I. Introduction
The Transdisciplinary Research Initiative (TRI) was designed to help map the University’s existing and emerging capabilities; to identify those research, teaching, and public service areas that hold the strongest potential for distinction; and to use the findings to guide us in pursuit of our goal of becoming a recognized center for learning and discovery in selected fields (Spires of Excellence). The initiative’s focus during academic year 2009-10 was on the identification of the initial Spires of Excellence: Complex Systems; Food Systems; and Neuroscience, Behavior & Health. During the 2010-11 academic year we began the process of building the administrative infrastructure necessary to support the Spires. Simultaneously, the faculty members associated with these three research areas established communication networks, identified opportunities for collaboration, and further explored the Spires to identify particular areas of focus.

This year can be characterized as the year in which Spire Steering Committees took full ownership of their charge to develop trandisciplinary excellence at UVM by hosting innovative outreach events; bringing in distinguished colleagues from around the world for lectures and seminars; launching innovative curriculum ideas in both undergraduate and graduate education; developing competitive grant submissions with state and regional partners. They also developed distinctive “Spire voices” in communications on their websites, twitter feeds, and research listservs and continued to actively engage the campus community in their scholarship, from students to senior administrators.

II. Spire Leadership: Steering Committees & TRI Advisory Committee (TRIAC)
Spire Steering Committees: As in 2010-11, all three Spire Steering Committees continued to be led by a designated Chair and Vice Chair (or Co-Chair in the case of Food Systems) and continued to hold regular meetings, usually biweekly. In 2011-12, Steering Committees were also given the authority by the Provost and Vice President for Research to make changes to their committee membership as needed. For Food Systems, changes to membership included several additional and valuable members, including former Associate Provost and former Dean of the College of Agriculture and Life Sciences, Professor Rachel Johnson. In NBH, the previous years’ Vice Chair chose to step down from the committee due to time-sensitive research
demands and another committee member, Professor Mark Bouton, took on a leadership role as Vice Chair with Chair Rae Nishi. Additionally, Professor Rex Forehand joined the committee in place of Tim Stickle, who is on sabbatical this academic year. Finally, Complex Systems leadership and membership remained largely the same as in 2010-11, with the addition of a Vermont Complex Systems Center Affiliate, UVM alum, and Site Leader for the MITRE Vermont Office, Dr. Brian Tivnan, to regular committee meetings.

Transdisciplinary Research Initiative Advisory Committee (TRIAC): Also in 2011-12, the Transdisciplinary Research Initiative Advisory Committee (TRIAC), a conjoint committee of senior administrators and the Faculty Senate Research, Scholarship, and Graduate Education (RSGE) Subcommittee, began to hold regular meetings and set up a website for more information about the TRI. Led by RSGE Chair Richard Galbraith and Vice President for Research and Dean of the Graduate College Domenico Grasso, TRIAC recognizes its charge as the oversight of, and assistance to, all Spires in matters concerning their progress, including meeting stated metrics and goals.

Appendix A lists all current Spire Steering Committee and TRIAC members.

III. Faculty Recruitment – Spire-Related and Spire-Driven Faculty Recruitments
Each spring, Deans are asked to submit a slate of faculty recruitments proposed for the following academic year. These proposed recruitments are evaluated in the context of four critical areas: contribution to undergraduate education; contribution to graduate education; the research foci of the positions; and their potential contribution to strategic priorities such as Spires of Excellence. The Deans proposed a highly strategic slate of tenure-track recruitments for academic year 2011-12, of which 27 were authorized. The research foci of 21 of these positions were in direct alignment with one of our Spires of Excellence. This maximized the use of existing resources and furthered our efforts to build critical mass in Spire areas.

The Spire-related faculty hiring protocol that was developed in academic year 2010-11 ensures that members of the Spire Steering Committees have the opportunity to meet with candidates when they are interviewed on campus, after which they provide a written assessment of the candidate’s potential contribution to the Spire directly to the Search Committee. We are making progress in this more collaborative and cross-college approach to evaluating and selecting candidates, but it is also true that we have further work to do to move some departments away from our former more insular process.

Academic year 2011-12 marked the inaugural Spire-driven faculty recruitment. That is, a new position was created (funded from the internal reallocation of existing resources) for the express purpose of meeting a pressing area of research need as identified by the faculty Steering Committee leading the Neuroscience, Behavior and Health Spire. In this case, the NBH committee identified human genetics as its highest area of need. Working in accord with the Spire-driven faculty hiring protocol, the recruitment was conducted this year. We are in the final stages of that process and are considering a highly-qualified candidate.
IV. FY 12 Investments
Among our long-term goals for the Spires is the expectation that they will generate external funding to support the majority of their research activities. It is necessary, however, to provide them with continuing funding to support their basic administrative needs. In academic year 2011-12, continuing base budgets were established for each Spires as follows:

| Administrative Staffing (salary and benefits) | $28,240 |
| Operating and programming Support            | $25,000 |

Each Spire was also allotted $10,000 from discretionary funds to provide grant proposal writing support. To be sure, these investments are modest in comparison to our expectations for the Spires. We need to identify and provide additional administrative support that will be essential to their success. Investments beyond administrative support will be considered in the context of the entire slate of strategic investments that is established by way of the Strategic Initiatives Project. In addition to the above administrative investments was the investment of salary, benefits and start-up resources in support of the Spire-driven hire in human genetics. This investment will likely exceed $350,000.

V. Plans for Future Spires
There is a general consensus on campus that we should allow the three initial Spires to grow and develop to a reasonable extent before pursuing additional Spires. After consultation with Faculty Senate leadership and TRIAC, we have decided that during academic year 2012-13 we will let campus know that there will be a formal identification and designation process during the following year, in 2013-14. There will be no pre-specified areas from which the new Spires will be selected. Faculty members will have a full year to self-organize around topic areas that are of most interest to them in anticipation of the process that will commence the following year. This timeline will allow our new president to be on campus, and the SIP process to be underway, before we consider creating more Spires.

VI. Annual Steering Committee Reports
In 2011-12, all three Spire Steering Committees actively advanced their charge to develop transdisciplinary excellence at UVM. Utilizing the resources given to them for administrative support and outreach coordination by the Office of the Provost, all three Spires hosted innovative outreach and informational events, including the MacMillan Trust Symposium on the Brainy Side of Exercise attended by faculty, staff and students from UVM and local colleges, schools and communities (NBH), a research workshop with UVM faculty and state government leaders (Food Systems), and a globally-viewed (in 32 countries), TEDx program and launch of a student reading group (Complex Systems). Complex Systems and NBH also held a distinguished speaker series, with two invitees to campus jointly sponsored by both Spires.

The three Spires also invested in the planning and development of innovative curriculum for both undergraduate and graduate education (e.g. the 2012 launch of a M.S. in Food Systems), wrote and submitted multiple competitive grants and peer-reviewed publications, and focused strategic communications on redesigning their websites, making regular postings to widely-viewed twitter feeds, and maintaining constant communication with colleagues – both on and off campus – through ever-growing research and education listservs. Spires were also actively involved in reviewing potential “Spire-Aligned” and “Spire-Driven” hires.
Preliminary communications with NSF lead us to be optimistic that an Integrative Graduate Education and Research Training (IGERT) grant will be funded in the area of Smart Grids - Technology, Human Behavior and Policy. This proposal involves both the Complex Systems and Neuroscience, Behavior and Health Spires, and leverages our research collaboration with Sandia National Laboratories. UVM has been one of only two states in the country that have not successfully competed for IGERT funding. This 2.6 million dollar award over 5 years would be a testament to the benefits of developing collaborative research emphases at UVM.

With support and strategic guidance from the Office of the Vice President for Research (OVPR), all three Spires were involved in the UVM Transportation Research Center review process that distributed over $1,000,000 in research funds to competitive, transdisciplinary projects that aligned transportation and Spire research interests. Spire related interests by UVM undergraduates and graduate students were also highlighted by OVPR and the Honors College in the annual Student Research Conference, with 157 of the 328 student projects submitted reported as “Spire-Aligned.” This included 65 student projects in Complex Systems, 44 in Food Systems, and 70 in Neuroscience, Behavior & Health.

A detailed list of the 2011-12 achievements as submitted by the three Spire Steering Committees can be found in Appendix B.
2011-12 Transdisciplinary Research Initiative (TRI)
Spire Steering Committee Membership & TRI Advisory Council (TRIAC) Membership

Complex Systems Steering Committee
- Professor Peter Dodds, Department of Mathematics & Statistics, Chair
- Professor Joshua Bongard, Department of Computer Science, Vice Chair
- Professor Jason Bates, Department of Medicine and School of Engineering
- Professor Christopher Danforth, Department of Mathematics & Statistics
- Professor Christopher Koliba, Department of Community Development & Applied Economics
- Professor David Novak, School of Business Administration
- Brian Tivnan, Ph.D., UVM Complex Systems Center Affiliate, MITRE Chief Engineer, Modeling & Simulation Department; Site Leader, MITRE-Burlington

Food Systems Steering Committee
- Professor Jane Kolodinsky, Department of Community Development & Applied Economics, Co-Chair
- Professor Naomi Fukagawa, Department of Medicine, Co-Chair
- Linda Berlin, Center for Sustainable Agriculture and Department of Nutrition & Food Science
- Professor Pablo Bose, Department of Geography
- Professor Rocki-Lee DeWitt, School of Business Administration
- Assistant Professor Tyler Doggett, Department of Philosophy
- Assistant Professor Charles Hulse, Rubenstein School of Environment and Natural Resources
- Professor Rachel Johnson, Department of Nutrition and Food Sciences
- Professor Ernesto Mendez, Department of Plant & Soil Science

Neuroscience, Behavior and Health Steering Committee
- Professor Rae Nishi, Department of Anatomy & Neurobiology, Chair
- Professor Mark Bouton, Department of Psychology, Vice Chair
- Professor Brian Flynn, Department of Family Medicine and Office of Health Promotion Research
- Associate Professor Hugh Garavan, Department of Psychiatry, Psychology
- Professor Sharon Henry, Department of Rehabilitation & Movement Science
- Professor Timothy Stickle, Department of Psychology – on sabbatical
- Professor Rex Forehand, Department of Psychology (replacement for Professor Stickle)
- Associate Professor Haley Woodside-Jiron, Department of Education

Transdisciplinary Research Initiative Advisory Council (TRIAC)
- Senior Vice President, Provost, and Professor Jane Knodell, College of Arts and Sciences
- Vice President for Research, Dean of the Graduate College, and Professor Domenico Grasso, College of Engineering and Mathematical Sciences
- Associate Dean and Professor Cynthia Forehand, College of Medicine
• Professor Richard Galbraith, College of Medicine
• Associate Professor Maureen Neumann, College of Education and Social Services
• Professor Rory Waterman, College of Arts and Sciences
• Associate Research Professor Terri Donovan, Rubenstein School of Environment and Natural Resources
• Professor George Osol, College of Medicine
• Professor George Pinder, College of Engineering and Mathematical Sciences
• Professor Sharon Henry, College of Medicine
• Professor Barbara McIntosh, School of Business Administration
• Associate Professor Feng-Qi Zhao, College of Agriculture and Life Sciences
• Associate Professor Paul Deslandes, College of Arts and Sciences
• Associate Professor Jeanene Light, University Libraries and Information Services
**2011-12 Transdisciplinary Research Initiative (TRI)**  
*Steering Committee Achievements*

**Food Systems**

In 2011-12, the UVM Food Systems Initiative (FS) worked meet all of its early (Year One) goals and metrics set in Spring 2011. Details are listed in the chart below.

<table>
<thead>
<tr>
<th>Food Systems Goal</th>
<th>2011-12 Metric or Activity</th>
<th>Current Status</th>
<th>Source of Support and/or Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Develop New Knowledge</strong></td>
<td>Ensure UVM records number of UVM faculty proposals submitted and grants awarded around FS themes</td>
<td>Steering Committee request of SPA to run monthly reports on FS designation</td>
<td>UVM Sponsored Programs Administration (SPA)</td>
</tr>
<tr>
<td>Award 2011-12 FS Planning Grants</td>
<td>3 reviewed/1 awarded 2012; reporting due July 2012</td>
<td></td>
<td>UVM Deans' Support &amp; Funding</td>
</tr>
<tr>
<td>Award FS Pilot Funds</td>
<td>11 proposals invited for full submission are under review</td>
<td></td>
<td>UVM Deans' Support &amp; Funding (CALS, COM, EXT)</td>
</tr>
<tr>
<td>Award UVM/Community Mini-Grants for FS</td>
<td>Grant round ending; reports due June 1</td>
<td></td>
<td>CRS Food Systems Special Grant Funds</td>
</tr>
<tr>
<td><strong>Develop New Leaders</strong></td>
<td>Work with UVM Summer Institute</td>
<td>Event scheduled for June 2012</td>
<td>UVM Continuing Education Support</td>
</tr>
<tr>
<td>Help students secure UVM Participation in National &quot;Real Food Challenge,&quot; or RFC</td>
<td>RFC formally signed by UVM Interim President Bramley on 22 March 2012</td>
<td></td>
<td>UVM student-led effort / UVM administration supporting institutional change</td>
</tr>
<tr>
<td>Host a UVM Food Day</td>
<td>Event held October 2011; Next UVM Food Day planned for Oct 2012</td>
<td></td>
<td>UVM FS Spire Steering Committee Operating Budget</td>
</tr>
<tr>
<td><strong>Share Knowledge</strong></td>
<td>Host Food Summit Public Conference &amp; Food Systems NE Sustainable Ag Leaders group meeting</td>
<td>Event scheduled for June 2012</td>
<td>UVM Continuing Education Support: Linda Berlin, liaison</td>
</tr>
<tr>
<td>Host 2nd Annual Food Systems Symposium</td>
<td>Event held November 2011 with great inclusion of UVM FS partners</td>
<td></td>
<td>UVM FS Spire Steering Committee Operating Budget</td>
</tr>
<tr>
<td>Launch of UVM Food Systems Masters’ Program</td>
<td>MS Program approved and accepting students for Fall 2012; Applications due May 1; Three FS prefix graduate level courses approved; one cross-listed course</td>
<td></td>
<td>USDA Challenge Grant provided funds for program development (PIs: Kolodinsky and Trubek); UVM Graduate College</td>
</tr>
<tr>
<td>Share Knowledge (continued)</td>
<td>Creation of UVM FS Courses</td>
<td>Continue to need coordination of FS courses across campus</td>
<td>Partners in the effort: CAS, CALS, Public Health, FS, RSEN, ENVS, Honors College</td>
</tr>
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<td>-----------------------------</td>
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</tr>
<tr>
<td>Increase FS Outreach &amp; Engagement</td>
<td>Food Systems Steering Committee supporting regular Twitter, blog, email updates about national, local, and campus FS events</td>
<td>FS Spire Steering Committee Operating Budget (administrative coordination)</td>
<td></td>
</tr>
<tr>
<td>Increase Communication About FS Relevance and Importance on Campus</td>
<td>Conversations with Deans Vogelman, Goldberg, Lantagne, Watzin and Gund Director Ricketts through Steering Committee Invitation (more Deans/Directors meetings planned for 2012)</td>
<td>FS Spire Steering Committee Operating Budget (administrative coordination)</td>
<td></td>
</tr>
<tr>
<td>Increase Transdisciplinary FS Publications</td>
<td>Submitted article for Journal of Food Systems Agriculture and Community Development Under revision: Walking the Talk of Food Systems at a Small Land Grant University</td>
<td>Authors: Kolodinsky, Fukagawa, Roche, Bellerive, Johnson</td>
<td></td>
</tr>
<tr>
<td>Continue Transdisciplinary FS Discussions</td>
<td>Continuation of the Brown Bag Series of last year—panel discussion around a relevant topic—e.g. Labeling of GMOs</td>
<td>FS Spire Steering Committee Operating Budget</td>
<td></td>
</tr>
<tr>
<td>Sustaining Leadership</td>
<td>Develop a plan to institutionalize Food Systems Initiative at UVM</td>
<td>Discussion for transition from volunteer steering committee to identified leader(s) and formal organization (e.g. Center or Institute)</td>
<td>Ongoing FS leadership discussions with Provost and Vice President for Research</td>
</tr>
</tbody>
</table>

**Complex Systems**

In the 2011-12 Academic Year, the UVM Complex Systems Spire significantly developed a timely, strategic focus and saw numerous goals met and accomplishments achieved.

The Complex Systems’ Spire strategic focus choice of “Big Data” -- finalized in Summer 2011 and chosen for its transdisciplinary research potential as well as its ability to bring a diversity of faculty, students, and external partners to the Spire effort -- pre-dated by almost a year the March 2012 announcement of $200M for a national focus on “big data” and data-driven research by the Obama Administration.

Goals and achievement highlights by the Complex Systems Spire in 2011-12 include:

- A highly successful UVM TEDx event in Fall 2011 introducing UVM complex systems expertise and collaborations through an event entitled “Big Data, Big Stories." Event highlights include:
  - 150 RSVPs for campus event (the maximum allowed by TEDx guidelines)
  - 540 unique online viewers of webcast
- 32 different countries represented by viewers of web-streamed event
- “TEDx Editor’s Pick” Award for UVM TEDx talk by Neil Johnson, guest speaker from Miami University (Professor Johnson’s talk has attracted several thousand views on the UVM Complex Systems Center website)
- 100s of on-line views of all UVM TEDx videos bringing new visitors to Complex Systems Center site

**2011-12 Goal Met: Annual Complex Sociotechnical Systems Conference (First one in Fall with a theme of Big Data).**

✓ Co-authorship of an article in *Science*, one of the world’s most distinguished and widely-read science journals, by Complex Systems Steering Committee member Brian Tivnan

**2011-12 Goals Met: Continued Growth of UVM Recognition as an Outstanding Transdisciplinary Research Institution.**

✓ Successful launch of a campus-wide Complex Systems Spire Lecture Series to introduce UVM and the public to complex systems ideas and innovations:
- Four internationally renowned speakers brought to campus, many with potential to be on Advisory Board. Speakers had diverse expertise in complex systems: a cardiologist from McGill; a computational neuroscientist from the Salk Institute, the most published living computer scientist and a member of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine; a scientist from Sandia National Laboratories; and a Chief Scientist of a rapidly-expanding web company (bit.ly);
- Each lecture is professionally recorded and video-embedded on the Vermont Complex Systems Center website in the TEDx model for continued sharing and outreach

**2011-12 Goals Met: Develop of Regular Series of Talks & Lectures using TEDx Style with Video Recordings on Website; Identify and Invite Potential Spire External Advisory Board Candidates to Campus**

✓ Successful Complex Systems Center website redesign and expansion of the “CSC” listserv throughout Vermont, the U.S., and the world
- 7000 unique visitors to Vermont Complex Systems Center website
- Analytics show that visitors to site come from over 95 different countries
- Website visitor views up from approximately 10 views/day over past two years to almost 30 views/day this year
- Almost 350 UVM faculty and staff subscribing to the “CSC” listserv
- Incorporation of Facebook and Twitter to outreach

**2011-12 Goals Met: Continued development of Complex Systems Center website as a knowledge repository Improve Web-based Outreach; Create System to Capture Website Hits and Viewing of Recorded Talks**

✓ Spire support of a Complex Systems Center biweekly journal club for faculty and students, with event attracting 20-30 faculty and students from across campus for each meeting

**2011-12 Goals Met: Expand Reading Groups and Increase Inclusion; Work On Connections Across Campus To Continue Bringing People Out Of Disciplinary Silos**
Support of Complex Systems Steering Committee member involvement in larger UVM research discussions with key external partners, including State of Vermont legislative and government interests as well as industry. In 2011-12, this included the Spire’s involvement in discussions around the Vermont Governor’s STEM education initiative, an effort to study Vermont’s education system as a complex system, and ongoing UVM complex systems project development with IBM Fellow John Cohn, a long-time supporter of complex systems and science education.

2011-12 Goal Met: Continued Growth of UVM Recognition as an Outstanding Transdisciplinary Research Institution

✓ Participated in Vermont Advanced Computing Core facility (VACC) discussions to align long-term Spire goals with potential VACC development as a data storage and processing system that will complement traditional supercomputing (Spring 2012 submission of capital project request by the VACC and Enterprise Technology Services (ETS) for cyber infrastructure were influenced by these discussions)

2011-12 Goal Met: Help Develop VACC as a Data Storage and Processing System, Complementing Traditional Supercomputing

✓ Participated in campus-wide searches for “Spire-Aligned Hires.”
✓ Advocated for a first cohort of complex systems “Spire-Driven Hires” at UVM, with specific focus on expertise in behavioral economics, computational social science, computational finance, and/or digital humanities

2011-12 Goals Met: Complete the Spire-Aligned Candidate Interview Assistance Process; Identify Three Tenure-Track lines of Greatest Need to Spire for Proposal to Provost

Plans for the Complex Systems Spire in 2012-13 include:
✓ Formal creation of an Advisory Board for the Complex Systems Spire
✓ Development of timely and innovative UVM courses in 'data science' for both undergraduates and graduate students
✓ Tighter integration with colleges and units on campus who are not yet well-represented in campus complex systems activities and discussions
✓ Tighter integration with both the Food Systems and NBH Spires in co-sponsorship of events, scholarly exchange, and achieving common goals

Neuroscience, Behavior and Health

In the 2011-12 academic year, the Neuroscience, Behavior and Health Spire continued to develop its base of interest and foster collaborative, interdisciplinary research.

Goal 1: raise UVM and public awareness of NBH through website (http://www.uvm.edu/~nbhspire)

Metric 1: hits on webpage
• 11/7/2010 - 11/7/2011:
  – 914 page views; 514 unique
  – 10,588 page views; 8624 unique

**Goal 2:** Have an impact on engaging the public and the UVM community about NBH

**Metric 2a:** participation in NBH Forum (Feb 6-7, 2012)

• 140 participants
  – 6 Dartmouth; 6 St. Michaels
  – 23 high school students
  – 31 UVM faculty members
  – 29 UVM grad students
  – 13 UVM staff members and postdocs
  – 24 UVM undergrads
  – 12 UVM prospective students for NGP

**Metric 2b:** participation in Macmillan Symposium (March 26, 2012): The Brainy Side of Exercise

• 403 on-site participants
  – 116 Non-UVM (community members plus other schools)
  – 81 UVM faculty/administration
  – 83 UVM grad students
  – 86 UVM undergrads
  – 33 UVM staff members and postdocs
  – 4 speakers

• Plus live web stream

**Metric 2c:** Sponsored Presidential Burack Lectures

• 4/5/2012
  – Thomas Schroeder
  – "Improving Health in America: Why change comes so hard"

• 4/9/2012
  – Louis Ptacek and Ying-Hui Fu
  – "Genetics of Headache, Epilepsy and related disorders"

• 4/18/2012
  – Joel Nigg
  – “ADHD: Mechanisms, causes, and future directions for research”

**Goal 3:** Identify opportunities for collaborations in research

**Metric 3:** participation and development of projects in three Focus Groups and provide seed monies ($7000 microgrants) to foster research collaboration in new areas

Addictive Behaviors group

• 10 faculty members
  – CAS, COM, CESS
  – 7 departments

• Microgrant: Neural mechanisms of stress-induced relapse of drug seeking behavior
  – CAS and COM faculty (ANNB and Psychology)
Stress, Trauma, Anxiety, Mood Disorders, & Pain (STAMP) Group

- 11 members
  - CAS, COM, CESS, CNHS
  - 7 departments
- Microgrant: Genetic Factors Influencing Development of Chronic Pain, Treatment Response, and Neural Reactivity
  - COM faculty (Psychiatry and ANNB)

Developmental Interventions Group

- 12 members
  - CAS, COM, CESS, CNHS
  - 10 departments
- Microgrant: Parent training & exercise: Implications for stress reduction and positive adjustment for families of children with ADHD or ASD
  - CAS, CNHS, CESS
- Also awarded pilot grant from CDCI (Center for Disability and Community Inclusion)

**Goal 4:** Increase the number of NBH associated faculty on campus

**Metric 4:** Participate in search process for new hires

- Spire related
  - Developmental neurobiologist (Biology)
  - Developmental psychologist (Psychology)
  - Neuroscientist/physical therapist (Rehabilitation and Movement Science)
  - Chair, Neurological Sciences
- Spire driven
  - Human geneticist