Proposal for

A FOOD SYSTEMS SPIRE OF EXCELLENCE AT THE UNIVERSITY OF VERMONT

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FOOD SYSTEMS: A SPIRE OF EXCELLENCE AT THE UNIVERSITY OF VERMONT

EXECUTIVE SUMMARY

The field of food systems focuses on connections among food production, promotion of human health and well-being, and maintenance of the environment. Modern food systems provide unparalleled productivity but are accompanied by unacceptable levels of diet-related health problems, food-borne disease, hunger and agricultural pollution. To address these challenges, new knowledge is needed about complex interactions in food systems. The University of Vermont (UVM) is uniquely positioned for a leadership role in generating that knowledge through transdisciplinary teaching, research and outreach. Already, our faculty and their community partners are engaging with models and methods that show promise for revitalizing agriculture while improving people’s diet, protecting environmental quality and creating economic opportunity.

To more comprehensively pursue the goal of healthier food systems the following four areas of transdisciplinary research are proposed as foci for a food systems spire of excellence at UVM:

• food, culture and health; • energy and food; • policy, ecology and land use; and • regional value chains.

Significant public and private resources exist to support a food systems spire, and these can be leveraged to support the following actions that will allow the spire reach its full potential: 1) Create four faculty positions to address critical transdisciplinary food systems questions; 2) Endow a Chair in regional food systems research to provide intellectual leadership; 3) Offer food systems research planning grants for faculty; 4) Host biennial national symposia on food systems research and outreach; 5) Establish a regional food systems advisory council to guide and review progress; 6) Engage the campus community in robust pursuit of healthy regional food systems; 7) Capitalize on food systems research and campus food activities for recruitment of students; and 8) Clearly commit to a leadership role in developing healthy food systems for Vermont. The spire’s work will raise UVM’s profile and benefit the greater public good.
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Background and Rationale. The field of food systems is a compelling interdisciplinary arena of study because it elucidates connections among vital interests of humanity such as the creation of nourishment, the pursuit of health and well-being, and maintenance of the environment. In addition, contemporary food systems pose a remarkable paradox that is the basis for serious societal concerns: unparalleled productivity accompanied by unacceptable levels of diet-related health problems, food-borne disease, hunger and agricultural pollution. The University of Vermont (UVM) is uniquely positioned to address these concerns by generating knowledge through transdisciplinary teaching, research and outreach conducted by faculty who participate in a food systems spire of excellence.

This spire will be organized around the definition of food systems as an interconnected web of activities, resources and people that extends across all domains involved in providing human nourishment and sustaining health, including production, processing, packaging, distribution, marketing, consumption and disposal of food. The organization of food systems reflects and responds to social, cultural, political, economic, health and environmental conditions and can be identified at multiple scales, from a household kitchen to a city, county, state or nation (Figure 1).

Increasing evidence shows that some of our most pressing public health problems—diet and diet-related illnesses—may be a consequence of our contemporary food systems, and the following statistics underscore the enormity of these problems in this country (although they exist outside this country as well):

• 67 percent of U.S. adults age 20 and above are overweight, 34 percent are obese (CDC, 2008).

• 17 million U.S. household have difficulty obtaining enough food at some during the year (ERS, 2009).

• Food-borne illness affects tens of millions of Americans each year (CDC, 2005).

Meanwhile, the agricultural landscape in the U.S. is under threat, seriously challenging the sustainable production of food. Consider the following situation:
• 42 million acres of American farmland have been lost since 1987.

• 2.6 percent of all farms now account for 59 percent of the nation’s gross agricultural sales (USDA, 2009).

Such consolidation creates vulnerabilities associated with reliance on fossil energy for transportation and storage, and can amplify food safety threats by aggregating risk.

• Agriculture is responsible for pollution of 48 percent of river miles, 41 percent of lake acres, and 18 percent of estuarine waters found to be water-quality impaired (EPA, 2002).

**The Vision.** A food systems spire of excellence at UVM will develop solutions to pressing problems in food systems through world-class transdisciplinary research, teaching and outreach dedicated to improving economic, ecological and human well-being.
Much of the spire’s emphasis will be on local and regionally-scaled food systems that can ameliorate the drawbacks of global industrial commodity systems. In the most recent Farm Bill, Congress defined locally-produced agricultural food products as those that are raised, produced and distributed within a locality or region and transported less than 400 miles from their origin. This geographic context suggests a food systems scale and scope wherein goods and services can be moved within a day’s time, minimizing storage, handling, and energy usage; wherein mutually beneficial relationships among food system entities can be better developed due to proximity; and wherein consistent political, social, and regulatory support can be established because of a limited number of jurisdictions. Therefore, we posit that local and regionally-scaled research will best facilitate problem-solving around obesity, food safety, sufficient access to food, environmental protection and farm viability in Vermont and its surrounding states. Such an approach will yield solutions that will be applicable elsewhere in the nation and the world, with modifications based on the natural and social contexts of a given location.

**Vermont: Already a Food Systems Laboratory.** The state of Vermont is an ideal site for an engaged exploration of healthy regional food systems due to its history of challenging “business as usual” assumptions of large-scale, global commodity food production and consumption. With its varied topography, harsh climate and limited infrastructure, Vermont has relied on entrepreneurship to maintain a vital agriculture in synergy with citizens who value food and farming beyond economic terms (Vermont Rural Development Council, 2009). Vermonters, as well as tourists to the state, support the working landscape. As a result, food is a significant economic engine in Vermont where 20 percent of private jobs and 31 percent of private business establishments involve the production, processing, distribution, sales or infrastructure of food (Vermont Sustainable Jobs Fund, 2009). Vermont leads the nation in per-capita direct-market sales from farms to consumers, and percentage of farmland under organic management. Nearly eight percent of the state’s land is protected by land trust conservation easements.
Vermont’s innovation in the face of problems that are widely shared beyond its borders makes it a rich site for research and development of sustainable models with relevance across the country and the globe.

**UVM is Well-Positioned** to engage in studying the complexities of food systems with a regional scale and scope for the following reasons:

- **UVM is a land-grant university in the Northeast where massive urban and suburban areas (New York City and Boston) are within a few hundred miles of large rural areas (northern New England and upstate NY).**
- **UVM's agricultural efforts are tailored to the community at a grassroots level; research and funding are not driven by a few commodity interests but by the state's diversified needs.**
- **UVM is engaged in nationally acclaimed entrepreneurship in food and farming, from artisan cheese research to farm-to-school food programs to renewable energy development on farms.**
- **Food systems research, teaching and outreach will integrate seamlessly into the university’s strategic commitments to environment and health.**
- **Undergraduate and graduate students at UVM are already deeply involved in exploring food systems, as seen in numerous service-learning projects, an undergraduate minor, popular travel-learn courses and the ongoing development of an interdisciplinary master’s program.**

**UVM has significant existing resources to support a food systems spire:**

- $25 million in external ‘food system’ funding (19% of UVM’s $133 million total in 2009).
- 442 relevant courses across 44 departments.
- 420 acres of farms and forests equipped with research facilities.
- A processing facility focused on new dairy product development.
- A health care system and medical/nursing/allied health schools engaged in the integration of nutrition with the treatment and prevention of disease in both research and practice.
- Off-campus extension demonstrations of new biofuel and animal feed crops that integrate energy and food production at a scale that is applicable to the Northeast.
Perhaps the most compelling case for elevating UVM’s role in food systems inquiry, education, and outreach efforts is that we are already involved in numerous transdisciplinary approaches organized around problems. Many of our faculty blend research methodologies and collaborate with stakeholders such as farmers, teachers and community physicians to conduct groundbreaking research and to involve students in systems approaches to problem-solving, as exemplified by these projects:

- Dept. of Animal Science faculty lead research and outreach that integrate biosecurity, epidemiology, emergency management and public policy aimed at food supply protection.
- UVM Extension is engaged in a $1 million project to improve organic wheat production, processing and culinary attributes through agronomic, marketing and baking quality investigations.
- The School of Natural Resources collaborates with an eco-industrial park to link businesses so that excess energy from one is used to heat greenhouse food crops while waste from another fertilizes those crops.
- Dept. of Nutrition and Food Sciences faculty are looking at the intersection of sensory science, food culture and rural economic development to understand the past, present and future of place-based foods.
- The Dept. of Medicine is analyzing the effects of environment and geography on obesity and energy balance, while improving diabetes management statewide through an automated health care reminder system.
- The Dept. of Plant and Soil Science hosts a project on coffee growing and rural livelihoods that considers the problems of creating economically and environmentally sustainable practices in El Salvadoran communities.
- The Dept. of Community Development and Applied Economics faculty study consumer food behavior and economic implications for new markets, including organic dairy, institutional markets and community supported agriculture.
- The Food System Research Collaborative in the Center for Rural Studies provides coordination for on- and off-campus research projects focused on consumer and institutional issues that affect demand for local food.
- The Center for Nutrition and Health Food Systems at Fletcher Allen Hospital provides a virtual community to connect food professionals throughout New England who are working to promote healthier eating habits.
- Clinical research on obesity at UVM has generated Vtrim, an online behavioral weight loss program accessed by physicians and individuals across the country.
- The Center for Sustainable Agriculture links extension, teaching and research with state agencies and producer groups to optimize grass-fed livestock production, local food systems and support for new farmers.
- CREAM (Cooperative for Real Education in Agriculture Management) has allowed more than 300 students to combine classroom and experiential learning as they manage a 32-cow dairy herd business.
- UVM Continuing Education helped create the Food Systems Leadership Institute. More than 100 leaders in higher education, government, and industry participated in this three-week leadership development training.
• The UVM Libraries are developing a website portal for disseminating research on food systems at a national and international level through the National Digital Library for Agriculture and AGRICOLA.

• The College of Agriculture and Life Sciences has matriculated over 400 students in the past five years with an undergraduate major in entrepreneurship that focuses on start-up food systems businesses, or an undergraduate minor in food systems.

• The School of Business faculty offer expertise in food branding, retailing, and market research.

• The Northeast Sustainable Agriculture Research and Education program of USDA is hosted by UVM, annually awarding nearly $4 million in food systems grants to researchers, educators and farmers.

• Sodexho, UVM’s food service provider, collaborates with student groups to increase availability and awareness of local food in UVM food outlets, including developing a premium on milk that is returned to local dairy farmers.

• The UVM Transportation Center is examining the impact of different scales of production, distribution systems and individual household access to food, as well as the impact of biofuels on the environment and health.

The UVM Food Systems Spire will be Unique. Few institutions can lay claim to the deep and broad commitment to food systems research and engagement exemplified by the projects above. Currently, a handful of departments at other universities offer sustainable food systems programs, including University of California (UC) Santa Cruz’s Center for Agroecology and Sustainable Food Systems and Tufts University Agriculture, Food and Environment M.S. and Ph.D. programs in the School of Nutrition Science and Policy. Smaller food systems programs exist at Cornell, Michigan State University, Iowa State University, New York University, UC Davis and the University of Wisconsin, and others are emerging. Many of these programs appear to be discrete efforts without integrated institution-wide engagement. In contrast, UVM will develop food systems as a transdisciplinary focus across all schools and colleges and the campus food service. This unique position will afford UVM ascendancy as a food systems research spire, attracting top scientists and students.

A Robust Community of External Partners and Programs. Vermont has over 400 diverse agencies, commodity associations and non-profit organizations working to provide innovative solutions to food systems issues (Vermont Sustainable Jobs Fund, 2009). From improving school food (Food Education Every Day), to promoting new products (Vermont Cheese Council), to support for local food purchasing
(Vermont Fresh Network), to a legislatively established think tank called the Vermont Sustainable Agriculture Council, UVM faculty and program staff have been responsive to and engaged with partners.

In 2009, the Vermont legislature authorized $100,000 to develop a 10-year strategic plan for agriculture—an effort titled ‘Farm to Plate’—focused on identification of obstacles and opportunities for local and regional production, processing, distribution and consumption. Over eight hundred Vermonter have engaged in public planning meetings, and dozens of UVM faculty and staff are providing support to the process. The results of this effort will provide specific guidance to the work of the food systems spire.

**New Foci for Food Systems Research.** Currently, a paucity of research links the theories and applications necessary to fully address our food systems challenges; looking at food from a transdisciplinary systems perspective is a relatively recent academic endeavor. We have identified four areas of focus for such research that are central to societal concerns about our food systems, with potential to attract significant external funding, generate new knowledge and raise UVM’s profile.

1) *Food, Culture and Health.* Individual dietary decisions are increasingly influenced by advertising, cultural norms, physical and economic access to food and other topics that cross multiple disciplines. Reversing the rise in obesity and diet-related illness requires new knowledge around the diverse drivers of individual food decisions. For example, study of farm-to-school programs is elucidating the manner in which classroom nutrition education, gardening experiences, and exposure to local food in the cafeteria can be combined to improve children’s eating habits. An interdisciplinary team of faculty will study connections among cultural values, public policy, food distribution and consumption patterns, and individual well-being. Health behavior, cultural, economic and environmental theories will inform investigations of current trends in Vermont, the Northeast and the nation to generate models for action. Health outcomes will include the effectiveness of interventions on the prevalence of obesity and type 2 diabetes. The results of this work will directly support achievement of Vermont's strategic health goals (Vermont Dept. of Health, 2007).
2) **Energy and Food.** Farms must feed future generations, even as fossil energy diminishes. Reducing energy use in agriculture will help maintain widespread access to food (food security) while mitigating environmental impacts associated with fossil fuel-based transportation and fertilizer production. To develop more efficient and sustainable practices and technologies, a deeper understanding is needed of the energy and carbon flows associated with varying levels of inputs and outputs of food systems. Faculty will team up to study the connections among regional food production and distribution systems with regard to energy use, greenhouse gas emissions and net energy balances. Faculty will also collaborate to analyze farm-based renewable energy systems and identify those that best harmonize with food production and available natural resources. Scholarly subjects will include the capacity of regional food systems for producing both food and fuel as well as the energy inputs and outputs associated with growing, processing and consuming biofuels.

3) **Policy, Ecology and Land Use.** The farm landscape includes cropland as well as forest, wetland and grassland that provide ecosystem services such as carbon sequestration, groundwater recharge and wildlife habitat. The long-term value of this multi-functionality is often compromised by short-term land use decisions. A collaborative team will study connections among agricultural policy, land use patterns and their relationship to food production potential, water quality and biological diversity in the landscape. They will document and connect these assets to socioeconomic processes that undergird rural economic development. Potential areas of investigation include intermingling of croplands and urban and suburban development, size and homogeneity of land use patches within the agricultural landscape, and application of critical point theory to identify the optimal sizes and clusters of food production, processing and distribution properties.

4) **Regional Value Chains.** Lack of profitability in commodity markets has proven difficult to overcome in the Northeast, yet booming direct producer-to-consumer retail markets for food cannot accommodate the volume of product needed to sustain farms or consumers. Research is needed to generate knowledge that can guide the development of higher-value products for wholesale markets through branding,
desired production attributes and/or processing. Regional value chains refer to marketing relationships and ‘differentiated products’ that can increase profit and market influence for farmers and their processing partners. For example, aggregating local milk for processing into a premium, branded wholesale dairy product can help farms overcome low commodity prices for milk, if farmers have equity in the processing business, and if the product can be effectively marketed. To address such opportunities, an interdisciplinary team of faculty will apply historical trend analysis, industrial organization, profit maximization and consumer behavior theory to study the structure and impacts of regional food systems entities. Areas of research include consumer demand, product development, production efficiency and distribution channels that lead to a regional production advantage.

**Extraordinary Recruitment Potential.** There is a high level of student engagement in food systems issues presently at the University, evidenced by high enrollments for courses addressing relevant topics and by student-initiated extra-curricular activities such as the Community Supported Agriculture program based at UVM’s horticultural research farm. Vermont’s national reputation for innovation in food and agriculture has led to numerous inquiries for graduate level opportunities in food systems from all over the country. This interest will grow with a recent award from USDA that funds a cross-college master’s degree program in food systems. The grant will provide resources and momentum for the creation of core courses and overall curriculum design based on a transdisciplinary, engaged pedagogy to educate students to be future food systems leaders and scholars.

The interdisciplinary master’s degree will also serve students interested in furthering their education with a PhD in policy, public health or environment that focuses on food systems research. Currently, UVM has an Integrative Graduate Education and Research Traineeship (IGERT) proposal for a doctoral program in food systems pending through National Science Foundation.
UVM has the potential to substantially enhance undergraduate and graduate curriculum offerings on food systems as faculty bring new transdisciplinary knowledge to the classroom. Integrating the four cutting-edge focus areas described above into traditional semester offerings, intensive travel and summer courses (focused on urban and rural food systems), internships (with food businesses, non-profits and state agencies), and student research opportunities (on emerging new models for regional food systems) will enhance the appeal of UVM to students seeking multi-faceted educational experiences around complex societal issues.

UVM’s campus-based food systems—including methods of production, procurement, consumption, and waste management—will be used as a “living laboratory” for students. The spire will integrate the academic learning environments (the horticulture and dairy farm, the foods laboratory, the office of sustainability, the Vtrim program) with students’ everyday decisions about what to eat (high fat or low fat, sit down or grab-and-go, anonymous or identifiable producers). This ‘informed eating environment’ will bring questions of scale, scope and sustainability to the forefront of the UVM student experience.

**Achieving Success.** To develop a food systems spire to its full potential at UVM we propose the following eight actions, which will be supported in large measure by an aggressive effort to secure external funding, leveraged with appropriate allocations of internal resources.

1. **Create four faculty positions charged with addressing transdisciplinary food systems questions.**

2. **Endow a Chair in Regional Food Systems Research to provide intellectual leadership.**

3. **Offer food systems research planning grants for faculty.**

4. **Host biennial national symposia on food systems research and outreach.**

5. **Establish a UVM Regional Food Systems Advisory Council to guide and review progress.**

6. **Engage the campus community in robust pursuit of healthy regional food systems.**

7. **Capitalize on food systems research and campus food activities for recruitment of students.**

8. **Clearly commit to a leadership role in developing healthy food systems for Vermont.**
New faculty positions and an endowed Chair will focus on the four research areas presented above, which are central to the sustainability of regional food systems. A key role of these food systems research leaders will be to facilitate teams of faculty working on ambitious transdisciplinary projects. To jump-start such projects, we suggest providing four $25,000 integration grants in each of the spire’s first three years. This will encourage team formation, project planning and submission of external funding requests. To foment cross-disciplinary communication and elevate UVM’s leadership role in food systems research, we propose that food systems faculty organize symposia on a biennial basis to share research results with national and international colleagues. To assure that research proposals are optimally connected to external partners, and to promote stakeholder awareness of UVM’s research efforts and results, we suggest that a food systems advisory council be created and that it meet semi-annually with the Food Systems Chair.

Comprehensively engaging students with issues and choices on a daily basis through the campus food system, as well as in educational programs, promises to yield benefits to both academic performance and student health. Such engagement will serve as a powerful recruitment tool for students seeking immersion in a transformative and highly applicable educational experience.

By unequivocally stating its commitment to generating new knowledge that will improve Vermont’s food systems, UVM will invite a rededication of partnerships from many sectors, while positioning itself for renewed interest from governmental and philanthropic funders.

**External Funding:** The spire’s work will align with the goals of several key federal funding agencies and philanthropic organizations, as well as the specific objectives of grant programs within those entities.

The five priority science areas of the National Institute of Food and Agriculture (NIFA) are: food security, climate change, sustainable energy, childhood obesity and food safety (USDA, 2009). These clearly align with food systems problems we seek to address at UVM.
In February of 2010, NIFA’s flagship competitive grants program, the Agriculture and Food Research Initiative (AFRI), will commit up to $800 million in funding for new grants that support interdisciplinary, multi-functional projects in the five priority areas to achieve significant and measurable outcomes (USDA, 2010).

Other competitive grant programs administered by NIFA also have strong potential for supporting food systems work, including: Community Food Projects, the Specialty Crop Research Initiative and the Sustainable Agriculture Research and Education program. The “Know Your Farmers Know Your Food” initiative is a USDA-wide effort to create new economic opportunities by better connecting consumers with local producers, with a focus on integrating government programs in a food systems framework.

The NIH Roadmap for Medical Research identifies interdisciplinary research as an approach to transforming the way scientists work and how their work is reviewed and supported (NIH, 2008). The National Center for Research Resources (NCRR) at the NIH will support research infrastructure, thematic research programs and clinical translational science centers; UVM presently has an application to support the latter in review. The NCRR Centers of Biomedical Research Excellence (COBRE) program has the objective of strengthening an institution’s biomedical research infrastructure through the establishment of a thematic multidisciplinary center. A UVM Food Systems Research Center would focus on the spectrum from food consumption patterns and behavior to nutrient-gene interactions that modulate the evolution of obesity and/or type 2 diabetes and related disease complications with the overall goal of improving public health.

Vermont foundations have a strong history of funding agriculture, environment and health-related projects. Several faculty, including the co-directors of Vermont Institute of Artisan Cheese at UVM, have repeatedly been awarded funding from Vermont foundations for food systems research and outreach. At the national level, UVM food systems work has previously garnered the support of the W.K. Kellogg Foundation.
Foundation, which recently announced a Food and Community program that will invest $32 million over three years to increase access to healthy food and physical activity.

**Measuring Success:** An annual measure of goals achieved will help guide and evaluate the spire’s work both internally and externally. While somewhat speculative, we consider the following benchmarks for the spire’s performance to be ambitious but achievable.

- **Year One:** UVM faculty submit three transdisciplinary proposals to funding agencies for a total of $1 million. The Masters in Food Systems program is launched, recruiting five new students; two new Ph.D. students will also conduct food systems research. Five faculty associate their refereed publications with the food systems spire. A philanthropic campaign is initiated to endow a Food Systems Chair, securing pledges of $500,000.

- **Year Two:** A total of $5 million in grant proposals is submitted, engaging 25 faculty members. Fifteen faculty associate their publications with the spire. The Chair’s endowment reaches $2 million in pledges and a search commences. An additional five master’s students and two doctoral students engage in food systems research.

- **Year Three:** At least $2.5 million in external grant funding is secured. Three publications are produced that are specifically based on the first transdisciplinary grant obtained. Endowed Chair is hired. More than twenty students, master’s and doctoral’s, are engaged in food systems research.

- **Year Five:** Annual external funding reaches $15 million above the 2009 level of $25 million in food systems related research. Faculty in the food systems spire generate 30 refereed journal publications. There is a cohort of twenty-five master’s and ten doctoral students.

These internal metrics are clearly important and they will help move UVM up in national academic rankings. However, the food systems spire also has the capability to make a real difference in society.
The logic model below (Figure 2) provides a brief summary of short-, medium- and long-term external metrics that will be affected by the spire’s work. For example, the study of “farm to school” programs is expected to generate information that can help reduce childhood obesity, improve academic performance, and increase the incomes of local farmers. Similarly, research on regional value chains can generate knowledge that will aid the development of new dairy food products that can succeed in the marketplace, provide reasonable returns to producers and processors and reduce energy consumption. Ultimately, these outcomes will provide the background for policy makers to promulgate legislation that promotes healthier food systems strategies.

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<th>Example Program Areas</th>
<th>Short Term Metrics</th>
<th>Medium Term Metrics</th>
<th>Long Term Metrics</th>
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<td>“Farm to School” (Food, Culture, Health)</td>
<td>healthier menus</td>
<td>fruit and vegetable intake</td>
<td>obesity, diabetes rates</td>
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<td></td>
<td>nutrition awareness</td>
<td>sugar consumption</td>
<td>academic performance</td>
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<td>use of local products</td>
<td>local farm income/profit</td>
<td>farms stay in business</td>
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<td>“New Dairy Products” (Regional Value Chain)</td>
<td>new products developed</td>
<td>sales of new products</td>
<td>food sector profitability</td>
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<td></td>
<td>regional markets established</td>
<td>transportation costs</td>
<td>energy, carbon flows</td>
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<td></td>
<td>farm partnerships designed</td>
<td>sales/profits per farm</td>
<td>land use pattern</td>
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**Conclusion.** There are few societal challenges that provide greater justification for transdisciplinary research than those presented by our modern-day food systems. To date, we have addressed food systems problems in relative isolation, whether it’s reducing obesity, improving farm viability, protecting water quality or developing sustainable bio-fuels. Clearly these problems can best be solved by seeking solutions that address their multiple root causes, using new knowledge that explains complex relationships. UVM is already providing leadership in this area and it will continue to do so. Creating a food systems spire of excellence at UVM will bring this work to a higher level by synergizing existing efforts, catalyzing bold thinking, and stimulating the acquisition of additional human and financial resources. The result will be elevated recognition for UVM and its faculty, and long-lasting contribution to the greater public good.
References.


