Transdisciplinary Research Initiative

Public Health and Health Policy Proposal

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Executive Summary

Public health is a product of complex interactions among individual behaviors, environment, built infrastructure, social institutions, and cultural conventions. The University of Vermont (UVM) currently has substantial research and education programs devoted to studying the various components of public health encompassing all of these dimensions. However, UVM lacks the capacity at this time to integrate existing strengths within disciplines to develop comprehensive, multi-perspective solutions to pressing public health problems. This proposal recommends a unique structure to leverage campus-wide assets in public health research and education with investments in transdisciplinary capacity building, including the development of faculty capacity, new collaborations in research initiatives, and degree programs in public health.

Proposed Transdisciplinary Spire of Excellence

A New Spire of Excellence

We propose the development of a Transdisciplinary Institute for Public Health (TIPH) to leverage and bridge existing strengths in health, social, behavioral, and environmental research and education at UVM. The Institute would be built around (1) a faculty of public health drawing on personnel from all UVM Colleges and Schools, (2) the development of research collaborations (called “collaboratories”) that coalesce our current and emerging strengths around critical public health issues, and (3) new public health education programs that combine a transdisciplinary orientation to problem-solving with established tracks of disciplinary expertise. UVM is uniquely positioned to establish such an Institute as the only university in the state, as host to an academic health center that cares for the majority of Vermont’s patients, and as a partner of state government and community organizations. Additionally, the State of Vermont is distinguished by its small size, rural character, citizen engagement, and forward-thinking health care reform. These characteristics foster UVM’s ability to create a living...
laboratory for public health research and education. The Institute will build upon these assets, as well as John Dewey’s legacy of a community-engagement approach to research and education and UVM’s heritage as a land grant university.

The Transdisciplinary Institute for Public Health  The Institute will bring together a critical mass in public health research and education at UVM by combining recent investment and existing strengths in biomedical and ecological informatics (collectively referred to hereon as “informatics”), translational health research, policy analysis, environmental science, exercise science, biomedical research capacity, and untapped campus-wide resources in the natural, health and social sciences. Initially, the proposed Institute will be housed in the Center for Clinical and Translational Science (CCTS), building on an interconnected approach to population health research, health care delivery and an infrastructure that is purposively collaborative across colleges and schools. This proposed Institute will add the key elements of a transdisciplinary faculty, campus-wide research collaboratories, and new education initiatives in public health to take the Institute and UVM to national and international prominence.

Transdisciplinary Faculty in Public Health. Many UVM faculty already work in fields that touch public health. These include individuals in the College of Medicine (COM) and the College of Nursing and Health Sciences (CNHS), as well as many social and natural science disciplines in the College of Arts and Sciences (CAS), Rubenstein School of Environment Natural Resources (RSENR), College of Agriculture and Life Sciences (CALS), College of Education and Social Services (CESS), College of Engineering and Mathematical Sciences (CEMS), School of Business Administration (BSAD), Graduate College (GC), and many other units across campus. Imagine an Institute that investigates trends in obesity and diabetes by bringing together scientists working on genetics and behavior, health care practitioners working daily with patients, social scientists working on the cultural and institutional dimensions of
individual choice, statisticians and computer scientists analyzing population-level datasets, and geographic information systems (GIS) analysts investigating spatial patterns of built infrastructure and natural capital. Imagine a team of behavioral health and rehabilitation professionals, using state-of-the-art health promotion, prevention and intervention models, partnering with the Veterans Affairs, Department of Justice, and community-based support services to help pre- and post-deployment veterans and their families promote, maintain and restore their health. Imagine public health professionals, animal scientists, medical doctors, wildlife biologists, and environmental chemists working together on the frontlines of the next infectious disease epidemic. Such collaborations are possible through the Institute.

Research Collaboratories. Building on UVM’s diverse faculty strengths, the Institute will foster transdisciplinary public health research through campus-wide “collaboratories,” – constellations of faculty and students working in virtual laboratories to blend the techniques of multiple disciplines to common problems. Collaboratories will encourage the participation of a full range of stakeholders to tackle public health research through appointing research fellows; facilitating workshops, conferences and lectureships; joining diverse datasets into informatics collectives; targeting new funding opportunities; and providing general financial and administrative support and incentives.

Two initial collaboratories will focus on public health and the environment and public health promotion and health care delivery systems. The Institute will launch these signature collaboratories and establish a process for faculty teams to organize future collaboratories, such as those focused on aging and elder care, disability and community inclusion, health care access and equity, integrated human and animal health, and global health; (for example, building on the over $8 million in annual funding (Figure 1) to UVM for assistance with such activities as the State’s Blueprint for Health, the Vermont Child Health Improvement Program (VCHIP) and the
establishment of environmental carcinogenesis as the theme for the Vermont Cancer Center.)

**Education.** New alliances among UVM departments, programs, schools, and colleges will provide the foundation for a graduate program in public health, including an undergraduate major in public health, an accelerated baccalaureate to masters (4+1) program options in public health through multiple departmental tracks, and a transdisciplinary master’s in public health (MPH). Developing 4+1 tracks within current undergraduate programs to combine students’ baccalaureate and master’s studies could be a unique UVM approach to transdisciplinary public health education. For example, students from majors as diverse as animal science, environmental science, economics, anthropology, sociology, social work, nutrition, and community development could specialize in their disciplinary baccalaureate programs and then join a cohort of public health students as seniors and then 2nd year master’s students.

**The Institute is Relevant to Critical Issues for the 21st Century** Several critically important and relevant matters are likely to be addressed by the Institute including healthcare delivery systems, environment and health, primary prevention, human behavior and health, global health, and informatics. The US is in the midst of epidemics of obesity and other chronic diseases that are having a major impact on the health and well-being of current and future generations. Congress is debating the most significant changes in the healthcare system in more than four decades with new legislation on the horizon, concern about the environment is at an all time high, and global health is a critical political, economic, and moral imperative. The relevance of these public health issues to students is evidenced by the programs in the departments of nursing and social work and the COM that engage students and faculty in work in rural Vermont as well as in developing countries such as Bangladesh, Haiti, India, and Nicaragua. This work is fostered by emerging research on the relationships of environment, built infrastructure, social and individual behaviors, and cultural conventions to health in the US and across the globe.
Continued progress requires transdisciplinary perspectives and sophisticated methods, including the use of the latest informatics innovations. Reflecting the high relevance of these areas of study, a recent article in the *Chronicle of Higher Education* identified public health and informatics as one of several high-profile new undergraduate majors.

**The Institute Provides Opportunities for World-Class Scholarship** The Institute will grow from and support the mission of this University and its commitment to the environment, health, and public service. Through the Institute, UVM has an opportunity to distinguish itself as an intellectual center for the exploration of population health issues, linkages between environment and health, and healthcare delivery at the state, national, and global levels. UVM’s well-developed expertise in informatics will provide the potential for population-based studies of health, healthcare delivery, and environmental quality, as well as advancing unique electronic decision-support systems. Such systems can allow healthcare practitioners to provide evidence-based care, cut costs by eliminating unnecessary testing and treatments, and improve health outcomes. However, the translation of patient data into meaningful decision-making tools, and their application in the context of the clinical setting, will need to build on the invention and implementation of new technological platforms. Success will require collaborations among providers, analysts, and policy-makers, which the Institute can nurture. In addition, UVM has GIS and spatial modeling capabilities that can readily link environmental factors to patient data, allowing unique explorations of linkages between environment and health.

**UVM and Vermont Have a Competitive Edge Potential for Resources** Vermont has comprehensive population health data systems and well-integrated state-wide systems with a history of strong collaborations to promote public health. It also has a relatively homogeneous and stable population that is open to participating in studies. Successful programs include the
Child Welfare Partnership Project with the Department of Children and Family Services, Vermont Interdisciplinary Leadership Education for Health Professionals (VT-ILEHP), VCHIP, and the Blueprint for Health strategy for managing prevalent chronic diseases. Although UVM faculty play important roles in these initiatives, with facilitation of collaborative work through the Institute they will be competitive for over $7 million annually from the Agency for Human Services for data analysis and policy advice that currently goes to out-of-state entities.

Building faculty and research capacity in public health at UVM will provide researchers with preliminary data for competitive research awards, allowing UVM to capture additional state and federal funds from entities such as the Agency for Healthcare Research and Quality (AHRQ), the Office of the National Coordinator for Health Information Technology, the National Science Foundation, and the National Institute of Environmental Health Sciences and other National Institutes of Health (NIH). UVM also has the opportunity and potential to bolster its presence and influence on global health by using existing faculty expertise and research resources, adding new undergraduate and graduate programs in public health, and expanding opportunities for study of global health issues in the classroom. UVM has leading global health research projects ranging from emerging infectious disease epidemics, to the connection between climate and malaria epidemics, to the vicious cycle between rural health and poverty. These exist in scattered pockets across the university, often in collaboration with other universities. Better facilitation between UVM departments and programs would position UVM to compete for grant and foundation support on global health that is over a billion dollars per year.

**Key University Outcomes in Research, Education and Public Service** The NIH Roadmap plan notes that “the scale and complexity of today’s biomedical research problems demand that scientists move beyond the confines of their individual disciplines and explore new organizational models for team science.” It is apparent that relevant knowledge-generating
strengths have emerged in all UVM Colleges and Schools. The value brought by a transdisciplinary faculty will be seen in greater engagement of faculty and students in proposing, developing, and carrying out innovative public health program and policy research and producing new knowledge to improve population health.

In education, the Institute will provide a structure to offer unique experiences for undergraduate and graduate students, building on the climate and culture of innovative public health education and service-learning at UVM. Laudable work is already underway exemplified by nearly 180 public health projects completed by undergraduate and graduate nursing and medical students who combine education in public health, service-learning, and research in their degree programs. By gathering more disciplines into non-traditional structures, we can improve the likelihood of developing educational experiences that promote engagement in vital community issues and creative problem-solving.

In public service, UVM will continue to serve its many constituents through extension of transdisciplinary research and education. Enhanced partnerships with the state of Vermont will increase the role and visibility of UVM in important health-related initiatives in the state, as illustrated by, a pro bono clinic initiated by graduate physical therapy students in the Burlington Community Health Center. The Institute would serve as a vital clearinghouse for service-learning opportunities and internships in public and global health, a key component of the experiential learning and translation of research into health policy mission of the CCTS.

**Justification for a Strategic Investment**

The proposed Institute will build on a strong foundation. UVM courses (Figure 2) and internships related to public health and the environment have increased substantially over the past decade. Growth has plateaued in the past few years, however, indicating the need for new approaches. Annual funding from state and federal sources has similarly leveled off (Figure 1).
Figure 3 demonstrates, through citation counts, the number of faculty collaborating on a publication, within and across academic units.

Faculty with the expertise needed by the Institute are found within and beyond the health science disciplines. Broad research capacity in public health and health policy already exist in many UVM centers of excellence, such as the Center on Aging, Center for Disability and Community Inclusion, Transportation Research Center, Gund Institute for Ecological Economics, Jeffords Center, Office of Nursing Workforce, Planning, Research & Development, Vermont Genetics Network, and programs in integrative medicine. Strong faculty interests related to public health issues are also found in Departments ranging from Anthropology to Psychology to Sociology and schools and colleges as diverse as Business, Education and Social Services, Environment and Natural Resources, Engineering, and CALS. All provide motivated faculty and students for potential Institute collaboratories. The Institute of Medicine Report, Health Professions Education: A Bridge to Qualityiv, notes that Vermont is unique in its ability to use informatics to access population data given that a relatively small population is largely served by one large academic health center with an integrated electronic health record. The strength of these many assets is reflected in the demand for UVM faculty expertise in health and the environment, locally, nationally, and around the globe.

**Emerging UVM Strengths Also Support the Institute** Notable areas of public health and health policy related research at UVM are emerging from strengths in environmental science and studies, informatics, and international community development. In the environmental arena, there is growing appreciation of the impact of subtle but pervasive harmful substances in human environments, the disease interface between humans, domesticated animals, and wildlife, and the design of the built environment on human health. Also, a growing number of faculty in diverse disciplines and academic units are conducting research and education activities relevant to public
health in many developed and less developed countries. Understanding of effective public health and health policy issues in Vermont and the US will be enriched by potential collaborations with research and education activities focused on similar issues in other settings around the globe.

**Institute Priorities Align with Funding Opportunities  Federal Funding.** The National Institutes of Health Roadmap\(^v\) identifies the critical path to funding as including “a cadre of scientists who can integrate diverse scientific approaches and work in interdisciplinary teams to solve complex health problems.” By pooling faculty resources under the banner of public health with a comparatively small investment UVM could position itself for new funding opportunities in research and education that are well ahead of peer institutions.

In 2004, the NIH began granting awards for interdisciplinary research, and the proposed new Institute will be well positioned to compete for such funding, especially in the NIH-designated areas of Interdisciplinary Health Research Training: Behavior, Environment, & Biology, and Training for a New Interdisciplinary Research Workforce. Other potential federal funding sources include AHRQ, the Substance Abuse and Mental Health Services Administration (SAMHSA) and the Maternal and Child Health Bureau. Four SAMHSA grants were awarded to the state’s Department of Mental Health (DMH) in the past two years to provide translational research in health policy and are based on the strong and ongoing collaborations between DMH and UVM health services researchers. AHRQ has received federal stimulus funds, to support comparative effectiveness research in priority areas that align with UVM expertise\(^vi\). Similarly, many Institute of Medicine priority areas align directly with UVM public health and health promotion strengths\(^vii\).

**State Funding.** The university also has a longstanding history of receiving state funding (Figure 1). AHS has expressed an interest in UVM developing the capacity and expertise to be competitive for additional contracts, preferring to keep funding in-state for such activities as
technical assistance; data, trend and cost analyses; and use of research to inform policy. The Institute will facilitate the alignment of faculty into transdisciplinary teams and improve our competitive position for such funds, bringing the tremendous expertise of the UVM faculty to state activities and better serving Vermont.

*Private and Non-profit Funding.* Public health issues are highlighted not just by public agencies but by private organizations and industries looking for solutions to the health care and cost challenges found in the US today. We can look for support from local organizations such as GE and IBM who have expressed interest in partnering with UVM on new business ventures that will move healthcare technology forward. In the global health arena, an Institute would better position UVM to compete for private and public foundation support. The Gates Foundation alone is spending about $2 billion annually on global health initiatives.

**The Institute Will Lead to Opportunities for UVM in the Next Five Years**  This Institute will build on existing resources and capture the unique spirit of both UVM and Vermont in pursing scholarly and creative endeavors that cross traditional disciplinary boundaries, creating an environment that fosters new knowledge, educates the next generation through engaging methods, and attracts world-class faculty. Incubated in the CCTS, the Institute will be able to build on the many resources already available, including the capacity for joint appointments, an environment supportive of transdisciplinary research and education, new mechanisms for allocating financial resources, and a diverse faculty with various public health-related degrees who collaboratively conduct research and teach at the undergraduate and graduate level. Our challenge will be to maintain a focus based on UVM’s strengths and resulting in collaboratories that bring research efforts, faculty, and students together over the next five years and beyond.

UVM is known for attracting faculty who are interested in conducting health-related research in a state they can “get their arms around”. Vermont as a “laboratory” should not be
underestimated. Testimony from recent recruits speaks to their interest in coming to Vermont for the potential it offers in research and education that is not found in any other state. The Institute will help tip the scale toward competitive recruitment of faculty and students. In fact, our ability to match student interests with university offerings is confirmed by data that support public health and the environment as areas of growing interest.

A high level of faculty and student interest in public health and health policy is also reflected in a plethora of proposals for graduate and undergraduate education. At the graduate level, a 2002 report exploring creation of a Masters’ of Public Health (MPH) program suggested a strong market and likely financial viability, but that resources within UVM were not yet adequate. A recently prepared doctoral proposal with a health policy track highlighted a rich set of relevant courses and examples of significant community engagement. The COM has been a leader in the development of national recommendations in population/public health education. At the same time, the Liaison Committee on Medical Education is incorporating “public health sciences” into national accreditation standards. A first step of developing a Certificate in Public Health available to all UVM COM students will put UVM at the forefront of these efforts and could be adapted for other graduate students. At the undergraduate level, recent initiatives include a Health Sciences major proposed by the CNHS in 2008, and the inclusion of a “Health and the Environment”, as a core course in the newly designed undergraduate General Education Requirements. In addition, testimony from a representative of UVM Continuing Education indicated that public health was the most highly requested area for development of new educational programming. In fact, one of the largest areas for Individually Designed Majors in the CAS over the past decade has been in areas related to public health. Graduates from these majors have gone on to pursue Fulbright research, work with Partners in Health, and attend graduate programs in Medicine and/or Public Health.
UVM currently has pockets of excellence in student education related to this Institute that, if built upon, will attract undergraduate and graduate students over the next five years and beyond. For example, medical students participate in a public health rotation; students in nursing and health sciences must complete and present community projects; the COM and the Rubenstein School have developed joint courses in Environment and Human Health; and the CCTS space supports interactions between faculty, staff, and students. At a time of economic crisis that threatens significant cutbacks in state government and other areas, UVM has the opportunity to create settings for student civic engagement and experiential learning, better preparing our students for entry into a workforce that needs experienced and well trained public health workers. Such learning opportunities complement UVM’s vision regarding “our comprehensive commitment to …public service” and support the continued economic development of the state, both through service delivery and a more robust workforce. Bringing in research funding which creates new jobs, finding new approaches to cost reduction and health improvement, and contributing faculty knowledge to decision-making at the state level additionally contribute to the economic development of the state in the near and long term.

Expected Faculty/Programmatic Facilities Needs over the Next Five Years

Investments in the Institute will be aimed at supporting the collaboratories, new faculty recruitments and new educational programs. The proposed budget requires each of the collaboratories, faculty and educational programs to be self supporting by their external direct and indirect grant funding or tuition by four years after their initiation. All funds below are estimated for the first five years. Housing the Institute in the CCTS will expedite its implementation by using existing resources of shared faculty and student space. Protected time for current faculty to support expansion of current work into collaboratories ($100K/each/year) will generate two new collaboratories each year for the first 3 years, for a total of 6
collaboratories ($2M). A director and mid-level faculty position will begin in the second year, 2.0 FTE, and a 1.0 FTE junior faculty position in the third year (timing allows for national recruitments). Protected time for a current faculty member to serve as interim director will require ($75K). Continued investment in central informatics resources, including the VACC as well as faculty and staff for the information management, integration, and analysis to support the research needs of faculty and students in the Institute, is estimated at ($1M). The Institute will also need administrative staffing and general operations support ($250K). A Certificate program will begin in the first year and be self-supporting after two years ($100K) and development of a Transdisciplinary MPH program will begin in the third year ($600K).

**Potential Barriers to Success and Proposed Solutions** Faculty at UVM have expressed their commitment to research and education in public health in many ways. Existing studies, interest in future collaboration, and identification of potential grant sources have all surfaced in the development of this proposal. However, the Institute’s plans for undergraduate and graduate education programs will compete nationally for students interested in public health, for which other strong programs already exist. We will need to market the unique strengths of Vermont, noted above, and ensure that the attractive service learning opportunities we can provide are established, well coordinated, and maintained. In addition, we need to ensure that UVM faculty perceive that the Institute includes the breadth of disciplines across the campus and that it respects and nurtures their diverse intellectual contributions to provide a strong public health program. At a minimum, the Institute must provide a forum for faculty to connect and converse as the Institute unfolds and its collaboratories are developed, reviewed, and enacted.

**Projected Metrics for Success in Five Years** As the collaboratories mature, the success of the proposed Institute can be assessed according to a specific set of metrics, as ultimately determined by the Institute Director and the Office of the Provost. Proposed standard metrics may include
increases in research funding from extramural sources and publications that involve multiple academic units. These metrics, in combination with methods to assess increased student competition for enrollment in Institute classes and academic programs, can be measured relative to areas presented in *Road to Excellence* (e.g., diversity of students involved with the Institute and the paths taken after graduation). The Institute-affiliated units’ ability to attract the highest-caliber faculty and students, which may contribute to overall improvement in National Research Council rankings for their respective disciplines, is a measure to be monitored. Finally, new metrics can be devised to measure the specificity of the increase in transdisciplinarity of the outputs from the Institute. For example, indexing terms (e.g., MeSH for MEDLINE) can be used to ascertain the uniqueness of publications or funded grants found before and after the Institute is launched.

**Conclusion**

To compete for the best, the university needs to make timely, strategic investments in emerging areas of education and research. UVM has an opportunity to address public health and environment needs of the future without being constrained by traditional academic public health boundaries. UVM can offer diverse educational settings and the experiential learning programs demonstrated by a long and growing history of success, buttressed by a state government that works in partnership with the university. The Institute will facilitate a transdisciplinary approach to health and the environment that proactively identifies areas for research, matches UVM priorities and expertise across disciplines to research opportunities, and targets the priorities of funding agencies. The end result will be an Institute structured to support an inquisitive workplace that rewards creativity, collaboration, and new approaches to scholarship and education.
Figure 1: In addition to the annual average of ~4 million federal dollars associated with environmental health or public health, there has been an upward trend in contracts and grants awarded from the State of Vermont since 2000.

Figure 2: Between 1995 and 2009, there has been a consistent increase in the teaching of public health courses across UVM. In addition to “traditional” public health courses within approximately 11 academic units (dark blue), courses have been offered in over 20 additional disciplines (patterned). Enrollment has followed the same increasing trend (dotted red line).

Figure 3: Based on publications indexed in MEDLINE, there is evidence of emerging trans-disciplinary collaborations across major UVM academic units (shown as boxes in graph above; the number of publications involving researchers between units [centers, colleges, schools, etc.] are indicated as numbers next to each edge). The above graph is based on an examination of over 1,000 MEDLINE publications from 2002-2010, representing approximately 600 UVM researchers. Approximately 1/3 of these publications are directly associated with public health or the environment, based on MeSH index terms in MEDLINE.
REFERENCES


iv Greiner AC, Knebel E, Editors, Committee on the Health Professions Education Summit. Health Professions Education: A Bridge to Quality Report, Institute of Medicine, 2003.


vi AHRQ priority areas that align with UVM: Cancer; Cardiovascular disease; Dementia; Depression and other mental health disorders; Developmental delays; attention-deficit hyperactivity disorder; autism; Diabetes mellitus; Functional limitations and disability; Obesity; Pregnancy including pre-term birth; Pulmonary disease/asthma; and Substance abuse.

vii IOM priority areas include:

-Compare the effectiveness of various primary care treatment strategies (e.g., symptom management, cognitive behavior therapy, biofeedback, social skills, educator/teacher training, parent training, and pharmacologic treatment) for attention deficit hyperactivity disorder (ADHD) in children.

-Compare the effectiveness of the co-location model (psychological and primary care practitioners practicing together) and usual care (identification by primary care practitioner and referral to community-based mental health services) in identifying and treating social-emotional and developmental disorders in children ages 0-3.

-Compare the effectiveness of pharmacologic treatment and behavioral interventions in managing major depressive disorders in adolescents and adults in diverse treatment settings.

-Compare the effectiveness of care coordination with and without clinical decision supports in producing good health outcomes in chronically ill patients, including children with special health care needs.

-Compare the effectiveness of traditional behavioral interventions versus economic incentives in motivating behavior changes (e.g., weight loss, smoking cessation, avoiding alcohol and substance abuse) in children and adults.


ix Personal communication from Alison Maynard, Dec 7, 2009 PHHP Open Forum

x Fogel, Knodell, and Grasso, “The Road to Excellence—Advancing Academic Distinction at UVM,” November 19, 2009