DEVELOPMENTS New England

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Off the Beaten Path: Economic Development in Isolated Places

By Michael Levin, Northeast Utilities

Of all places, Fargo. If the off-beat movie of the same name brought this North Dakota city some national publicity, the story of its recent economic growth is creating a more lasting image. The city's rejuvenation, marked by both strong employment gains in manufacturing (more than 50 percent between 1992-97) and the development of a thriving high-tech sector is making Fargo a role model for success despite its being isolated from a major metropolitan area. New economy growth has been correlated to being in or connected to larger metros like Boston, Phoenix or Minneapolis.

Fargo has capitalized on lower labor costs to lure businesses, including a major call center, from more costly metros, and nurtured local entrepreneurs to build a high-tech base. Great Plains Software has been a huge success — it was bought by Microsoft in 2000 (which has pledged to keep the company in Fargo) — and has spurred the creation of smaller software and support companies. The area's educational institutions, led by North Dakota State University with 10,000 students (half majoring in science, engineering or business programs), have supplied the skilled workers needed for the expansion.

The results have been newsworthy. In Cass County, where Fargo's 74,000 people comprise 60 percent of the total, population growth was almost 20 percent between 1990-2000, while the U.S. grew 13.1 percent and North Dakota overall increased less than 1 percent. Private employment growth has been even better, with Cass County adding 34 percent more jobs in the private sector vs. 15.7 percent for the U.S.

Keys to High-Tech Success

Growth strategies for most places involve attracting high-tech companies (however these are defined) or developing your own. This is a sensible plan even if your region is not a hotbed of biotechnology, photonics or software development because the techniques that create fertile soil for these businesses are also helpful in growing the economy generally.

A recent examination of high-tech growth strategies around the U.S. by *Governing* magazine summarized the keys to success. Not surprisingly, at the top of the list was building a solid labor pool, primarily by utilizing the pipeline of nearby colleges and universities and industry-education training consortiums to develop the engineers, scientists and technicians that power today's economy. Universities also supply ideas, through research activities, that result in the creation of cutting-edge businesses.

Building a skilled labor force and supporting entrepreneurs through university-based research and locally-available venture capital funds help produce a "critical mass" of high-tech workers and companies to cushion the shocks of periodic layoffs that are characteristic of volatile tech companies. One of these entrepreneurs might also create the

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Guest COLUMN

Bringing Venture Capital to Underserved Areas

By Matt Harris
Village Ventures

As venture capital investing rapidly matures and evolves from being a "cottage industry" into a substantial financial market, its focus remains surprisingly concentrated. Over three quarters of all venture capital dollars in the United States are invested in only 10 geographic markets. This reflects where venture capital firms are located. Two-thirds of all early-stage venture capital is invested in companies that are within an hour's drive from the offices of their investors.

New England mirrors the national trend with Boston dominating the region. The fertile corridors around Routes 128 and 495 rank Boston second among venture capital metro areas with $6.4 billion invested there in 1999. The rest of the region, however, neither generates nor receives nearly that level of investment.

Universities and colleges in and around Boston have contributed significantly to the Massachusetts economy through research and development expenditures. Just more than $1 billion dollars in R&D was invested at 10 schools in Boston in 1998. The Massachusetts

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Institute of Technology received $413 million, enabling the school to maintain its hugely positive impact on the economy of Boston. An MIT study found that companies founded by MIT faculty, students and graduates and located within the Boston metro area report annual revenues exceeding $50 billion. Outside Boston, research universities have raised similar amounts in R&D. However, while the Top 10 New England research universities outside of Boston spent 84 percent of the total spent by Boston universities on R&D, their communities received only 11 percent of the venture capital dollars.

In response to the "dot com" implosion and the public market correction, venture capital investment has contracted. According to a PricewaterhouseCoopers MoneyTree Survey, the amount of venture capital money raised by companies in the first quarter of 2001 — $10.2 billion — is the lowest since the second quarter of 1999 and is 39 percent less than the $16.7 billion raised in the final quarter of 2000. The total number of deals decreased to 705 in the first quarter of this year versus 1,596 in the same prior-year period, a 56 percent drop.

However, history tells us that the downturn does not mean an end to the maturation of the venture capital industry. Continuing technology innovations will stimulate investment. Witness how Apple's IPO triggered a boom in the personal computing market in the early 80's and, later, how Genentech's success triggered the explosion in the biotech market in the late 80's. It the late 1990s, the bang was much bigger. To put it in perspective, in 1991, as the biotech boom was fading, there was $2.6 billion in venture capital invested in the United States. By 2000, that number had skyrocketed to greater than $100 billion!

The "Have Nots"

Despite that growth, most of the country remains excluded and, as reflected in a recent article in *The Wall Street Journal*, politicians in the "have not" states worry that the technological revolution will pass their states by if they remain on the venture capital sidelines. Rightfully, they fear that the economic benefits seen in places like Boston will happen elsewhere if venture capital is not generated in their own states.

Last year Village Ventures, Inc., began its mission to bring early-stage venture capital to promising underserved communities across the country. Village Ventures is a network of early-stage venture funds outside of the core venture capital regions, addressing the imbalance of where these funds are invested and capitalizing on the imbalance that concentration has created. With funding of $100 million from Bain Capital, Highland Capital Partners, Sandler Capital Management and Janus Capital Corporation, Village Ventures has established a national network of early-stage venture capital of 10 funds in nine states and co-invests capital alongside the money these funds raise locally. The Village Ventures network of funds has raised an additional $150 million locally. In New England, Village Ventures operates funds in Massachusetts (three funds), Rhode Island, Maine, New Hampshire and Vermont.

Village Ventures' sole goal is to generate returns for its investors. But a byproduct of its endeavors, just as any other company involved in successful venture capital investing, is economic development. A recent study from National Venture Capital Association found that U.S. venture-backed companies created 4.3 million jobs and generated $736 billion in revenue during 2000. This represented 3.3 percent of the country's total jobs and 7.4 percent of the Gross Domestic Product in 2000. According to the study, venture-backed companies in the Northeast created 680,681 jobs and generated revenues of almost $107 billion.

The risk in venture capital investing, particularly in the early-stages, is considerable and should not be overlooked. However, as the business continues to emerge from its cottage phase into one that is more institutionalized and has better systems for evaluating deals, the odds should improve. If a market has intellectual capital to spawn ideas, then astute venture capitalists can unlock this potential for their investors and the community at large. There is no reason to believe that intellectual capital only resides in large urban areas. ■

Matt Harris is Chief Executive Officer of Village Ventures, Inc. The company is based in Williamstown, Mass.

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Douglas G. Fisher
Manager, Economic & Community Development

Michael B. Levin
Chief Policy Specialist and Editor

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Power POINTS

Personal Income Soars

Massachusetts (9.9%) and New Hampshire (9.5%) had the third and fourth fastest growth in personal income in 2000. Nationally, personal income — income received by all persons from production, from government/business transfer payments and government interest — increased 7.3 percent, the fastest rate since 1989. Growth slowed in the last two quarters of 2000 as the national economy cooled. Earnings growth was led by the finance and government sectors in Massachusetts and the trade sector in New Hampshire. The other New England states had below average growth rates, ranging from 6.1 percent in Maine to 7.1 percent in Rhode Island.

Winners and Losers (1)

Wealth disparities in the region increased during the 1990s, according to recent data from the U.S. Bureau of Economic Analysis. At $40,640, Connecticut led all states in *per capita* personal income in 2000, just as it did in 1990, remaining 37 percent above the national average. Massachusetts per capita income jumped from 19 percent to 28 percent above average during the decade and its national ranking from fourth to second, while in New Hampshire per capita income increased from 6 percent to 12 percent above average and its ranking from 11th to 6th. Maine, Vermont and Rhode Island all lost ground in the 1990s. Per capita income fell from 89 percent to 86 percent of the U.S. average in Maine, 92 percent to 91 percent in Vermont and 103 percent to 100 percent in Rhode Island.

Winners and Losers (2)

New Census data highlight population trends with significant economic ramifications for New England cities. Cities with 100,000 persons or more that grew most during the past decade were generally in the orbit of large metro centers like Boston and New York, and those that fared worst were isolated from these centers. Cities near Boston, such as Manchester, New Hampshire (up 7.5% between 1990-2000) and Providence (up 8%), grew as did Stamford, Connecticut, whose population increased 8.4 percent, helped by its proximity to New York City. Somewhat more remote cities like Hartford and New Haven, Connecticut, and Springfield, Massachusetts, lost population.

Foreign enrollment as a share of total college enrollment in New England was almost 5.5 percent in 2000, up from 3.5 percent in 1989. The direct economic impact of foreign students was estimated at $1.4 billion in 2000.

Property Taxes: New England Favorite

The region continues to lead the nation in its reliance on property taxes to finance local government and education costs. In 1997, the last year with complete data from the Census Bureau, New Hampshire raised 31.9 percent of state and local government revenue from the property tax, by far the highest share in the U.S. (One must note that New Hampshire has no broad-based sales or personal income taxes). Connecticut ranked third, raising 22.2 percent of total revenue from property taxes, with Vermont (21.4%), Maine (20.8%), Rhode Island (20.7%) and Massachusetts (17.3%) all placing in the Top 10. Between 1979-97, property tax reliance continuously decreased in the nation and dropped in Rhode Island, Connecticut and Massachusetts (markedly in the latter two states). Property tax reliance increased in Maine, Vermont and especially New Hampshire.

Sales Taxes: Less Used

Except for Connecticut, New England states trail the nation in relying on sales tax revenue. Only Connecticut (20.8%) raised a greater share of total state/local government revenue from general and selective sales taxes in 1997 than the U.S. average of 16.2 percent. Other states in the region were in the bottom third of sales tax usage, raising from 14.4 percent of total revenue in Rhode Island to only 8.1 percent in New Hampshire. During 1985-97 the sales tax share of total revenue dropped in most states, including all New England states. Maine had the largest decline in sales tax dependence during this 13-year period.

World Students Welcome

Foreign students account for an increasing proportion of enrollment in New England higher education institutions and are making a significant contribution to the region's economic base. According to the New England Board of Higher Education, foreign enrollment as a share of total enrollment in New England was almost 5.5 percent in 2000, up from 3.5 percent in 1989 (the nation's share in 2000 was 3.5 percent). The economic impact of foreign students was estimated at $1.4 billion in 2000 based solely on their average tuition, fees and living costs, not considering any multiplier effect from their presence (e.g., parental visits). Massachusetts institutions host the majority of foreign students and reap the lion's share ($961 million) of the economic benefits.

Higher Education Advantage

New figures from the Census Bureau reinforce the region's claim to having the best educated residents in the country. Four New England states are in the Top 10 in the percent of population 25 years and older graduated from college as of 2000. Massachusetts (32.7%) ranks second, Connecticut, fifth (31.6%), New Hampshire, seventh (30.1%) and Vermont, ninth (28.8%). Rhode Island ranks 17th at 26.4 percent, still above the U.S. average of 25.6 percent. Only Maine, at 24.1%, is below average.

New England's Educational Advantage: If We Don't Use It, Will We Lose It?

By Ross Gittell and Patricia Flynn

Education, and particularly higher education, is a critical mainstay of New England's regional culture and economy. The physical presence of educational institutions in cities and town across the region, the fact that half of the Ivy League institutions call New England home, and the daily news of the outstanding accomplishments of graduates and faculty of New England colleges and universities are constant reminders of the importance of education in the region.

Yet, there is evidence that the New England states do not take full economic advantage of their education edge. There are also indications that while still an education leader, the region is losing some of its prominence to other states. Many of these states, including North Carolina, Colorado and Georgia, recognize the value of investment in higher education and consciously leverage their investments. They are also acting to reinvest some of the gains made in their economies by making long-term strategic investments in public higher education institutions and offering financial support for in-state students.

It is not only New England public officials and economic development professionals who are not taking a strategic approach to higher education positioning and investment. Educational institutions themselves are guilty of not using the economic benefits derived from their presence to build stronger local and regional constituencies of support. While this may at least in part reflect the reluctance of university faculty to taint education and scholarship with immediate economic returns and needs, it also represents a lost opportunity to build support and good will.

There has been increased attention paid to the instrumental aspects of higher education. For example, MIT and Harvard both recently documented the economic benefits derived from their activities and graduates. Most striking and important to our discussion here — even more so than their individual estimates of overall economic contributions larger than the GNP of some nations — was the relatively low percentage of these institutions economic benefits which actually stayed in Massachusetts and New England. In the case of MIT, there were more economic benefits from the institution going to the Golden State (California) than the Bay State.

The New England Higher Education Advantage

Today, New England is home to 268 colleges and approximately 800,000 students. The region has a significantly higher percentage of college graduates — 30 percent of adults compared to 25 percent in the nation — than other regions. It is also a net exporter of higher education. With less than 5 percent of the nation's population, the region's share of total college and university degrees conferred is 6.7 percent, including 8.8 percent of all master's and 8.2 percent of doctoral degrees.

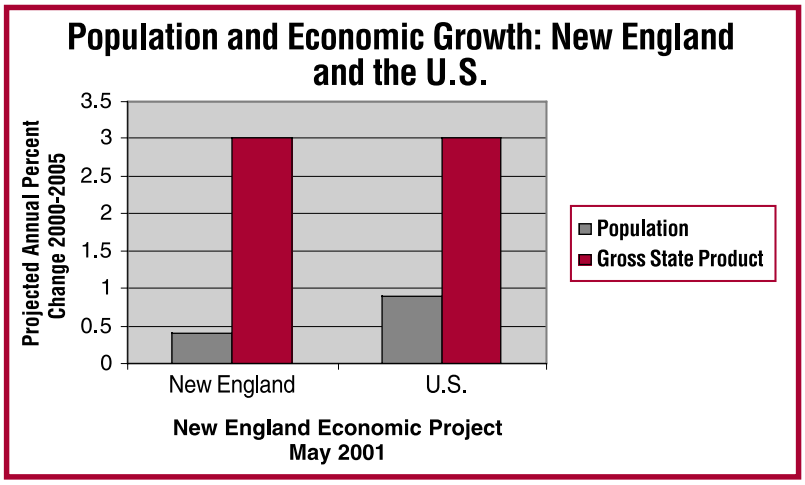
Beyond numbers and percentages, higher education has played an important role in the New England economy. Over the past three decades New England has outpaced the nation in realigning its employment away from traditional manufacturing industries to a high technology and services-based economy. Federal research and development (R&D) funding facilitated this transition by shifting from support of defense-related manufacturing to high-value-added non-manufacturing areas such as health care and biotechnology. Venture capital, too, has fueled innovation and change in the region. The "third leg" and intimately tied to the first two has been New England's colleges and universities bolstering the pool of well-educated highly skilled workers and supplying new ideas for new industries and firms in the region.

For decades this dynamic infrastructure has provided the backbone for New England's competitive advantage in innovation and high technology and helped the region lead the nation in productivity and per capita income growth. The region has a concentration of high-technology employment more than 40 percent higher than the nation and includes states among the leaders in per capita R&D and venture capital funding.

The Concern: Is New England Losing its Higher Education Advantage?

While there are many positive elements of the New England economy and higher education's role in the New England economy, recent trends in population and college degrees awarded could undermine the region's long-term position. Growth projections highlight the role of higher education in the region (see graph, page 5), indicating how population growth in the region will continue to lag well behind the growth in gross product in the region and lag U.S. trends. The most important issue for the regional economy is continued excellence in education to ensure that the region's slow growing population continues to supply the region's firms with an adequate labor force to fuel the high technology and high value-added economy.

Unfortunately, New England has been losing higher education market share. The percent of total U.S. college and university degrees awarded in the region declined from 7.2 to 6.7 percent between 1993 and 1998 (the last year complete data is available) with the number of degrees in New England declining by nearly 1 percent while



increasing by 7 percent nationally. Part of this reflects demographic trends, as the region's growth in college-aged population lags the nation's. However, it also reflects the relatively low public support of higher education in New England, relatively high costs, and increased competition from schools in other regions. (The average cost for in-state tuition and mandatory fees in 2000-01 was 35 percent higher, and state tax fund appropriations for higher education operations was 33 percent lower on an appropriations per $1,000 personal income basis, in the New England region than the U.S. mean.)

A smaller supply of new college graduates in New England reduces the pool of talent from which businesses can recruit. Moreover, degrees in several fields critically linked to high-tech industries have experienced greater than average declines of new graduates in the region. For example, New England's share of engineering and math/computer science degrees awarded in the United States has also fallen over the past two decades.

Even in the current economic slowdown there is evidence of a skills gap. Demand for well-educated workers has been rising, as the fastest-growing segments of the New England economy have high proportions of professional, technical, and managerial occupations. In addition, integration of new technologies and production processes has led to greater use of college graduates across a range of industries, including those that traditionally have employed significant numbers of blue-collar workers.

Looking Ahead

The region's economic development professionals, in concert with higher education institutions, can play a significant role in helping to secure New England's economic position as a leader in high technology, innovation, and change in the 21st Century. To make the partnership work, economic development officials need to more effectively engage higher education institutions (administrators, faculty and students) on economic matters. This includes finding ways to get different higher education institutions to work together and to coordinate efforts to achieve common objectives — not an easy task.

Businesses can work more closely with educational institutions in defining labor needs and designing and implementing programs to meet current and future labor demand. Economic development officials and employers should be active in working with a variety of schools, in a variety of ways and in promoting higher education. This could include participating on advisory boards, providing internships and guest speakers, arranging site visits and advocating for enhanced public and private support to keep higher education an advantage in New England.

Targeted efforts could be focused on improving the retention of high school students in the region to arrest the "brain drain" through state and local scholarship programs. (Currently three of the New England states — Connecticut, Vermont and New Hampshire — rank in the bottom four nationally in the percent of students who stay in state to attend college.) While students are in school, businesses could provide internship opportunities. Then, working together, colleges and employers could communicate information about the rewarding employment opportunities in the region to help retain more college graduates. Businesses could also work with colleges to enhance higher education's role as an important point of entry for skilled foreign labor. Efforts can be bolstered to attract foreign students to the region's schools and keep them in New England after graduation. Firms in the region could also help address workforce needs by working closely with higher education institutions to re-train incumbent workers.

Alliances can be formed to address one or more of the action areas suggested above. Partnerships could be activated in towns and cities, in larger economic corridors within individual states, and those that transverse state boundaries such as the Hartford-Springfield area.

The concentration and quality of higher education institutions provide a competitive advantage to New England. Graduate schools of business, for example, have been successful in jointly sponsoring recruitment efforts in other countries based on the "Come to Business School in Boston" theme. Why not expand this to, "Come to College in New England … Then Stay to Work or Start a Business"? ■

This article was authored by Ross Gittell, Associate Professor and Department Chair, Management Department, Whittemore School of Business & Economics, University of New Hampshire with Patricia Flynn, Dean of Graduate, Executive, and Professional Education and Professor of Economics at Bentley College.

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break-out company that all regions crave, such as Dell in Austin or Great Plains Software in Fargo.

Other keys include enhancing telecommunications and transportation infrastructures, or capitalizing on existing infrastructure laid down by the military, such as Omaha's sophisticated fiber-optic network constructed for the Strategic Air Command or the transformation of the former Pease Air Force Base in New Hampshire into a thriving international transportation and business center.

Specialization is also important since even large metros can't be leaders in all economic sectors. Thus Boston/Cambridge has become a biotech center, and more traditionally, a center for mutual investment funds. Developing a niche usually involves building on a natural asset, such as Boston's great research universities, but can also mean broadening typical definitions of high-tech to capitalize on strengths already in your region. Governing uses the example of Fresno, California, where a new set of companies specializing in water-management has grown up to support Fresno's powerful agricultural sector.

New England Experience

The national economic boom was so long-lasting that it lifted many traditionally slow growing places. But while some relatively isolated New England areas, like Burlington, Vermont, thrived, others, like Pittsfield, Massachusetts, did not share in the rapid growth of the past decade. Based on national examples one can speculate on the reasons for divergent outcomes in this region.

Berkshire County, with Pittsfield at its center, had a population decline of 3.2 percent between 1990-2000, while Massachusetts grew 5.5 percent and the United States, 13.1 percent. Private employment contracted 4.5 percent between 1990-98 in Berkshire County, contrasted to 5.5 percent growth in Massachusetts and 15.7 percent more new jobs nationally. Berkshire County underperformed both the state and the nation.

Chittenden County, which includes Burlington, has fared far better. Its population increased more than 11 percent and jobs grew 14.8 percent, a better result than Vermont, which increased 8.2 percent in population and 11.1 percent in jobs over the decade. Thus Chittenden County outperformed the state and, in fact, was the driver of the Vermont economy. Interesting to note is that both Pittsfield and Burlington (with, respectively, 46,000 and 39,000 residents), lost population during the 1990s, demonstrating the continuing suburbanization of America occurring in both growing and shrinking counties.

So what accounts for the striking contrast? The Burlington area has been a focus of state development efforts, while Pittsfield is an also-ran to the Boston economic powerhouse. This fact accounts for some of the difference in performance in the 1990s, but not all. Burlington has skillfully made a business asset out of Vermont's quality of life reputation. It has the benefits of a rural area (less traffic and crime, slower pace) but with all of the urban cultural and recreational amenities in combination with a prime location on Lake Champlain. Distant from major metros, Burlington nonetheless has a solid transportation nexus, with Interstate-89, Amtrak service and a small hub airport. Home to the University of Vermont and four other colleges, the region is an important educational center. The upshot has been a flourishing economy with a 16 percent increase in manufacturing employment and more than 50 percent in services in the 1990s.

Pittsfield represents the other end of the spectrum. Demoralized by the gradual loss from 1970-87 of 10,000 manufacturing jobs at its largest employer (General Electric), the region has never fully recovered. Add poor interstate access, lack of an airport (the nearest airport is in Albany, New York, some 45 miles away), a weak telecommunications network and the absence of major higher educational institutions (only Berkshire Community College is nearby), and the Pittsfield metro faces formidable obstacles to growth. Known primarily for its wonderful vacation attractions like Tanglewood, the summer home of the Boston Symphony Orchestra, the region's business and community leaders are working hard to diversify and strengthen its economic base. Two key initiatives are the development of an advanced telecommunications infrastructure in the county, through "Berkshire Connect," and reviving the environmentally contaminated General Electric site.

One takeaway is that small, isolated cities can prosper using different development strategies. They can build a critical mass of employment/firms in one industry, like Fargo in software development. Or they can capitalize on their position as retail/health/educational center of a region (like Burlington for central Vermont or Bangor for eastern Maine). Lacking the prospect of becoming a destination, it is probably wise for cities being bypassed by the new economy to improve their linkages to larger metro regions through regional alliances and highly efficient transportation and telecommunications networks.

Stimulating Growth in Out-Of-The-Way Places

	Population 2000	Pop. Change 1990-2000	Population Density persons/ sq. mile	Median Household Money Income, 1997	Poverty Rate 1997	Private, NonFarm Employment Change 1990-98	Largest City
Berkshire County, MA	134,953	-3.2%	145.0	$ 37,284	11.3%	-4.5%	Pittsfield
Massachusetts	6,349,097	5.5	809.8	43,015	10.7	5.5	Boston
Chittenden County, VT	146,571	11.2	271.9	46,747	7.1	14.8	Burlington
Vermont	608,827	8.2	65.8	35,210	9.7	11.1	Burlington
Cass County, ND	123,138	19.7	69.8	38,871	9.0	34.1	Fargo
North Dakota	642,200	0.5	9.3	31,764	12.5	26.8	Fargo
United States	281,421,906	13.1	79.6	37,005	13.3	15.7	New York

Source: Census Bureau.

SOURCES:

- *Governing*, May 2001; U.S. Census Bureau; CUED, "Economic Developments," February 15 and February 28, 2001 issues; Berkshire Council for Growth. From web; Maine Department of Labor.

Regional Economic TRENDS

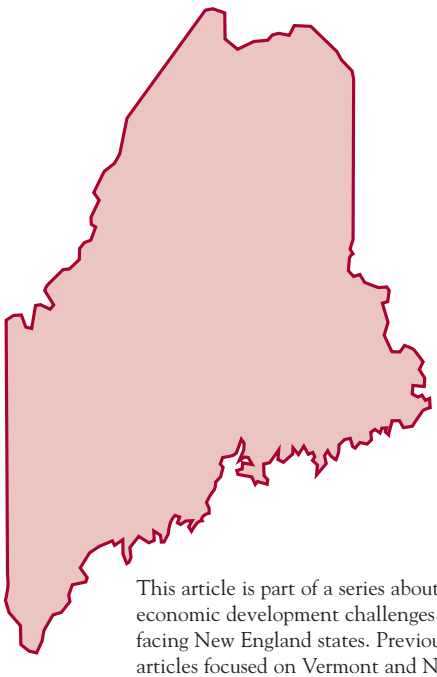
Maine's Quiet Growth Strategy

by Joel Russ, President
Maine Science and Technology Foundation

A quiet revolution has occurred in Maine's economic growth strategy. After years of under-investing in research and development, the state has seriously focused in the last several years on increasing its investments in R&D.

If a company increased its investment in a state by 1,600 percent, headlines would hail the activity. But Maine's 1,600 percent increase in R&D funding — from $2.5 million a year in 1995 to $41 million in FY 2001 — has barely caused a ripple of notice outside the state.

That's starting to change. The state's new strategic science and technology action plan, coupled with a rigorous five-year evaluation of its investments in R&D, are winning notice from other states.



This article is part of a series about economic development challenges facing New England states. Previous articles focused on Vermont and New Hampshire.

Maine's investments are balanced among educational, research and business activities. They focus on emerging technology sectors in which Maine may have a competitive advantage and around which we can build successful industry clusters.

This portfolio of investments includes:

- Millions of dollars in new funding to build the R&D capacity of the state's primary research university;
- Increased funding for a small business enterprise growth fund;
- The creation of a network of applied technology development centers to support businesses in targeted technology sectors;
- The creation of the Maine Technology Institute, which makes direct public investments in businesses with promising new technologies at the pre-commercialization stage;
- The creation of a Patent Assistance Program at the University of Maine School of Law.

R&D Investments Pay Off

Maine's public support for its science and technology enterprise is beginning to show signs of paying off. A recent analysis by the State Science and Technology Institute of federal obligations for science and engineering research in all 50 states revealed that Maine had the greatest percentage increase in federal research funding between 1992 and 1999 of any New England state. In fact, Maine had the sixth largest percentage increase among all states.

In part, Maine's large proportional gain in federal funding can be explained by the fact that the state traditionally has received very little federal funding for R&D compared to most states. It's easier to show a large proportional increase when the absolute dollar amounts are still relatively small. Nonetheless, the increase is real and suggests that Maine's public investments are having the desired effect of enhancing its research capacity.

Public investments in R&D have enjoyed a high level of public support in Maine, which was reflected by an overwhelming vote of support by 64 percent of Maine voters for a bond issue to build facilities and purchase equipment at Maine's research university and not-for-profit research laboratories.

State lawmakers have recognized, however, that continued public support requires public accountability. It is essential that Maine evaluate the progress and impact of its substantial investments, so that public officials can answer the question: How are we doing?

It's a lesson that policymakers in every state should take seriously.

Why does Maine believe evaluation is so important?

Politically, it is the wise thing to do. If investments in R&D are having a positive impact on the state's economic growth, it makes sense to document those results, so that the case for continued investments remains strong.

Second, evaluation helps identify areas where improvements are needed and where the state may have competitive strengths.

Third, evaluation keeps the state on course and focused on a long-term strategy. And a long-term mindset is needed, because investments in R&D do not bring returns overnight. Building a state's research capacity, nurturing the commercialization of technologies and supporting entrepreneurial initiatives require patience every step of the way.

We know that scientific research lies behind our nation's economic success, but we also know that prosperity does not occur quickly. A sustained commitment to supporting the science and technology enterprise from both policymakers and the public is a key to long-term economic growth.

More Challenges Ahead

So what challenges does Maine continue to face? Clearly, the need for an

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educated and technically skilled workforce remains a paramount concern. Maine's workforce traditionally has included a smaller proportion of college graduates than any other New England state. In a knowledge-based economy, it becomes critically important for the state to increase the number of college graduates, with a particular emphasis on expanding Maine's science and engineering graduates.

Secondly, the state must continue to strengthen its institutional research capabilities. One means of achieving this is by fostering an alliance between Maine' s universities and its not-for-profit research laboratories and private industry. It's a novel concept that is being implemented this year.

Maine has never had a tier one research university, but it does have a vibrant nonprofit research sector. By bringing the nonprofit sector together to formally collaborate with the universities — and by using information technologies to link the institutions — Maine is in the process of raising its research capabilities to a new level.

High-speed access to the Internet and information technologies reflects an area's ability to participate in the new economy. The third challenge that Maine faces is to ensure that all regions of the state are fully connected. In Maine, like most states, further action is needed to ensure that rural communities have adequate access to broad bandwidth at an affordable price. Diminishing the geographic digital divide must be a high state priority.

These three challenges are among the major issues outlined in the *State's Science and Technology Action Plan 2001*, which was recently issued by the Maine Science and Technology Foundation. The plan offers a broad-based strategy comprised of 49 specific recommendations for achieving success in an innovation economy.

Many leading institutions and policymakers are coming to a consensus about what is needed to continue strengthening Maine's economy. There is a common recognition that Maine must continue to invest in its research and development capacity. It's a quiet revolution, but already the results are noticeable. Working together, businesses, academia, researchers and the government are building the foundation for an economy that can compete in the Information Age. ■