economy. Ohio established Edison Technology Incubators to foster the growth of new companies in partnership with the Edison Technology Center program, which exposes those new companies to the expertise of industrial partners.

Excera Materials, a developer of methods for processing ceramic-aluminum composite materials into various end products, is an example of an Ohio technology company that has benefited from the Edison Technology Incubator system. During its time at the incubator, Excera developed its technology from an idea into a business that has attracted the attention of such heavyweights as the U.S. Air Force. In order to accommodate its increased manufacturing demands, the company is graduating from the incubator and will move into its own facility this spring, creating approximately 20 new jobs initially.

Nurture investments

Business incubators provide new companies with many services at reduced rates, but new ventures also require capital to continue growing, particularly early-stage investments. Ohio has increased funding for startup ventures and reduced investor risk by establishing several incentive programs for investing in Ohio-based companies. In 1996, Ohio created the Technology Investment Tax Credit (TITC) program, which offsets the risk associated with investing in small R&D and technology-oriented firms by offering a 25 percent state tax credit to Ohio taxpayers. Since the program started, 1,470 investors have invested more than $45 million in 131 companies throughout the state.

The success of the TITC program prompted the state to consider other initiatives to promote early-stage capital availability, particularly to bridge the gap between innovation and commercialization. Since 2000, the state has invested more than $18 million in seed funds and validation funds throughout Ohio. With only a quarter of the available money invested to date, state dollars already have helped leverage more than $150 million in nearly 60 Ohio start-up companies. These funds have helped create more than 400 high-skill, high-paying jobs statewide.

To increase venture capital funding in the state, Ohio created the Ohio Venture Capital Authority (OVCA), a fund-of-funds program. OVCA is hiring a program administrator who will capitalize the fund with $100 million through loans from banks, insurance companies, corporations and individuals. The program administrator will determine qualified, professional venture capital funds in which to invest this money, which then will invest in startup companies throughout Ohio. Revenues will be funneled back through the program fund to repay the principle and interest incurred on its loans.

Awarding money to professional investment funds allows the state to assume some of the risk of early-stage investments, while keeping investment decisions in the hands of the experts. More importantly, it ensures a readily available source of funding for Ohio innovators and grows the state's professional private equity infrastructure.

Invest in talent and workforce

Producing a pool of workers with advanced skills is critical to a region's ability to compete and succeed in an increasingly technology-driven economy. Ohio recognized that gaps existed between its educational and economic development initiatives and developed a number of programs for bringing them together. These programs are designed to better meet the needs of both current and prospective employers, as well as the workforce, by continuing workforce development throughout the career cycle and preparing even the youngest children for future careers in advanced technology.

Through the AdvanceOhio plan, a statewide advisory board was created to work with technology and advanced manufacturing companies to identify skills that currently are lacking in high school graduates. Together, they are developing programs that will teach these critical skills to children in elementary schools through college.

The state also developed the Third Frontier Internship Program, which provides college juniors and seniors with hands-on training to better prepare them for the corporate world. Technology-based corporations throughout Ohio can receive state funds by creating internships that enrich the educational experience for Ohio college students. More than 1,300 college students have gained invaluable experiences through this program, and consequently are creating a pool of talented workers for Ohio businesses.

Accommodate and be flexible

We believe the innovators of today hold the future of Ohio's economy in their hands. Their knowledge, ingenuity and determination to improve the world we live in keep Ohio at the heart of innovation and drive the state's economic prosperity. As economic development officials, our responsibility is to support them by continually creating programs that encourage innovation, improve the business climate and breed success. Ultimately, that is the "best" best practice.
★★★

Replanting the Economic Forest in Northeast Ohio

By Ray Leach

Chief Executive Officer, JumpStart Inc.

Visitors to Northeast Ohio – particularly those arriving for the very first time – are often struck by the area's physical beauty. From the majestic shores of Lake Erie, to the 60 mile-long string of parks known as the Emerald Necklace which surrounds the city of Cleveland, Northeast Ohio's attractiveness is impressive and unexpected for those who know the region only as part of the "Rust Belt" – the perception echoed ubiquitously by the media in recent decades.

Those of us who live here or visit frequently find themselves in an exceedingly comfortable environment, with short commutes, a diverse population, a broad range of housing and lifestyle choices, world-class healthcare, and extraordinary cultural amenities. However, even the most avid cheerleader for the area – which stretches from Lorain in the west to Akron and Canton in the south and to Warren and Youngstown in the east – must acknowledge that the struggling region still has a long road before it emerges from its 30-year recession.

Northeast Ohio has suffered disproportionately from the decline of the manufacturing economy that began in earnest during the last quarter of the 20th century. The 2004 presidential candidates from both parties, who repeatedly visited Ohio promising job growth throughout the election season, clearly recognized that the area has serious economic issues to deal with. At the heart of the problem is a disturbing statistic: hard-working Northeast Ohio, known for most of the 19th and 20th centuries as a powerhouse of industrial innovation and wealth production, ranked 57 out of 61 regions in 2004 according to *Entrepreneur* and Dun & Bradstreet's "Tenth Annual Best Cities for Entrepreneurs."

The old-growth entities in the region's economic forest, planted by renowned and successful entrepreneurs like John D. Rockefeller and Marcus Alonzo Hanna in the 19th century, began to age and decline at the end of the 20th century in the face of the technology revolution, and new growth was hard to come by. Despite impressive upgrades to the region's physical infrastructure, including large-scale improvements to the downtown areas of Akron and Cleveland, there was no matching economic turnaround.

In reaction, regional leaders from academia, government, and the business and philanthropic communities began to build a new model for stimulating economic development with a focus on rekindling the entrepreneurial spirit. Out of their vision for the future, JumpStart Inc., a unique public-private partnership, was created to solidify, celebrate and continually grow Northeast Ohio's position as a nationally significant center for entrepreneurship and innovation.

The prescription: Early stage investment and support for entrepreneurs

A diverse nexus of community leaders, convened by NorTech (the Northeast Ohio Technology Coalition), coalesced into an Entrepreneurial Task Force that quickly confirmed the region's lagging position in early-stage entrepreneurial development. As evidence, they cited a decade-long bottom-10 percent ranking in virtually all entrepreneurial benchmarks and a lack of early-stage capital as the primary culprits. NorTech identified a critical lack of appreciation within the region for the power of entrepreneurial activity to shape its economic future. The "serial" entrepreneurs who fuel the cycle of growth in today's economic hot spots were missing – often having departed for the more supportive coasts, with their regional focus and risk-friendly angel capital that can be the lifeblood of an entrepreneurial company.

The solution was to consolidate and sharpen existing efforts to support economic development and add new elements to the mix, with a focus on nurturing the region's entrepreneurs and providing the critical early-stage funding that drives their success. NorTech partnered with the region's leading university, Case Western Reserve University (Case) to merge several entrepreneurial support organizations into JumpStart. Case and NorTech remain the parents of JumpStart.

JumpStart received its initial funding from several sources, including the State of Ohio and the Greater Cleveland Partnership, a consortium of the regional corporate community. Simultaneously, farsighted philanthropic concerns in the region such as the Cleveland and Gund Foundations banded together with other groups to create the Fund for Our Economic Future, a consolidation of 62 regional entities, which created a charitable fund earmarked

for economic development. The Fund examined JumpStart's approach, performed due diligence on similar organizations, and decided to invest substantial resources into making JumpStart a reality.

This partnership between state and federal funding, combined with private financial support from foundations, individuals and corporations, all coordinated on a regional basis, recently was cited as a national example to follow in the National Innovation Initiative Report published in December by the Council on Competitiveness.

With the support of these groups, JumpStart has embarked on its mission: providing focused resources to entrepreneurs and the community in order to grow bright ideas into brilliant companies. To that end, we focus on developing the businesses and ideas that have the potential to grow to $30 to $50 million in annual revenues in five to seven years.

Social networks, deep expertise and risk-friendly capital

JumpStart officially opened for business in January of 2004 as a nonprofit corporation with a staff of former serial entrepreneurs, investment professionals and support staff, all with extensive experience in entrepreneurial endeavors.

We chose to focus in three specific areas:

- Social networks: JumpStart Exchange is our plan for building the social networks, public awareness and regional interest necessary to encourage an entrepreneurial culture in Northeast Ohio. By facilitating events that are primarily social, educational and promotional in nature, we enable entrepreneurs and supporters of entrepreneurship to gather, exchange ideas and make critical connections, developing the human capital necessary to grow the region.
- Investments: JumpStart's Investment Fund can invest an average of $250,000 of early-stage funding into selected portfolio companies. Individual investments range from $50,000 to $900,000, depending on a company's needs and how it progresses through mutually determined milestones.
- Acceleration services: To accelerate growth, each portfolio company also receives intensive mentoring support. A JumpStart Entrepreneur/Executive-in-Residence is assigned to each company to provide guidance and to help ensure that key milestones are met.

The JumpStart process

Our process begins with the solicitation of ideas and business plans from the 15-county area we serve. A formal application process is conducted three times per year. We seek companies with a demonstrated potential to attract follow-on capital, create or support high-paying jobs, and generate revenues that will increase Northeast Ohio's economic wealth.

- After gathering ideas and business plans, we find the brightest ideas through a thorough and intensive due diligence process. We then proceed to a carefully structured, three-tiered investing and business development process:
- Advise: We advise companies by reviewing their business plans, providing constructive input and referring them to resources in our network where they can find valuable help.
- Assist: Half of the companies we advise will, based on the merits of their plan, participate in our Assist Program. We assist companies by helping strengthen their business plans, identify and fill plan gaps, and provide input from industry experts.
- Accelerate: From the pool of companies we assist, we choose 12 each year to accelerate by directly investing in the company and by accompanying that investment with intensive support from our Acceleration Group.

Our goals

Over our first three years of existence, JumpStart expects to advise 225 high-potential companies in Northeast Ohio's 15 counties – significantly increasing opportunities to create economic wealth. We'll be investing $9 million in equity capital in 45 to 60 of those companies over a three-year period, and expect those companies to attract add-on capital from private sources of $27 million over three years and $63 million over five years. We project that these efforts will create or support at least 200 high paying jobs over the next three years.

As 2004 came to a close, JumpStart made its first investments in five carefully selected businesses in several sectors, including technology, advanced manufacturing and service businesses. We anticipate funding six to eight more businesses before the middle of 2005.

In just two application cycles, we've been able to confirm that there is no shortage of bright ideas in Northeast Ohio. We have already received more fundable plans than we have the capacity to fund and are currently evaluating options to address this truly "happy problem." ★★★

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