Multi-Scale Dynamics in Biological Systems

**Strengths:**
The large number of faculty in the biological and bioengineering sciences, who are active in research relevant to this spire, are responsible for much of the university’s funding.
The concept is for a genuine transdisciplinary effort.
The multiscale dynamics approach was identified as a strength.
Private sector spin offs were likely.
Many facilities are in place to support this spire.
There are connections to Complex Systems and Neuroscience.
There is potential for impact on graduate and undergraduate education.
Potential future funding sources are identified.

**Weaknesses:**
Lacks focus. Topic of multiscale dynamics seems forced.
Need for a PhD program in multiscale dynamics was not made.
Return on investment was not convincing; there would be little value added beyond what the same people would do anyway for funded research. If no spire investments were made, there would be the same funding outcomes.
Specific collaborations among faculty of the six core areas would have been helpful.
What would make the curriculum and graduate research transdisciplinary and innovative?

**Recommendations for Revisions:**
This proposal was widely regarded as well written. It came across as interesting, different and transdisciplinary. The data on grant funding are compelling. Try to keep these attributes in the revision.

That said, we recommend that the working group address the following:

- If the vision of the working group is that the spire would build bridges like spokes emanating from a hub, articulate this vision more clearly and give some examples. Give examples of potential recruitments and how they would connect a discipline (department) to the transdisciplinary research. Describe why the spire would be attractive to applicants. Presumably some of the bridges would be to Neuroscience and Complex Systems; make these bridges more clear or concrete and take this opportunity to show how UVM biology and bioengineering would be drawn into this spire.
- Make it clear how this spire would be seen by someone being recruited to UVM. Explain what they would be joining and why they would find it attractive.
- Make tangible connections among the 6 core areas and investments in the spire or sub-spire.
• Address why this spire would improve the return on investment considering the enormous amount of funding that the spire researchers already bring into the University. What is the value added?
• Describe how the spire would take studies of multiscale dynamics to the next level.
• An internal but important issue: why would this program be more effective in recruiting graduate students than the existing narrow specialized biomedical graduate programs that struggle with recruitment?
• The term M3 was distracting to some reviewers. Extension of the scales to the population level seemed extreme. Is this necessary?
• To some reviewers, cohesion is missing. It is not convincing that a project will tackle nanoscale motors to robots. A different kind of cohesion issue is that it would not bring biology together. If a focus at the expense of inclusion is necessary for the collaborative interactions that you are envisioning, then state this.
• Leave some details for the implementation phase: Avoid discussion of the costs of the spire - $1M per hire etc. This may seem low to some of the reviewers. Leave the costs to the next phase. Likewise, avoid discussion of how GTAs should be redistributed. Presumably the reviewers will assume that resources will be made available and redistribution is an inside UVM issue.

Recommendation: This proposal should advance to external review.
Complex Systems

The Final Review Council saw many strengths in this proposal and a few challenges, which led to suggested changes before proceeding in the review process.

Strengths

- A proposal which was well written.
- Truly a transdisciplinary proposal.
- Substantial potential for funding.
- The potential for a Ph.D. program, as the first in the country in CSYS, could lead to recognition of UVM in this area as could the creation of tracks in existing Ph.D. programs.
- The Certificate of Graduate Studies, initiated in Fall Semester, 2009, should “feed” graduate students into the Ph.D. program(s).
- The recruitment of CSYS pioneer Stuart Kauffman to UVM provides instant name recognition for our University in Complex Systems.
- The existence of a core faculty with interest in CSYS, particularly in computational science departments.
- The potential for business alliances and economic development.

Weaknesses

- The proposal did not articulate adequately that CSYS is a research area (discipline) rather than a computational tool.
- The cost, even at the low end scenario, seemed expensive in terms of faculty hires.
- New hires should be considered outside of core CSYS department.
- The potential link to undergraduate education was underemphasized.

Recommended Changes

- Build a better case for CSYS being a discipline.
- The rationale for new faculty lines, and departments in which they would be assigned, should be developed further. How these hires will facilitate the new Ph.D. program and/or research tracks should be delineated.
- Comment further on undergraduate education.

Summary

This is a proposal with strength and promise. With some revisions, it can be excellent.

Recommendation This proposal should advance to external review.
Culture and Society Proposal

Prior Review Results:

Negative: Council of Deans, Distinguished Faculty, Senate Executive Council,
Senate Exec.Council+Review Panel
Negative as spire, but positive as center: Senate Review Panel
Faculty Senators' poll: 27 yes, 19 no

Strengths:

There was unstinted admiration for the committee's ability to have crafted a proposal within the parameters of its virtually limitless domain (culture and society). Inclusiveness was a strong feature of this proposal (but also its weakness), reflected in a flexibility that would allow widespread participation on the part of faculty and students (both undergraduates and graduates). Enthusiasm for the proposal focussed on recognizing the high quality of UVM faculty and diversity of their research, and supporting the intellectual value of collaborative conversations and potential for creative synergies that could be derived therefrom. Compared to other proposals, this one was relatively cheap, and the kind of institute delineated seemed a workable concept--one that could and perhaps should be developed outside the TRI framework. Reluctance to create a transdisciplinary doctoral program was viewed as a strength in light of the fact that such programs elsewhere currently languish, and not only because of a dismal economic climate.

Weaknesses:

The same attempt at inclusivity was also the proposal's chief weakness, for reviewers missed meaningful and substantial presentation of themes and topics. Missed as well was clarity on identification of emerging issues of transdisciplinary nature. The potential for funding is low in humanities (although this might be a reason for internal support of a center such as this). The proposal did not address the wider community audience, if any ("for whose benefit are you working?" was asked at the Town Meeting session), nor did it speak effectively of ways that the proposal would enhance existing programs or collaborate with existing interdisciplinary groups and centers. The focus on research, once graduate program was eliminated from consideration, left vague the possibilities for curricular enhancements of existing graduate and undergraduate programs. Overall, there seemed no strong claim for the proposal to be unique to UVM, and it was unclear how the proposal would foster a means to generate significant knowledge.

Suggestions:

Welcome would be more specific focus on certain themes, defined from bottom up by faculty with interrelated interests. Consider ways that humanities, social sciences (and even fine arts!) might take advantage of an opportunity to become domains within complex systems.

Recommendation: This proposal should not advance to external review.
Environment

**Strengths:** It was widely agreed that Environment is part of the institutional fabric of UVM; it is part of our branding as a university, it is immensely relevant to our curriculum, research and for training of students at all levels for the challenges that they will face in the future, and it was widely affirmed that Environment should be a future focus area. Although not articulated in the proposal, the opportunity for undergraduates to “feed” the graduate program was seen as a potential strength. The proposed summer institute offering graduate courses by existing and visiting faculty was viewed as having merit. Because of these fundamental strengths, a consensus view was that everyone wanted this proposal to rise to the top.

**Weaknesses:** There was far more commentary on the weaknesses of the proposal than the strengths. The five research areas of the spire are not integrated and the proposal fell short of building on the foundation of inherent institutional strengths. The proposed activities do not make a convincing case for building a consortium of research activities among allied faculty, nor is it clear how most of the requested investments would fuel a spire of national prominence. Although modeling provides focus, how does this differ from modeling at other universities? There are missed opportunities to cross-bridge allied academic units, particularly the physical and health sciences, with research, graduate training and innovations at the undergraduate level. Some comments:

“The spire does not go far enough or do enough. It is too modest and underwhelming. It is especially too small given the talent on campus that could have been drawn upon.”

“It sounded like most of the pieces [of the proposal] belonged in other ones. It was not essentially different from the rest of them, it was exclusive rather than inclusive, the ideas were scattered”

“Environment is completely scattered on campus and this proposal just demonstrates that.”

“Suggestions for improvement were to focus on one area, and partner with food systems and/or complex systems.”....”or Policy Studies.

**Recommendation whether to advance to external review:** The assessment was not to forward to outside review.
Food Systems

**Strengths:** This is already an area of active interest at the University of Vermont, and an area of strong undergraduate interest. It is also important to recognize that in the current economic transition our country is going through it is likely that “relocalization” and the development of robust food systems will be an increasing area of national interest. The committee was enthusiastic about its fits to the University’s mission to the state. It was felt that this spire was potentially much stronger than revealed by the proposal, particularly because there was broad interest throughout the University and Medical school in various aspects of food systems, and the health implications of diet. This is also seen as an area where the potential for recognition of UVM is high, especially if global agriculture and food service were developed as part of the spire.

**Weaknesses:** As currently written this is nearly entirely a spire within CALS, with some participation from the medical school and the school of natural resources, but essentially no CAS representation. This is a problem from the perspective of undergraduate education because many, if not the majority, of students that have interests in some aspects of food sciences are likely to be in CAS, thus as written this spire potentially disenfranchises a large portion of the UVM undergraduate population. The proposal would be much stronger if it tied in with some important undergraduate programs such as Environmental Studies and Environmental Sciences, and with CAS departments such as Anthropology, Political Science, Sociology and Economics.

The committee felt that the proposal was going in the right direction, but we have to be sure that its transdisciplinary reach stretches across the University. As written there is a lack of pure natural sciences. If this spire to develop to its full potential it must incorporate pure researchers from areas such Plant Biology, Biology, or other pure science field, as well as more theoretically oriented social science departments. Also noted was that the proposal failed to embrace broad areas of culture and sociology, and as a result failed to develop the human health and wellbeing component that will be of interest to medical students and undergraduates.

The committee concluded that while the concept was exciting the scholarship component of the proposal was weak. The proposal does not outline the quality of the researchers that are participating. Some metric (number of publications, number of citations, individual grant dollars obtained) to verify that the assembled group is indeed of high stature and can develop this spire needs to be included. In addition, although the four areas were mentioned and discussed separately, they were not integrated, thus the “systems” analysis aspect of the proposal was lacking. It was also brought to light that the Food Systems group had recently submitted an IGERT proposal, and that could be used as a source of material to rapidly revise the spire proposal.

**Decision:** The committee voted to advance this proposal to external review, conditional on revising the proposal to strengthen the research and scholarship component. It is recommended that the Food systems IGERT be used as a framework for revising the spire proposal to broaden it, to add emphasis to the social, cultural and pure science aspects of the spire, and to document the quality of the faculty and their ability to support this spire.
Neuroscience, Behavior and Health Proposal

Overall this is an excellent proposal that merits consideration by the external review panel. Multiple review panels strongly endorsed the proposal, which builds on outstanding strengths and collaborative interaction among a large group of faculty distributed across multiple departments and colleges. The research base of the potential spire is supported by successful groups in multiple departments and by substantial collaborative programs. Perceived impact on both graduate and undergraduate education is very positive. Undergraduate students are currently active in neuroscience research laboratories and this spire would enhance those opportunities. The newly approved BS in Neuroscience will draw a new population of undergraduate students to UVM with specific interest in neuroscience. The focus of the spire will enhance interest in three current successful graduate programs (Neuroscience and the Clinical and General/Experimental Psychology Programs). A new track that bridges these programs and the Clinical and Translational Science graduate program will provide a unique opportunity for graduate students to train in the relationships between neuroscience, health and behavior and add opportunities for graduate training in disabilities and interventional neural sciences.

Although neuroscience and behavior programs are not unique, the specific focus of transdisciplinary neuroscience approaches to health and behavior presents a niche in which UVM has considerable strength and the potential to excel with focused investment. Extramural funding is available from a number of sources, including a new institute-wide initiative to promote research on behavior change expected soon from the NIH.

The spire proposal would be strengthened by clarification of the associated costs. Emphasis on the new building should be tempered as the building is already in the planning stages, and is not fundamental to the success of the spire. Though the fact that faculty could be added in multiple departments/areas indicates breadth in the spire, faculty needs should be prioritized with respect to areas that would be most beneficial to build core strengths. Increased technical infrastructure in neuroimaging is critical to the spire; more discussion of funding sources for equipment would assuage concerns that the spire is expensive.

The focus of the spire on the span of molecular to behavioral sciences to address human disease and disability in which behavior plays a key role is broad, but could benefit from more community inclusion. Synergies with the food systems and public health groups offer possibilities for expansion of translation of new knowledge to the community. Additionally, inclusion of more focus on behavior in the context of environmental and socioeconomic effects and on gene/environment interactions would enhance the proposal.

Though there is room for improvement, the final review council rated this proposal as excellent.

Specific comments for Neuroscience Spire group:

For the building: consider an approach of discussing the fact that the building has been proposed and is planned – find out where it sits currently on the rankings list of priorities.
presented to the board of trustees. Then center the request related to the building around taking that opportunity to co-locate the grad programs to enhance interactions.

Faculty request was confusing. Some groups thought you asked for a handful of faculty (less than 5) and others thought you asked for 12. After discussion, agreed that you wanted two for sure (translational behavioral or cognitive) to fill a gap and then the other list were just examples of places to add depth. If that’s the case, make more explicit. Computational neuroscience is weak here and a hire would complement complex systems.

P3, 1st paragraph, last sentence: martial should be marshal

**Recommendation:** This proposal should advance to external review.
POLICY STUDIES
FINAL REVIEW PANEL SUMMARY

The final review panel voted unanimously not to send this proposal forward for external review.

That said, the panel found several important strengths in the proposal. It is a truly transdisciplinary initiative that seeks to build on existing faculty strengths. The tie-in to the Jeffords Center is a natural connection to an existing, although new, campus institution. The idea of a PhD program in policy studies met with favor, especially given that there are master’s degree programs at UVM that could feed into it.

There are a number of ways in which the proposal could be strengthened for the next round of TRI proposal submissions. Overall it was felt that the proposal needed more development to be competitive. The policy studies field is already overcrowded with academic programs; how will we distinguish ourselves? The proposal was seen as too diffuse, never focusing on a clear area of expertise in which to achieve national prominence. The panel believed that the unifying theme—diverse methodological and theoretical frameworks—was not a strong basis for differentiation and uniqueness. It was seen as important to move beyond the research interests of the committee members in order to find that niche of uniqueness and excellence. Finally, it was difficult to align the performance metrics with the timeline for the program.

Recommendation: For the time being, the panel recommended additional consideration of the viability of a PhD in policy studies, but outside the framework of a spire of excellence.
Public Health & Health Policy

**Strengths:**
- Describes a Transdisciplinary Public Health Institute (comprised of core faculty in public health & the development of research collaboratories) that develops new knowledge initially in *public health & the environment* and *health promotion & health care delivery systems* – two areas appropriate to examination of the current VT landscape as rural community with a focus on health and environment
- Recognizes the critical health elements facing our nation and the global community
- Has some documentation of ongoing funding through VT’s Blueprint for Health, VCHIP & VCC (environmental carcinogenesis)
- Proposes new alliances among UVM departments, programs etc. that would provide a foundation for an accelerated masters (4 + 1) through established UG majors and a transdisciplinary MPH.
- Makes a case for undergraduate interest as public health is considered an up and coming preferred major for many students nationwide (CHE, 2009).
- Presents an effective student recruiting tool by suggesting an accelerated masters program with access to research fellowships, service learning opportunities and public health internships.
- Offers graduate research fellowships that would be a draw for students as they engage in coursework that facilitates service learning at a local, national and global level and is a viable model to support excellence in graduate education.
- Identifies access to the public health systems in VT and state requests for data and policy analysis which increase graduate research opportunities and service learning courses in public health and health policy—some of which already exist in CNHS, Department of Social Work & COM.
- Has access to funding sources for public health (e.g., AHRQ, Office of the National Coordinator for Health Information Technology, NSF, Substance Abuse & Mental Health Services Administration, NIEHS & other NIH venues). There are opportunities for private and public funding; most funding to date has been through the State of VT and MCHB (about $7 million each year).
- Describes broad research capacity in public health and health policy at UVM through the Center on Aging; CDCI; Transportation Research Center; Gund Institute for Ecological Economics; Jeffords Center; Office of Nursing Workforce, Planning Research & Development; Vermont Genetics Network & programs in integrative medicine with 600 researchers that have an established scholarship record and roughly $56 million dollars in funding in the last 10 years.
- Identifies the CCTS as an existing infrastructure that could support the PHHP Institute. There are several institutes and centers already in existence that could support a phased in approach to the initiative.

**Weaknesses:**
- Needs to develop faculty recruitment potential as it is unclear who we have at UVM now, and what leadership & expertise in public health & health policy
would attract new faculty researchers at a research level and would attract new faculty. The attraction to new faculty may lie in the ability to get their ‘arms around the state’ as it serves as its own laboratory—this might be appealing to new faculty with existing collaborations and access to FAHC, COM and CNHS. The growing strength in informatics might have an appeal for those interested in population-based studies or our environmental focus for those interested in health & the environment, but VT does not have the national and international connections needed to attract this level of faculty.

- Lacks a unique niche that can compete with a number of strong public health programs across the country.
- Needs a convincing focus for excellence that would fill a nationwide void (public health care delivery systems were mentioned but not developed)
- Is not designed to support doctoral education.
- Has not defined the research fellowships. It is unclear if these are for undergraduate or graduate students or faculty or all three.
- Identifies opportunities with GE and IBM to partner with UVM on ventures to move forward health care technology; however, this was not the area of initial spire focus.
- Needs a clear description of how the collaboratories will be developed and function, specifically, how Vermont would be used as a “living laboratory.”
- Has a disadvantage in competitive funding arenas because a school of public health, a health sciences research center, and a program in epidemiology do not exist at UVM.
- Lacks the needed demographics, particularly from a research perspective (e.g., VT does’t have the diverse population needed for longitudinal studies).
- Lack a curriculum with a research focus that would give it uniqueness & doesn’t specifically define the likely programs that could feed into the framework of the proposed spire.

**SUMMARY:**

This proposed spire recognizes the critical elements facing health and health care at a state and national level and has designed an institute with a focus on developing faculty, research collaboratories and coursework at the undergraduate and graduate level (at least at a master’s level). There are existing strengths in the access to state funding and relationships already established with AHS in examining health promotion, using VT as a rural health laboratory, and an existing CCTS infrastructure (although needed funding is still pending). The challenges are the ability to attract top quality researchers, faculty and students when there are numerous existing high quality programs around the country. This would require UVM to strategically define their unique focus on health and the environment, and health care promotion and delivery in a rural setting that can be a model for other rural settings. To attract students, there would be a need to specify the unique research fellowships, service learning opportunities and internships that would be available at a national and global level. A unique niche with a national audience would be important but was not developed in the current proposal. Although some felt the demand for undergraduates was absent, the proposal did identify data from the Chronicle of
Higher Education (2009) suggesting that public health is one of the top 5 up and coming majors. There was also some question about successful funding but the proposal indicates there is approximately $8 million dollars in public health funding annually although the vehicles for this funding have typically been state and MCHB dollars. The challenge lies in the ability to build from disparate strengths to achieve an excellent curriculum and research agenda, which takes significant time and resources. There were suggestions that this spire and policy studies might be merged to more clearly define a spire that was achievable, although the competition is significant. In place programs nationwide with well-developed curricula and research foci make it difficult for this proposal to move forward. The Vermont demographics also make the study of diverse populations, which is critical for the study of public health policy, challenging. It will be important for those committed to this area to continue their work, define the clear connections with Vermont’s Blueprint for Health and VCHIP as a model program at the national level, highlight the unique research currently being done in the identified niche, and explain how Vermont can become a research laboratory considering the population challenges.

Recommendation:

It was recommended that this proposal not move forward to external review at this time. As the interest in and development of public health and health policy grows at UVM, this may be a consideration for a future spire proposal.