Vermont EPSCoR
Experimental Program to Stimulate Competitive Research

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Upcoming Events

National NSF EPSCoR Annual Meeting
Lexington, Kentucky
November 6-10, 2006

Annual VT EPSCoR State Meeting
Date & Time TBA

SBIR Phase (0) Funding Opportunity
RFPs available January 2007

Inside this Issue:

New Vermont State Science & Technology Executive Summary Approved

The Vermont Technology Council has approved a new Vermont Science & Technology Executive Summary that outlines its vision for the state over the next ten years. The Summary is intended to inform and advise state government on suggested corridors for science and technology advancements based on the state's current strengths and projected growth areas. These advancements are designed to have measurable impacts on economic development and opportunity in Vermont through job creation, broadening of the private sector base, and strengthening research and development efforts and competitiveness in higher education.

The Summary was developed using input from various stakeholders from the private sector, state government, and higher education during a series of publicly held meetings. The Vermont Program to Stimulate Competitive Research (VT EPSCoR) coordinated the meetings which were facilitated by Technology Council Executive Director, Dr. Paul Hale and VT State EPSCoR Director, Dr. Judith Van Houten.

Strategies for Success

The new Summary lists five strategies for success:

Strategy One – Solid Research Infrastructure: Support and Expand Vermont's Research and Development Infrastructure.

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

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

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

Strategy Five – Advanced Manufacturing: Maximize Efficiencies, Support 21st Century Transformation, and Expand Opportunities for Vermont Manufacturers.

All five strategies list mechanisms that currently exist or could be developed in order to attain each objective over the next ten years. Several organizations and programs such as the Vermont Experimental Program to Stimulate Competitive

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Vermont EPSCoR Expands Leadership Team with New Associate Directors

University of Vermont faculty members, Drs. Kelvin Chu (Physics) and James Iatridis (Mechanical Engineering) have joined the VT EPSCoR leadership team as Associate Directors with State Director (PD), Dr. Judith Van Houten. The VT EPSCoR staff also includes Project Administrator (PA) Lillian Gamache; Information Technologist Benjamin Ware and Business Manager Troy Krahl.

Dr. Van Houten explained that "The reasons to expand the number of Associate Project Directors to two are first to provide leadership with a depth of expertise and second to develop new leadership for the future of VT EPSCoR and for the future of science and engineering efforts in the State. Both Associate PDs have worked together effectively to help develop the recently submitted Research Infrastructure Improvement (RII) proposal under consideration at the National Science Foundation (NSF). I am delighted that both Kelvin and James have agreed to join us as we move into the next phase of EPSCoR in Vermont. We are fortunate to have their expertise and leadership skills at this transformative time in science and technology development in the state."


Dr. Kelvin Chu

Associate PD, **Dr. Kelvin Chu**, is a leader on the UVM campus and is well known for his

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innovative courses. Dr. Chu is looking forward to his new role with VT EPSCoR: "When I started at UVM, Vermont EPSCoR provided me and three other new X-ray crystallographers with important equipment for the UVM Center for X-ray Crystallography. A large DOE EPSCoR grant later provided critical support for Structural Biology and Computational Biology research in Vermont. This funding was essential in helping many of us start our research and get our own grants. I'm really enthusiastic to be working for Vermont EPSCoR under the leadership of Program Director Dr. Judith VanHouten. I think that the direction that she has chosen will have a tremendous impact on research in the state. It's very exciting to be working for a program that plays a key role in success for so many scientists and engineers in Vermont."

Chu received his Sc.B. degree in Physics from Brown University and M.S. and Ph.D. in Physics from the University of Illinois in Urbana-Champaign. Beginning in 1995, he was a Director's Postdoctoral Fellow in the Biophysics Group (P-21) at Los Alamos National Lab. Chu joined the faculty of the Department of Physics at University of Vermont in 1998. He is also affiliated with the Center for X-ray Crystallography within the Structural Biology and Bioinformatics effort at UVM as well as the Program in Cell and Molecular Biology. Chu's research interests include the functional and structural consequences of protein dynamics. The projects in his lab are aimed at achieving a quantitative understanding of biological function and enzyme mechanism. Recent research projects include: Structural biology and kinetic crystallography, Heme proteins (myoglobin, hemoglobin, *cytochrome* P450cam) and Energy transduction proteins (photosynthetic reaction centers from *R. sphaeroides*). For a full description of his research areas, please visit his web site at http://www.uvm.edu/~kchu/.

Associate PD, **Dr. James Iatridis**, a bioengineer, has taken the lead with the development of the VT EPSCoR Polymers & Composites Group. "Six years ago, the VT EPSCoR program provided resources that were integral to my recruitment at UVM and eventual success in attaining federal funding for my research program and tenure", said Dr. Iatridis. "I am delighted to now be a part of the leadership team and believe VT EPSCoR is vital for infrastructure development in the state of Vermont. I am particularly enthusiastic about VT EPSCoR's newly proposed innovation fund awards as well as its SBIR Phase 0 program with demonstrated success translating basic research into the industrial sector towards economic growth in Vermont."


Dr. James Iatridis

Iatridis received his Ph.D. in 1996 and his M.S. in 1992 from ColumbiaUniversity in Mechanical Engineering with a specialization in biomechanics; in 1990 he received a B.S. in Mechanical Engineering from Columbia and a B.A. in Physics, Cum Laude, from Franklin and Marshall College. He became Associate Professor of Mechanical Engineering in 2005 at the University of Vermont, and holds a secondary appointment in the Department of Orthopedics and Rehabilitation where he was previously a Post Doctoral Fellow from 1996 - 1999. His research is in spine bioengineering with a focus on understanding the mechanical, chemical and electrical signals responsible for degeneration and repair in the intervertebral disc.

For a full description of his research areas please visit http://www.cems.uvm.edu/~iatridis/.

Dr. Judith Van Houten, became the VT EPSCoR Program Director on July 1, 2005. Dr. Van Houten has a long record of administration and mentoring, including service as Director of the Cell and Molecular Biology Graduate Program for 6 years, Associate Dean of the College of Arts and Sciences for 5 years, Chair of Biology from 1995-2005.


Dr. Judith Van Houten

Perhaps most importantly, she has served as Associate PD of VT EPSCoR from 1996 – 2005, and as Associate Director for research 1991 - 1996. Van Houten has a record of extramural funding from NIH and NSF. She has received a 7-year Pepper award from NIDCD and the Manheimer Award for career achievements in Chemosensory Sciences. The University of Vermont has recognized her as a University Scholar and the George H. Perkins Professor. She is well regarded in her field, has been elected to offices, including President, in the Association for Chemoreception Sciences, and serves on editorial boards. She is familiar with federal funding mechanisms at NSF and NIH, has served for 6 years on the CMS study section (2 years as chair) and is currently a member of CMBK study section. Dr. Van Houten's style of management is inclusive. Recently she received the Jackie M. Gribbons Leadership award from the Vermont Women in Higher Education. A full description of Dr. Van Houten's research areas may be found at http://www.uvm.edu/%7Ebiology/Faculty/VanHouten/VanHouten.html.

The Vermont Experimental Program to Stimulate Competitive Research (VT EPSCoR) is funded by the National Science Foundation (NSF) and located at the University of Vermont. VT EPSCoR contributes to building an infrastructure which will improve the research competitiveness of Vermont scientists and engineers as well as bring NSF resources to the service of the broader community. Regular competitive funding opportunities for faculty at UVM and baccalaureate institutions in Vermont as well as high school outreach and private businesses are posted on the web. For further information, please visit www.uvm.edu/EPSCoR. ■

Vermont Science & Technology Executive Summary

As approved by the Vermont Technology Council:

Our Vision for Vermont

Within ten years, Vermont is nationally recognized for its ability to create, grow, and retain innovation-focused[1], 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[2] 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.

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 21st 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[3], 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.

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)[4], 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[5].

The Vermont Technology Council believes that Vermont's focus must be on growing its own technology- and knowledgebased 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.

Vermont TECHNOLOGY Council

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.

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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.

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 49th 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 21st 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

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Vermont EPSCoR Notables

New Information Technologist Joins VT EPSCoR

Mr. Benjamin Ware recently joined the VT EPSCoR administrative team as the new Information Technologist. Ben returned to Vermont after receiving his Bachelor of Science degree in Computer Science from the University of Tennessee, Knoxvlle in 2005. He can be reached at bware@uvm.edu.

Dr. Judith Van Houten Receives Vermont Higher Education Leadership Award

Dr. Judith Van Houten, was recently honored as the recipient of the 2006 Jackie M. Gribbons Leadership Award by the Office of Vermont Women in Higher Education (VWHE) at an award reception in Fairlee, Vermont on October 13, 2006.

The Jackie M. Gribbons Leadership Award is presented to a woman who has demonstrated leadership ability, served as a model and mentor, developed innovative programs, and contributed significantly to the institution and profession. ■

Shown Left to right: Ms. Julie Paris (VGN Administrative Assistant), Drs. Janet Murray (VGN Outreach Coordinator), Judith Van Houten, Allison Brody (UVM Biology) at the 2006 VWHE Awards Ceremony in Fairlee, Vermont, October 13, 2006.

Science & Technology Executive Summary *continued from page 1*

Research (VT EPSCoR), the Vermont Genetics Program (VGN), the Vermont Academy of Science and Engineering (VASE), the Vermont Center for Emerging Technologies (VCET), the Small Business Development Center (SBDC), Small Business Innovation Research (SBIR), the Vermont Manufacturing Extension Center (VMEC), are listed as being instrumental partners in the implementation of the Plan.

Vermont EPSCoR is cited explicitly as having a key role in driving development in the following areas:

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.*
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.*

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.*

The full S&T Plan will soon be presented to the Governor. For more information regarding the S&T Plan or the Vermont Technology Council, contact Dr. Paul Hale at Paul.Hale@uvm.edu. ■

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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[6]), 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.

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

[1] 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."
[2] 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."
[3] 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.
[4] Robert W. Fairlie, Kauffman Index of Entrepreneurial Activity State Report, 2005.
[5] Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce.
[6] "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. ■