

# Vermont TECHNOLOGY Council

## Vermont Science & Technology Plan

### **Our Vision for Vermont**

Within ten years, Vermont is nationally recognized for its ability to create, grow, and retain innovation-focused<sup>1</sup>, technology-enabled businesses. Vermont companies are able to transform scientific and technological advances into new products and services, and are competitive in the global marketplace.

### **Executive Summary**

More than ever, scientific discovery and the technological innovations derived from basic research serve as a foundation for dynamic state, regional, and national economies. Accordingly, the Vermont Technology Council recognizes that science and technology strategies can no longer be left on the periphery of economic development planning. Rather, the role of science, technology, engineering, and advanced manufacturing<sup>2</sup> and how they intersect with education, training and workforce development, venture capital, healthcare, and physical infrastructure must be a cornerstone of the state's long-term strategy for a vibrant, competitive, and diversified economy.

---

<sup>1</sup> According to the 2006 National Science Foundation definition, "innovation" refers to "The transformation of scientific and technological advances into new products, processes, systems, and services."

<sup>2</sup> According to the U.S. Dept. of Labor, "advanced manufacturing" is defined as "The accelerated use of high-tech processes in the manufacturing plant. The emphasis is on high-tech processes used in production, rather than the output of high-tech products."

Vermont stands at a crossroads and its business, government, and academic leaders, together with the science and technology community, are in a unique position to influence the economic future of the state. Steps taken now to enhance the state's infrastructure for research and technology, and address the changing education, skills, and training needs of its workforce, will have profound implications for the state's competitive position for decades to come. Vermont must continue to strongly support the 21<sup>st</sup> century transformation of its manufacturing sector, while leveraging its significant assets in science and technology. The state's economic future will depend on how it positions itself to continue to build a knowledge-based, innovation-driven economy.

Recent initiatives around the state, such as the Vermont Center for Emerging Technologies, the Bennington Microtechnology Center, and the Vermont Advanced Computing Center, bode well for Vermont's future, but the state must continue to position itself to take advantage of new opportunities. Breakthroughs in biomedical research, environmental technologies, and information technology, combined with emerging interdisciplinary sectors such as complex systems<sup>3</sup>, sensors, and advanced materials, are attracting significant amounts of research funding. Ongoing research infrastructure programs such as the Vermont Experimental Program to Stimulate Competitive Research (EPSCoR) and the Vermont Genetics Network, coupled with the recent surge in research grants received by the University of Vermont have, in turn, created an environment conducive to the commercialization of new products and services and the development of new, high-technology companies.

---

<sup>3</sup> In the scientific community, a "complex system" is a system whose properties are not fully explained by an understanding of its component parts. Complex systems consist of a large number of mutually interacting and interwoven parts, entities or agents.

These promising advances are taking place against a fragile economic landscape. Vermont has continually struggled to create and retain high-paying jobs for its citizens. Although, in 2005, Vermont had the highest rate of entrepreneurial activity in the nation (550 new entrepreneurs per 100,000 adults)<sup>4</sup>, this high rate of entrepreneurial activity has not translated into significant new job creation. According to its most recent Development Report Card for the States, the Corporation for Enterprise Development finds Vermont to be “the worst state in the nation at creating jobs through new companies.” This economic fragility is also represented by our state’s chronically low per capita income, which for over a decade has remained below 80% of the New England average<sup>5</sup>.

The Vermont Technology Council believes that Vermont’s focus must be on growing its own technology- and knowledge-based firms. We must leverage every available asset, including our high quality of life, our climate for entrepreneurship, access to a highly skilled, highly motivated workforce, and our extensive knowledge base. The 2006 Vermont Science & Technology Plan builds on our state’s competitive advantages and suggests several strategies for turning science and engineering “know how” into new products and services. These strategies will foster the development and commercialization of new products, better leverage the state’s research and development resources, create jobs, and ultimately enhance the region’s competitive edge and further diversify its industrial base in an increasingly competitive global economy. This Plan takes into account recommendations from a broad cross-section of stakeholders in Vermont’s technology- and knowledge-based industries and higher education communities, and is intended to provide state government,

economic development organizations, and business and academic leaders with a framework for making informed decisions to maintain a vibrant and dynamic state economy.

### Strategy One – Solid Research Infrastructure: Support and Expand Vermont’s Research and Development Infrastructure

1.1: Firmly establish a culture of research and development in Vermont’s universities and colleges through continued support for research infrastructure programs such as Vermont EPSCoR and the Vermont Genetics Network.

1.2: Focus our research and development resources on several key science and technology areas: environmental science and sustainable technologies, biological science and technology, and computational science and information technology.

1.3: Under the direction of Vermont EPSCoR, establish statewide high-end computing capabilities and complex systems modeling programs to support and enhance the research and development focus areas.

1.4: Establish the Vermont Eminent Scholars Program, which would provide funds for recruiting renowned scientists to Vermont to lead extraordinary programs of research and development with high potential economic development impact for the state.

1.5: Sustain and promote the Vermont Academy of Science & Engineering in order to bring a deeper understanding of the benefits of science and technology for Vermont to its citizens, and to persuade more young Vermonters to choose scientific or technical careers.

---

<sup>4</sup> Robert W. Fairlie, Kauffman Index of Entrepreneurial Activity State Report, 2005.

<sup>5</sup> Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce.

Strategy Two – Strong R&D Ties Between Industry and Academia: Foster Collaborative Research Projects Between Vermont’s Academic Scientists and the Private Sector

2.1: Increase technology transfer activity at the University of Vermont and expand university - industry collaborations by increasing university outreach to industry in Vermont to increase awareness of the research capabilities and promising technologies within our academic laboratories.

2.2: Establish the Vermont Commercialization Fund, which would provide “pre-seed” development funds for promising technologies resulting from research at the University of Vermont and our other higher education institutions. Funds would be used primarily within the academic institutions to support applied research, market assessments, and prototype development, if appropriate.

2.3: Establish a pilot program to provide research and development vouchers to help Vermont’s small and medium technology-based businesses take better advantage of the resources found in our academic research facilities.

2.4: Under the direction of Vermont EPSCoR and the Vermont Genetics Network, develop and maintain an online science and technology directory for Vermont, as well as a database of instrumentation and related equipment within our universities and colleges. These tools will help foster collaboration between Vermont’s academic and private sectors.

2.5: Establish annual meetings and other regular networking events to promote interactions between higher education and the private sector.

Strategy Three – Entrepreneurship & Capital: Foster Entrepreneurship and Attract Investment

3.1: Provide entrepreneurship and research commercialization training to university faculty in order to increase academic contributions to the innovation pipeline in Vermont for technology business formation and growth.

3.2: Promote Vermont’s academic entrepreneurship programs through the state’s economic development organizations to create an environment where technology entrepreneurs can easily find business expertise and training opportunities.

3.3: Build strategic alliances between the Vermont Center for Emerging Technologies and other incubator programs throughout Vermont, New England, and Canada to expand opportunities for Vermont companies to access investment capital resources, as well as specialty laboratory facilities and equipment.

3.4: Establish a high-profile and prestigious Governor’s Entrepreneur in Residence program at the Vermont Center for Emerging Technologies. This program would provide a stipend to a seasoned entrepreneur who commits to work on-site with faculty, business/MBA students, existing Vermont firms, and start-up companies to identify commercially viable opportunities.

3.5: Provide ongoing support to the Vermont Small Business Development Center for its SBIR (Small Business Innovation Research) and STTR (Small Business Technology Transfer) training programs and proposal writing assistance to increase the competitiveness of Vermont companies in obtaining federal SBIR / STTR grants.

3.6: Expand and promote Vermont EPSCoR's highly successful SBIR "Phase 0" program, which funds pre-SBIR / STTR projects that show promise for federal grants, and create a partner "Double Zero" program to help defray some of the costs incurred in developing a SBIR or STTR proposal.

3.7: Promote and expand Vermont's existing technology business associations, create new associations as needed, and form strategic alliances between these organizations and the state's regional development corporations to promote the growth of these sectors.

#### Strategy Four – Talent: Develop and Retain a World-Class Technology Workforce

4.1: Make higher education more affordable for Vermonters by developing a long-term plan to dramatically improve Vermont's state ranking for higher education funding, which is presently 49<sup>th</sup> in the nation.

4.2: Provide increased support for science and engineering education, expand Vermont's science and engineering graduate programs, and promote hands-on research opportunities for students through programs such as Vermont EPSCoR's summer internship initiative.

4.3: Create a central clearinghouse for internship opportunities with Vermont companies.

4.4: Support further development of distance-learning technologies for the delivery of high-quality workforce training in order to expand access to higher education across the state and promote efficiency through sharing of courses, faculty, and other resources.

4.5: Maintain Vermont's strongly performing K-12 science and mathematics education system by providing increased professional development opportunities for science and mathematics teachers.

4.6: Increase the percentage of the Vermont workforce participating in training programs and life-long learning.

#### Strategy Five – Advanced Manufacturing: Maximize Efficiencies, Support 21<sup>st</sup> Century Transformation, and Expand Opportunities for Vermont Manufacturers

5.1: Promote and ensure continued support for the Vermont Manufacturing Extension Center (VMEC), an affiliate of the National Institute of Standards and Technology's Hollings Manufacturing Extension Partnership, which has provided valuable assistance to over 800 Vermont companies since 1996, and has leveraged millions of dollars of federal, state, and private funds from fees-for-service.

5.2: Encourage training and education programs, practices, and processes necessary to ensure a sufficient supply of new and incumbent workers prepared to meet the changing needs of Vermont's manufacturers.

5.3: Using experienced resources such as VMEC, encourage, support, and grow the skillful adoption and successful implementation of continuous improvement methodologies (such as Lean Manufacturing<sup>6</sup>), market-driven knowledge, a culture of innovation, and the exploitation of new technologies to meet the needs of Vermont manufacturers, their supply chains, and their marketplaces.

5.4: Encourage and promote training, knowledge sharing, and technical assistance to Vermont manufacturers to grow global export opportunities.

---

<sup>6</sup> "Lean Manufacturing" refers to a philosophy of production that emphasizes the minimization of the amount of all the resources (including time) used in the various activities of the enterprise. It contains a set of principles and practices to reduce cost through the removal of waste and through the simplification of all manufacturing and support processes.

## **Vermont Technology Council Board of Directors**

Mr. Steven Arms, MicroStrain, Inc.  
Dr. Frances Carr, University of Vermont  
Mr. Frank Cioffi (Chair), GBIC  
Dr. Robert Clarke, Vermont State Colleges  
Dr. John Evans, University of Vermont  
Dr. David Finney, Champlain College  
Dr. Daniel Fogel, University of Vermont  
Dr. Domenico Grasso, University of Vermont  
Mr. Luther F. Hackett, Hackett, Valine & MacDonald, Inc.  
Dr. Paul Hale, Vermont Technology Council  
Dr. David Japikse, Concepts NREC, Inc.  
Mr. Charles Kireker, Freshtracks Capital  
Dr. James Losse, General Dynamics Armament and Technical Products  
Ms. Daria Mason (Vice-Chair), Central Vermont Medical Center  
Mr. Peter Murray, Geotech Environmental Equipment, Inc.  
Mr. John O'Kane, IBM Corporation  
Mr. Michael Quinn (Secretary/Treasurer), Vermont Dept. of Economic Development  
Dr. Richard Schneider, Norwich University  
Mr. William Shouldice IV, Vermont Country Store  
Mr. Francis Voigt, New England Culinary Institute

## **Ex Officio Board Members**

Dr. Alan Betts, Vermont Academy of Science & Engineering  
Mr. David Binch, Vermont Information Technology Center  
Mr. Daniel Hecht, Vermont Environmental Consortium  
Dr. Judith Van Houten, Vermont EPSCoR  
Mr. Bob Zider, Vermont Manufacturing Extension Center (VMEC)

*August, 2006*