

The Integrative Center for Sustainable Solutions (ICSS)

A Proposal for a New Matrix Center at the University of Vermont

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1: Introduction

Building upon its land-grant mission, the University of Vermont is increasingly committing to fostering learning and service for the purpose of developing solutions for interconnected environmental and social problems. As articulated in our vision statement, we seek *“to be the nation’s premier small public research university, preeminent in liberal education and the study of the environment and health, and dedicated to providing students with extraordinary opportunities for learning and personal development and to enhancing the cultural, social, and economic life of Vermont, the nation and the world...”*

As solving social and environmental problems requires integrating knowledge across traditional fields of study, there has been a growing interest among faculty in inter and transdisciplinary programs characterized by participatory action research and service-learning. Yet disciplinary and organizational boundaries remain largely intact, hindering the effectiveness of these endeavors. As a result, our efforts are largely relegated to individual, isolated initiatives that fail to fully engage a broad range of students, faculty, staff, and community members.

To facilitate what some have suggested is the “modernization of our land grant mission,” we are proposing a new matrix center that will support integrative research and learning initiatives generated by faculty in collaboration with students, staff, and community members. The center will provide an academic structure with the appropriate institutional and financial incentives able to catalyze and facilitate efforts to develop integrative solutions for the interconnected ecological and social problems we face.

Much of the center’s research focus will derive from a model that brings researchers and students from all colleges, schools, and extension programs together to collaboratively develop holistic, socio-ecological solutions. Problem-based courses will link students with the cadre of faculty, fellows, and graduate students who are working on these research projects. The center will offer new certificates and minors to encourage students to bridge different fields of study and to pursue competencies in areas that may be outside their home discipline. One goal of the Center will be to sponsor interdisciplinary initiatives that will lead to the establishment of new graduate degree programs through the Graduate College.

This new center will be similar in many ways to a few established initiatives at other universities such as the University of Wisconsin, and to new initiatives at other institutions including Columbia University, Arizona State, Duke University, and Michigan State. In fact, many universities are now attempting to encourage transdisciplinary efforts aimed at solving our interconnected environmental and social problems. But UVM has significant advantages in this area, including the depth of faculty resources in our existing colleges and our ability to form effective partnerships with the university operational side. Furthermore, our location in Vermont, a state known for its commitment to civic engagement, participatory government, and local and state government institutions amenable to collaborating with the University provides a unique opportunity to develop solutions to address pressing community needs. Integration is a difficult process, but by building upon the matrix center structure and capitalizing on existing efforts, we have the opportunity to make real breakthroughs at UVM.

This proposal is organized in five main sections. Chapter 2 presents the proposed focus and activities of the matrix center. Chapter 3 discusses the planned structure and governance. Chapter 4 responds to the five criteria the Faculty Senate uses to judge proposed matrix centers. Appendix A consists of the formal “Format for Proposals for a New Curriculum, Academic Program, Research or Service Endeavor” required by the Faculty Senate’s Curricular Affair Committee. Finally, Appendix B presents the Center’s proposed organizational structure, and Appendix C includes a list of potential faculty partners.

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2: Matrix Center Programs

The center will focus on specific initiatives and projects developed collaboratively by faculty, in conjunction with internal and external partners, following an integrative learning approach. A cadre of faculty fellows will facilitate many of the center's projects and courses. New courses will engage students in the action research and experiential learning opportunities related to the Center's projects. Research accomplished in the learning opportunities will be complemented by independent scholarship conducted by Center-affiliated faculty, researchers, and graduate students. The Center will work with faculty from a variety of disciplines to develop interdisciplinary graduate certificates and academic minors to provide a mechanism for engaging both graduate and undergraduate students in center-affiliated course offerings. The Center will also partner with Continuing Education to develop certificate programs accessible by the community or scholars from other institutions, and with Cooperative Extension to better link college research to community needs.

2.1. *Integrative Learning*

The Center will rely largely on a learning theory known as integrative learning. As defined by theorist Jerry Perez de Tagle, integrative learning implies "connecting skills and knowledge from multiple sources and experiences, applying skills and practices in various settings (Kline 1988)." The Center will use a problem-based approach (PBL) to facilitate integrative learning. In its courses and projects, teamwork and critical analysis will guide the educational process. Designed to help students develop solid decision-making and inquiry skills, PBL brings students from a variety of backgrounds together to address real-world problems in a semi-structured environment.

Service-learning and experiential approaches will also be facilitated to help to better integrate the university with the community. Participatory action research will be central to the Center's integrative approach. Participatory action research identifies research topics through collaboration with stakeholders and applying results directly to craft solutions to the problems at hand.

2.2. *Transdisciplinary Initiatives*

The Center's Transdisciplinary Initiatives will provide focus to the Center's research, education, and outreach efforts. Collaborative work plans and budget development will be facilitated by the Center's staff and advisory committees. In addition, the Center will position itself as a flexible environment able to form additional partnerships and award grants to a range of faculty and students through a series of other initiatives and projects as funding allows.

For example, one of the Center Initiatives will focus on complementing the efforts of the Campus Office of Sustainability by providing the academic support structure, faculty incentives, and financial resources necessary to ensure high quality academic engagement in campus sustainability projects. The Center would play a key role for the University by facilitating the

work of the three interdisciplinary graduate assistantships to be funded by the Office of Sustainability.

To develop each Initiative, the Center will engage the university community in roundtable discussions to discuss the Transformative Initiatives concept and foci. A subset of faculty, staff, and community members will be invited to draft full work plans for each of the Transdisciplinary Initiatives. The Center will expand the initiatives by facilitating additional discussions with stakeholders and potential partners. The Center's Director will work with participating faculty home academic units to draft MOU's for faculty who will become Center affiliated due to their participation in the initiatives. The Transdisciplinary Advisory Committee will be charged with reviewing and approving each Initiative's work plan and associated budgets.

2.3. Transformative Projects

To engage a broad range of academic units, the Center will fund "Transformative Projects." While smaller in scale than the Transdisciplinary Initiatives, these projects will similarly involve forming teams of faculty, students, staff, and community members who will collaborate on developing and implementing solutions for interdependent social and environmental problems.

The center's annual "Community Congress on Integrative Solutions." will serve as the Center's primary public event. At the Congress, the outcomes of previous projects will be presented and the Center's staff will share the Transformative Project concept and development process. The Congress will also serve as a venue for initiating dialog on potential projects through group discussions. Following the Congress, project ideas will be officially solicited in a formal call for pre-proposals.

The Center's Advisory Committee will be responsible for selecting the projects to be further developed. Project teams will be asked to create a new proposal with the assistance of the Center's Project Manager. The Advisory Committee will be responsible for approving each project and their associated budget. As needed, the Center will provide ongoing support and guidance to aid in project implementation.

2.4. Course Offerings

The Center's associated faculty and researchers will create a set of Center-affiliated courses. These courses will fall into two categories: solutions-oriented courses, which focus on solving real-world interdependent environmental and social problems, and online courses, which provide students and community members with web-based course materials and activities. The Center will work with faculty to develop interdisciplinary courses geared to undergraduates that are based in approved academic units. It will also establish an interdisciplinary graduate curriculum, offer graduate courses, and will partner with Continuing Education to offer non-credited courses to the larger community.

Solutions-focused courses

Solutions-focused courses supported by the Center will engage students, faculty, staff and community partners as they collaboratively pursue solutions to interdisciplinary, real-world problems. Grounded in experiential learning models such as service learning or problem-based

learning, these courses will draw upon the wisdom of education philosopher and UVM alumnus John Dewey and complement the research conducted in the Center's initiatives and projects.

Online courses

The Center's online courses will capitalize on the strengths of the Internet and new technology tools while providing a new means of public outreach for UVM's academic units. This platform will enable educators to create a variety of resources available to professors teaching the course within a classroom or entirely online. Courses will encourage intellectual collaboration and thinking and consist of synchronized videos and presentations by professors from different disciplines, interactive work concentrating on skills from different fields, and open-ended debates and discussions on forums.

2.5. Fellowships

Multiple types of fellowships will be offered through the Center to help achieve its goals. They will include full and part-time fellowships for faculty, graduate and undergraduate students, as well as for external participants from the business, government, and NGO sectors. Faculty and external participants will be involved primarily through part-time fellowships during on the summer intensive session. Students will be offered both full-time and part-time fellowships. The fellowships will allow substantive, paid work by a broad and diverse set of participants on the courses, initiatives, projects, and other activities of the Center.

2.6. Certificates and minors

Certificate programs and minors allow bridging across many different disciplines and allow students to pursue competencies in an area of study that may be outside of their field of study while maintaining a disciplinary home. The center will work with the Graduate College and faculty from a variety of academic units to develop new certificates. It will collaborate with departments to develop new minors to provide an incentive structure for engaging a range of undergraduate students in the Center's associated courses and research projects.

2.7. Outreach

A commitment to outreach will be an aspect of all of the Center's research, curriculum, and supported projects. Its participatory action research approach will link college research directly with community needs. Problem-based courses will regularly involve stakeholders from the larger community. The Center will partner with Continuing Education and faculty from a variety of disciplines to develop certificate programs accessible by the community or scholars from other institutions. Its online courses will be designed to be broadly accessible to a national audience. The Center, where appropriate, will partner with Cooperative Extension to collaborative on outreach programs.

The Center's annual Community Congress on Integrative Solutions will be planned to attract regional attendees and provide an opportunity for information dissemination, networking, and to highlight the Center initiatives and supported projects. In addition, the Center's Initiatives and Projects may involve community workshops, community programming, and permanent exhibits. Public seminars may also be held in conjunction with Center related courses.

3: Center Structure and Governance

The Center will be an entity owned and governed by the University of Vermont. It will both cultivate current efforts underway at the University's colleges and schools while facilitating the formation of new partnerships across a wide range of campus units. Collaborations with external organizations such as the City of Burlington, Fletcher Allen Health Center, the Intervale Foundation, and other schools, colleges, and universities will be an important aspect of its approach.

3.1. Staff Structure

Professor Robert Costanza will serve as the Interim Director of the Center, and a search for the director of the center will be initiated once funding is secured. The Director will report to the Provost of the University of Vermont. The Provost will have final authority over all matters pertaining to the operation of the center, including the appointment or discontinuation of the appointment of the Director. Similar to the UVM Transportation Center, we anticipate a lean administrative structure with two additional staff positions; a project manager and an administrative assistant. This and other reporting arrangements are detailed in the accompanying organizational chart (Appendix B).

The center director and staff will be responsible for:

1. Management of the center, including financial tracking
2. Collaborating with existing academic units in strategic faculty hiring processes
3. Participation in Transdisciplinary Initiatives
4. Outreach and promotion of the center and its work
5. Management of student programs
6. Partnership with internal and external groups for projects and conferences
7. Proposal development for additional research and educational programs
8. Tracking and preparation of performance metrics
9. Publication of the website and center reports
10. Dissemination of project results including research journal papers
11. Internal UVM reports on operations and programs of the center as requested by the UVM Office of the Provost and the UVM Board of Trustees.

3.2. Advisory Committees

Provost's Advisory Committee

As described in the description of Matrix Centers in the Faculty Handbook, the Provost will appoint members to and convene a Provost's Advisory Committee. Its members will include Deans or their designees of all eight Colleges and Schools and Cooperative Extension, the Vice President for Research and Dean of the Graduate College, Deans or their designees and

representatives of external partner organizations. This group will be responsible for advising the Provost on all matters relating to the function, structure and operation of the center to ensure appropriate balance in resource allocation and utilization. The Committee is also expected to play a role in strategic analysis and planning for future Center goals.

Director's Advisory Committees

Two committees concerning the operation of the center will advise the Director:

The Transdisciplinary Advisory Committee

This Committee will be comprised of at least one faculty member from every College or School at UVM, a representative from Cooperative Extension, one student representative, one non-UVM affiliated Vermont resident, and one staff member. Members will be individuals who are actively involved in some aspect of center research, education, or service, and have an appointment within the center. The Committee will meet monthly and will be involved in more ongoing operations of the Center, including reviewing and facilitating the development of transformative projects.

The External Advisory Committee

The External Advisory Committee will be comprised of three to four individuals from outside the University who are innovators in integrative, solutions focused education, research, or service. They will meet once a year to hear detailed reports on the activities of the Center. They will also review the structure, function and operation of the Center and make written recommendations to the Director, the Transdisciplinary Advisory Committee, the Provost and the Provost's Advisory Committee. The function of this Committee will be to provide an independent evaluation of the Center from an outside perspective and help the Center to maintain its balance and competitiveness.

3.3. Faculty Access and Appointment

UVM faculty from any College, School, or Cooperative Extension Program will have access to the resources and expertise contained within the Center and will be actively encouraged to participate in the Center's activities. Some faculty, however, will apply for and receive partial to full salary support from the Center and as such will be dual-appointed, Center-affiliated, or full-Center faculty.

Each initiative, course, project, or certificate, will be led by a faculty or staff member with particular expertise and experience relevant to the activities. Individual staffing patterns will range from minimal (i.e. 0.20 FTE) to substantial (.90+ FTE). A number of Faculty fellowships (paid and unpaid) will be available for affiliation with the Center to work on projects, courses and initiatives.

As provided by the matrix center structure, all faculty appointments and tenure homes will be in existing schools, colleges, departments, or other appropriate units of the University. The Center

will provide input to academic units in RPT processes. Indirect costs generated by research sponsored by extramural funding will be shared by administrative units, negotiated on a project specific basis. Center and department's additional shared responsibilities will include joint recruitment, interview, and vetting processes, faculty salary sharing, and a joint commitment to provide, by appropriate negotiation, start-up funds, space, technical support, equipment, and service and teaching assignments. These commitments will be negotiated and formalized in Memoranda of Understandings between the Center and the relevant departments, schools, or colleges.

The Center's staff will collaborate with the University's Colleges and Schools in strategic hiring processes to help ensure that the University has expertise in the Center's themes of inquiry. It may cost-share interviewing and recruiting costs for these searches, as well as contribute a proportion of salary and start-up funds for new Center affiliated faculty, as outlined in negotiated Memorandum of Understandings.

3.4. Evaluation Mechanisms

An ongoing process will evaluate the effectiveness of this collaborative in cultivating the desired outcomes presented in this proposal, which will include:

Periodic Academic Review.

The University of Vermont's Faculty Senate has an established mechanism for periodic academic review. The academic review process, conducted on a five-year basis by the Curricular Affairs Committee, guides institutional planning and programmatic delivery. Under their auspices, the matrix center will be evaluated based on its contribution to the university's mission, its external funding base, its program quality, program demand, societal need, effectiveness, efficiency, and quality control mechanisms. The outcome of this review determines whether the center remains a viable entity or will be dissolved. In addition, curricular programs developed by the Center will be reviewed in the context of the regularly scheduled Academic Program review process.

Internal Center Review

In addition to the required UVM Senate Review, there will be an annual report and newsletter prepared by the center. The report will include the following performance metrics:

- Number of Center-affiliated faculty
- Number of research projects selected and rejected for funding
- Summaries of student and community member project evaluations
- Number of students supported by assistantships and fellowships
- Number of research reports published
- Number of research papers presented at academic/professional meetings
- Number of courses offered that were considered part of the center's curriculum
- Number of students participating in the center's research projects
- Number of advanced degree programs offered that were Center related
- Number of students enrolled in those Center related advanced degree programs
- Number of online learning classes, seminars, and symposia conducted
- Number of participants in those events

- Press coverage as a metric of public education

Internal Project evaluation

Each initiative and project will also undergo periodic review to maintain Center funding. The review process will be conducted by the matrix center's internal advisory board and will evaluate each program's quality and effectiveness. Each initiative will be required to establish and report on measurable outcomes to help gauge its success.

3.5. Location, Infrastructure, and Space

The staff, equipment and other resources for the Center will be housed in one primary location on the UVM campus. The Provost has committed to assisting the Center's Interim Director in locating three contiguous offices to house the Center's Director, Project Manager, and Administrative Assistant, once funding is secured.

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4: Faculty Senate Matrix Center Criteria

A set of criteria have been developed by the Faculty Senate to provide a standard against which the organizational structure and plans of an aspirant Center will be judged during consideration of designation as a Matrix Center. Following are the five established criteria, each with an ensuing section describing how the Center meets each criterion.

1. Clear evidence that that the Center’s areas of focus are consistent with and supportive of the mission and strategic goals of the University and with societal beneficence.

The vision for UVM, as articulated in our vision statement, is oriented toward developing solutions to the social and ecological problems our world faces. We wish *“to be the nation’s premier small public research university”* with strengths in *“the study of the environment and health”*. The Center seeks to provide students with the experiences articulated in the mission; *“extraordinary opportunities for learning and personal development and to enhancing the cultural, social and economic life of Vermont, the nation and the world.”* And the Center’s focus on community partnerships will increase UVM’s ability to be *“a place that provides an exceptional student-centered experience extending beyond the classroom.”*

President Fogel, in his vision statement titled “Signature’s of Excellence,” singled out transdisciplinary initiatives and service-learning. He suggested we must leverage our small size and heritage *“by coupling the continued building of strength in the disciplines with transdisciplinary research collaborations...and by enhancing academic rigor and quality in undergraduate, graduate, and professional education, especially through a focus on the practical application of knowledge and on experiential learning.”*

In summary, the goals of the center directly address the University of Vermont’s vision and strategic goals. Its emphasis on transdisciplinary partnerships, the study of the environment and of health, experiential learning, and promoting the societal mission of the University, are consistent with the University’s guiding documents, and the original mission of land grant institutions.

2. A demonstrable programmatic need for coalescence of at least two established academic disciplines from at least two colleges or schools possibly with one or more emerging disciplines.

It is increasingly recognized that ecological and social systems are extremely complex, and adequate assessment requires the integration of knowledge across disciplines. A key endeavor for the Center will be to form teams of faculty, students, and staff drawn from every college and school at UVM in collaboration with community members who will apply, a holistic, solutions-focused mindset to a range of social and environmental problems. For example, it may draw on Arts and Sciences, Business, and Engineering and other colleges in developing new graduate

degrees, such as a new track within the new policy PhD currently being developed in a campus-wide initiative.

In recent years, there have been attempts by faculty members in the College of Medicine, College of Agriculture and Life Sciences, and the Rubenstein School to collaborate on a research program aimed at studying the linkages between ecological degradation and human health and crafting solutions for communities involved in research efforts. Yet disciplinary boundaries have limited the ability of these efforts to move forward. The matrix center will provide the appropriate awards and faculty review structure to allow these efforts to form a “Collaborative on Ecology and Health” initiative to move forward with greater effectiveness.

A Sustainable Campus Initiative will address an area of study at UVM that crosses many academic boundaries. There is great potential to form new partnerships between UVM Extension and faculty and student work in agroecology, ecological design, civil engineering, nutrition, art and the humanities, and various staff offices. Yet most current initiatives are currently relegated to individual colleges and departments and nonacademic clubs and do not involve the wide range of faculty and students that could be involved.

In addition, the Campus Office of Sustainability will soon begin funding three graduate assistantships relating to ecological literacy, democratic decision-making, and tracking environmental progress. These assistantships will best be served if a variety of academic departments host these assistantships. The proposed center would support the office’s efforts by helping to better integrate these new graduate assistantships across campus. Working with the Office, the Center could develop an application process by which individual students and their mentors would apply for this funding by demonstrating quality of the student and applicability of the student’s interests to both the Center’s research and mission and the needs of the Office of Sustainability.

As a final example, the Rocky Mountain Institute suggested that the formation of a new campus center to address sustainable enterprise development would be the best potential outcome of their intensive campus workshop. By providing appropriately designed incentives and awards in an interdisciplinary environment the projects discussed could come more easily to fruition.

3. A multidisciplinary plan or portfolio of research that demonstrates high scholarly potential and is innovative.

As illustrated by the initiatives discussed earlier, the research portfolio of the center will be built specifically on a transdisciplinary foundation. Its portfolio of research will be structured around several themes that will evolve and expand as funding opportunities allow and research interests and needs change.

The university has many exceptional scholars who will be drawn to the collaborative, integrative work the matrix center will foster, and its very mission is to create innovative solutions for interconnected environmental and social problems. The creation of the center will also allow us to compete more favorably for extramural funding for additional research in this growing field of inquiry.

The Center has a unique ability to be innovative due to location in Vermont, a state known for its commitment to civic engagement, participatory government, and local and state government institutions amenable to collaborating with the University to address pressing research needs. In this regard, the Center will build upon past success of such efforts such as The Rubenstein School's Watershed Alliance, The College of Engineering and Mathematical Sciences "Catamount Initiative," and the College of Arts and Sciences "Political Science Policy Workshop."

4. An expectation that the focus of the Multidisciplinary Center will grow and continue to be relevant.

As ecological and social crises deepen, the education, research, and outreach that will be the focus of the proposed center will undoubtedly grow and remain relevant. Indeed, colleges and universities are increasingly committed to fostering learning and service for the purpose of developing solutions for interdependent environmental and social problems. Recognizing that social and environmental problems cross traditional disciplinary boundaries, there has also been a growth in interdisciplinary programs and centers, (i.e. Columbia University's Earth Institute, Arizona State's School of Sustainability, University of Michigan's Erb Institute) aimed at developing holistic and integrated solutions. And around the world, college campuses are beginning to model, through their campus operations, designs for a sustainable world. It is highly likely this trend toward integration and solutions-focused endeavors will continue, as will external funding opportunities for these efforts. UVM has an existing reputation and ongoing commitment to be "the environmental university." The proposed center will capitalize on that reputation to help move UVM into the top tier of universities striving to transcend disciplinary boundaries in order to solve our increasingly complex societal problems.

5. Identification of external funds adequate to enable the Center to be financially self-supporting.

It is our expectation that the operational costs of supporting the Center will derive initially from a grant from the Lewis Foundation. In 2007, the Lewis Foundation asked the University to submit a proposal to help transform the University into a *"catalyst, a model, and an engine of change—a driving force that leads society by design to a sustainable and desirable future."* A proposal was developed by the University's Leading By Design Task Force. The proposal to be submitted to the Lewis Foundation will request \$5 million/year for the first three years to support faculty, fellowships, and specific projects. There is an expectation for matching funds from the Lewis Foundation beyond the first 3 years, and the Director will work with the President to aggressively seek out additional external grant and gift sources to complement the Lewis Foundation funding.

As stipulated by the faculty senate guidelines, the matrix center will be financially self-sustaining. It will keep costs to a minimum by relying on a lean administrative structure. Indirect costs generated by research sponsored by extramural funding will be shared by administrative units, negotiated on a project specific basis. If funding levels become insufficient for the Center's operation, its initiatives will either be dissolved or reworked as direct partnerships between existing institutions.

Appendix A: Format for Proposals for a New Curriculum, Academic Program, Research or Service Endeavor

“Appendix A” is a formal, sixteen section proposal structure required by the Faculty Senate’s Curricular Affairs Committee for all new academic programs, research, and service endeavors. It is presented below.

I.

Program title: The current title for the proposed center is the Integrative Center for Sustainable Solutions. This may be modified after consultation from potential funders and other stakeholders.

Director: Robert Costanza, Ph.D., will serve as interim director

Participating Faculty. The Center aims to engage faculty from each of UVM’s colleges & schools, as well as Cooperative Extension. Appendix C contains a list of faculty who have participated so far in the development of the ideas leading to the Center.

Responsible Academic Unit: Provost’s Office

Program Description for catalog:

“The Center supports initiatives generated collaboratively by students, faculty, staff, and community members that seek to develop integrative solutions for the interdependent ecological and social problems society faces. The Center runs projects and solutions-focused and tools-based courses that bring together students in all colleges with a cadre of faculty, fellows, and graduate students who are working on its ongoing initiatives.”

II. Exact wording of degree to be awarded, if appropriate. N/A

III. Rationale for the curriculum, program, or endeavor:

A. Philosophic goals statement

To be an academic environment that promotes collaboration across disciplinary and co-curricular boundaries to pursue holistic solutions to the interdependent ecological and social problems humanity faces.

B. General and specific objectives

- To facilitate the formation of new transdisciplinary research programs working to create holistic solutions for a suite of ecological and social problems.
- To orchestrate solution-focused, problem-based, service learning courses that bring together students in all colleges with a cadre of faculty, fellows, and graduate students who are working on these initiatives
- To provide an environment where faculty scholarship is assessed for impact, not just for having been disseminated
- To promote a vision of faculty pedagogy built on a model of broadly accessible learning, making use of podcasts and web-based course content.
- To engage students and researchers in efforts to design facilities and physical plant operations based on ecological design principles, integrating with natural, human, and social capital resources

IV. Relationship of this curriculum, program, or endeavor to current mission and long-range plans of:

1) Participating departments, programs, schools, and colleges;

To grow graduate and undergraduate research and education while serving as a collaborative venue for developing projects that address interdependent social and environmental issues using an integrative, whole-systems approach.

2) The University.

To design transdisciplinary programs that emphasize systems-thinking to help solve interdependent ecological and social problems. To reorient pedagogical practices towards learner-centered, experiential approaches. To reward collaboration, integration, and partnerships in both research, education, and campus operations.

V. Relationship to programs offered currently

The University of Vermont is home to several programs working on interdependent environmental and social issues and experiential learning, including the Environmental Program, the Rubenstein School of Environment and Natural Resources, the Gund Institute for Ecological Economics, the University Transportation Center, the University's Community-University Partnerships and Service-Learning (CUPS) office, the Holistic Engineering Program, Continuing Education's Global Sustainability Institute. The center will work to build collaborations between these and other programs through its activities.

VI. Indicate any other programs at the University that are similar in title or content and illustrate how they may overlap or differ.

As discussed above, there are other programs at the University engaged in similar education and research. The intention of the center is to partner with these existing programs, expanding their effectiveness. For example, Continuing Education's Global Sustainability Institute has begun organizing intensive summer classes around sustainability issues, and the Gund Institute for Ecological Economics (in collaboration with the Department of Community Development and Economics, the Business School, the Vermont Law School and several other units) has run many problem-based "atelier" courses during its tenure. Their efforts will serve as a model for the Center's courses. The Rubenstein School of the Environment and Natural Resources and the College of Engineering both seek to prepare students to think holistically when the graduate, and are increasingly building problem-based learning into their curriculum. The College of Education and Social Sciences is firmly committed to the teachings of John Dewey, and is committed to partnering on new projects that will bring their expertise in education critical to solving environmental and social problems. The College of Agriculture and Life Sciences' ecological agriculture and ecological design programs will provide an important starting point for landscape scale campus sustainability initiatives.

VII. What comparable programs, if any, are in existence today in reputable colleges and universities:

Colleges and universities are increasingly committed to fostering learning and service for the purpose of developing solutions for real world problems. Because social and environmental problems cross traditional disciplinary boundaries, there has been growth in inter and transdisciplinary programs aimed at developing holistic and integrated solutions. These include Columbia University's Earth Institute, University of Michigan's Erb Institute, Arizona State's School for Sustainability, RIT's Golisano Institute for Sustainability, the Yale Center for Business and the Environment, Duke's Corporate Sustainability Initiative, Stanford University's Global Climate and Energy Project, the University of Wisconsin's Nelson Institute for Environmental Studies, and the University of California at Berkeley's Energy and Resources Group.

One also finds extensive use of problem-based education at institutions such as Maastricht University, Netherlands, Alborg University, in Denmark, and Evergreen College, in Washington state. Service-learning courses have been infused extensively through the educational programs at California State University at Monterey, Berea College, and Warren Wilson College. Other universities have taken the lead in creating links between their outreach programs and traditional disciplines within the university setting by articulating clear institution priorities and favorable review, tenure, and promotion guidelines. Some of the more successful have been Michigan State, North Carolina State, and the University of Minnesota.

There are many highlights to these programs that the proposed Center seeks to emulate.

The best:

- Successfully involve a wide range of fields of study while preventing any single discipline from dominating
- Offering a "neutral ground" to foster collaboration among faculty and students
- Focus on a specific themes and real-world problems to structure their research and education
- Engage in applied, action oriented research
- Prepare students to think and work collaboratively when they graduate
- Use well developed RTP guidelines and MOU's to facilitate cooperation
- Use the campus grounds and facilities as a place for experimenting and showcasing sustainable systems
- Have strong connections with businesses, governments, and nonprofits outside the university
- Are supported by a clear presidential vision and university mission

VIII. Evidence of communication with academic units likely to be involved in or affected by the program. Indicate the effect (cost, enrollment, etc.), the program will have on other academic units.

In 2007-2008, the idea of a new Center was discussed extensively through public processes spearheaded by the Leading By Design Task Force, a workshop led by the Rocky Mountain

Institute, an additional advisory committee established by the President, and through communication with individual units.

For example, in September 2006, a "Community Congress on Integrative Solutions" brought together over 300 community members to learn about the proposal and help develop ideas for transformative projects.

By nurturing existing efforts and catalyzing action on new initiatives, and through specific cost-sharing agreements, it is intended that the impact of the new Center on existing academic units will be uniformly positive.

IX. Evidence of demand or need for program

There has been a growing interest among faculty in inter and transdisciplinary programs characterized by action research and service learning aimed at developing holistic solutions and sustainable systems for society. Yet our disciplinary boundaries remain largely entrenched, hindering the effectiveness of these integrated programs. As a result, our efforts are largely relegated to individual initiatives and isolated efforts that fail to fully engage a broad range of students, faculty, staff, and community members. The Center's focus of problem-based learning and action-oriented research will help bridge the gaps between both disciplines and the community. Furthermore, the matrix center structure provides the appropriate institutional and fiscal incentives necessary to facilitate faculty participation in these programs.

X. Students (if curriculum or academic program):

The center's program of study will focus on a set of evolving themes that require a holistic approach to research and education. Students will be engaged in problem-based courses, will be funded through a series of both graduate student and undergraduate student fellowships.

XI. Programs of study

The Center will work with academic units to develop new minors, graduate certificates and continuing education certificates to provide an incentive structure for engaging a broad range of students in the Center's supported courses.

XII. Resources for the Program

A. Faculty

Faculty will be supported from external grant and gift sources. Three faculty lines committed to the Center have been promised by the Provost as matching support, pending successful foundation funding of the Center. The center will work with departments to provide support for new hires of faculty that fit the center's mission. If the center is dissolved, the Provost will decide if the hired department will continue to receive central support for the faculty line. If a Center affiliated faculty member leaves the university, the line will remain with the Center, and

the Director will restart the process of working with departments to provide support for a new hire that fits the center’s mission.

B. Library Support

If the Center’s Transdisciplinary Advisory Committee determines the library does have critical journals or reports necessary for the Centers research initiatives, the Center will fund cost-sharing of these journals during the life of the associated project.

C. Equipment needs and plans to meet them

Limited equipment will be purchased with Center’s base funding. Future benefits and costs of the equipment will be negotiated with the particular College at the time of purchase.

D. Physical space needs and plans to meet them:

The staff, equipment and other resources for the Center will be housed in one primary location on the UVM campus. The Provost has committed to assisting the Center's Interim Director in locating three contiguous offices to house the Center's Director, Project Manager, and Administrative Assistant, once funding is secured. To the maximum extent possible, administrative support for the center’s programs will be shared between partnering units to reduce administrative cost.

XIII. Cost Estimates

A. First-year costs in addition to current budget

We anticipate costs for the remainder of FY 08 to be approximately \$30k, which will be covered by a planning grant awarded by the Lewis Foundation. These costs consist mostly of compensation for one staff member to set up the program and assist with recruiting the director.

B. Total costs for first five years in addition to current budget;

The Center will be externally funded through research and educational grants and gifts. The Transdisciplinary Initiatives will be designed, in part, to build UVM base research capacity to target external research funding sources in the future. The Center’s budget for its initiatives and projects will be based on the support it receives from the Lewis Foundation and other external sources. Once funding is secured, each initiative’s work team will develop a budget with the following categories: faculty, graduate student, undergraduate student, and external fellowships, project costs, library costs, and associated indirect costs. We are anticipating about \$390,650 in annual administrative costs (Table 1).

Table 1. Estimated Administrative Costs.

	Annual expenses	Description
Administrative Personnel		
Center Director	\$150,000	Assumes 1 FTE, 12-month position.
Project Manager	\$60,000	Assumes 1 FTE, 12-month position.
Secretarial Assistant	\$45,000	Assumes 1 FTE, 12-month position.
Total Including Benefits	\$364,650	Assumed .43% Fringe Benefits
Equipment and supplies, misc. expenses	\$16,000	Office supplies, phone service, etc.
Community Congress Event	\$10,000	Annual conference hosted by Center
Total Administrative expenses	\$390,650	

Faculty lines may be committed to the Center's mission by the provost as matching funds for successful external funding efforts, for a total university cost of \$429,000 per year for the first five years.

C. Anticipated non-University support, if any, such as federal or industry grants.

We expect the Lewis Foundation to provide \$15 million for the first three years. Indirect costs charged to the Lewis Foundation grant are estimated to be \$1.5M. In-kind cost share from within existing UVM programs (direct and unrecovered indirects) will be determined through negotiations as project work plans and budgets are developed.

D. How program will be funded if no new money is available

If funding levels become insufficient for the Center's operation, its initiatives will either be dissolved or reworked as direct partnerships between existing institutions.

E. Proportion of salary of any faculty member who would contribute to program.

We expect the faculty serving as principal PIs to dedicate between 2 and 90+% FTE in any given year for research work on individual projects. These percentages will be set by the individual faculty and approved by their deans based on the work they wished to contribute.

XIV. Schedule for curriculum, academic program, research, or service endeavor:

The matrix center's initiative will commence pending receipt of extramural funding and the selection of the center's director, anticipated in early 2009. Curriculum will initially be offered predominately in the summer session, but will be expanded to the academic year as demand increases and the center's capacity improves.

XV. Evaluation

An ongoing process will evaluate the effectiveness of this collaborative in cultivating the desired outcomes presented in this proposal, which include:

- Designing transdisciplinary programs that emphasize systems-thinking to help solve ecological and social problems
- Reorienting pedagogical practices towards learner-centered, experiential approaches
- Rewarding collaboration, integration, and partnerships in both research, education, and campus operations

Periodic Academic Review

The University of Vermont's Faculty Senate has an established mechanism for periodic academic review. The academic review process, conducted on a five-year basis by the Curricular Affairs Committee, guides institutional planning and programmatic delivery. Under their auspices, the matrix center will be evaluated based on its contribution to the university's mission, its external funding base, its program quality, program demand, societal need, effectiveness, efficiency, and quality control mechanisms. The outcome of this review determines whether the center remains a viable entity or will be dissolved. In addition, curricular programs developed by the Center will be reviewed in the context of the regularly scheduled Academic Program review

process.

Internal Center Review

In addition to the required UVM Senate Review, there will be an annual report and newsletter prepared by the center. The report will include the following performance metrics:

- Number of Center affiliated faculty
- Number of research projects selected and rejected for funding.
- Summaries of student and community member project evaluations
- Number of students supported by assistantships and fellowships
- Number of research reports published
- Number of research papers presented at academic/professional meetings
- Number of courses offered that were considered part of the center’s curriculum
- Number of students participating in the center’s research projects.
- Number of advanced degree programs offered that were Center related.
- Number of students enrolled in those Center related advanced degree programs
- Number of online learning classes, seminars, and symposia conducted
- Number of participants in those events
- Press coverage as a metric of public education

Initiative and Project evaluation

Each initiative and project will undergo periodic review to maintain funding. The review process will be conducted by the matrix center’s internal advisory board, which will evaluate each program’s quality and effectiveness. Each initiative will be required to establish and report on measurable outcomes to help gauge its success.

XVI. Endorsements.

Program Date

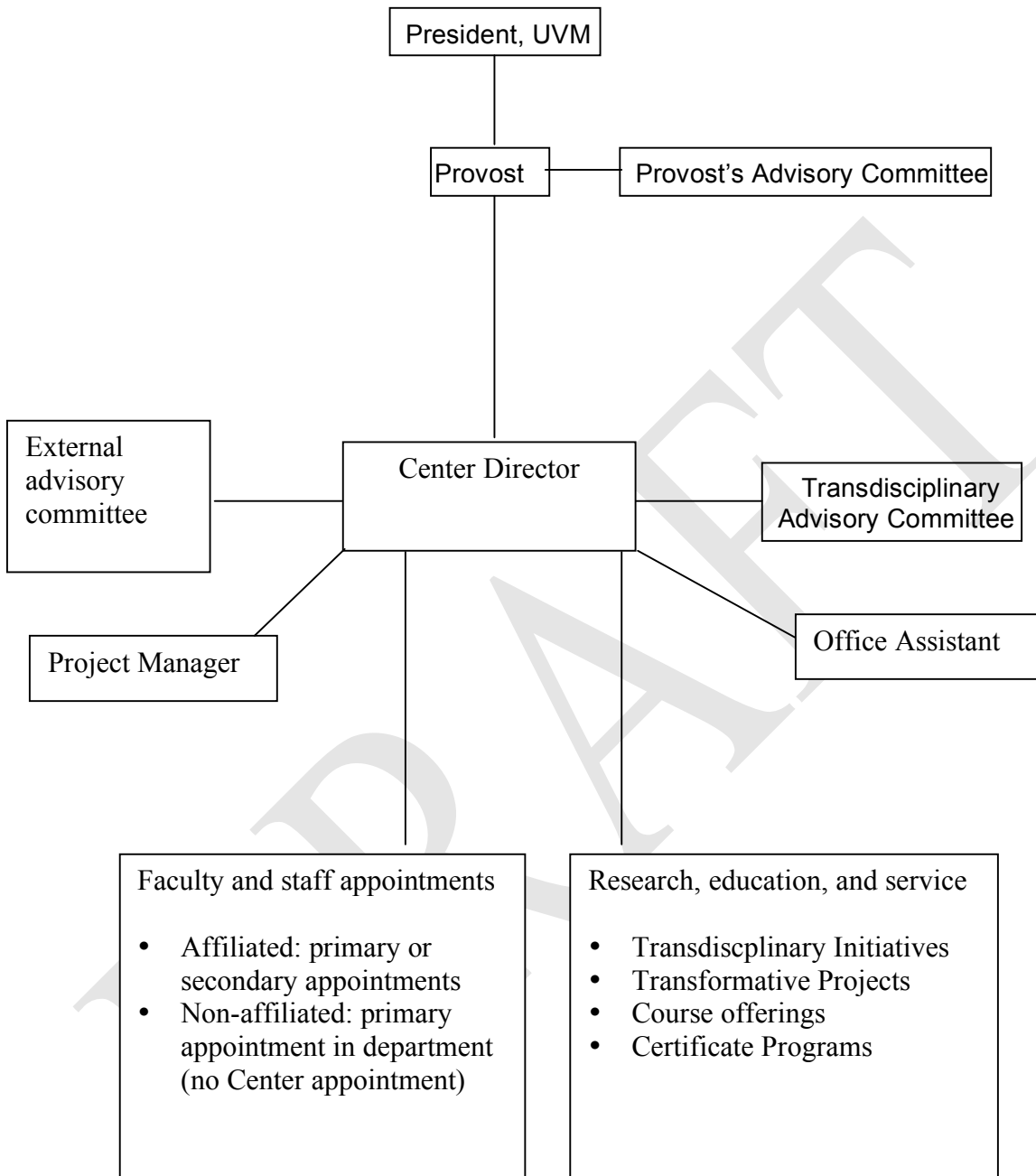
Senate Committee Date

Provost Date

President Date

Board of Trustees Date

Appendix B: Organization Chart



Appendix C: Potential Faculty and Community Participants

Over 1000 faculty, students, staff and community members participated in the leading by design process and would be potential participants in the Center's activities. Below we list a few of these to give a flavor of the range of potential participants.

Leading by Design Task Force Faculty Members

Lisa Aultman-Hall, UVM Transportation Center
Cynthia Belliveau, Continuing Education
Paul Bierman, College of Arts & Sciences, Department of Geology
Judith Ann Cohen, College of Nursing and Health Sciences & Faculty Senate
Robert Costanza, Gund Institute for Ecological Economics
Cami Davis, UVM Environmental Program & Department of Art and Art History
Domenico Grasso, College of Engineering and Mathematical Sciences
Charles Hulse, College of Medicine
Deb Neher, College of Agriculture and Life Sciences
Donna Rizzo, College of Engineering and Mathematical Sciences
Betty Rambur, College of Nursing and Health Sciences

Additional faculty who contributed to the Leading By Design project

Saleem Ali, Rubenstein School for Environment and Natural Resources
Daniel Baker, College of Agriculture and Life Sciences
Robert Bartlett, College of Arts and Sciences
John Erickson, Rubenstein School for Environment and Natural Resources
Joshua Farley, College of Agriculture and Life Sciences
Gary Flomenhoft, College of Agriculture and Life Sciences
Michael Gurdon, School of Business Administration
Tom Hudspeth, Rubenstein School for Environment and Natural Resources
Christopher Koliba, College of Agriculture and Life Sciences
Jane Kolodinsky, College of Agriculture and Life Sciences
Steve Libby, Rubenstein School for Environment and Natural Resources
Sarah Lovell, College of Agriculture and Life Sciences
Alan McIntosh, Rubenstein School for Environment and Natural Resources
Christian Skalka, College of Engineering and Mathematical Sciences
Larry Shirland, School of Business Administration
Richard Watts, University Transportation Center
Marjan van den Belt, Continuing Education
Lini Wollenberg, Director Ctr for Sustainable Agriculture

Staff

Gioia Thompson, Office of Sustainability
Susan Skalka, Business Process Re-Engineering Team
Carrie Williams Howe, Office for Community University Partnerships
Kate Westdyck, Office of Experiential Learning, Rubenstein School
Shirley Fortier, Office of Campus Planning

Community Participants

Bill Mitchell, Intervale Foundation
Matt Dubel, Sustainable Schools Project
Bill Dunnington, Global Challenge Award
Diane Gayer, Vermont Design Institute
Bob Kiss, Mayor, City of Burlington
Chuck Ross, Senator Leahy's Office