

Transforming the University

**Recommendations of the Task Force
on Collaborative Research**

Submitted on behalf of the Task Force by:

**Frances Lawrenz
Mark S. Paller
Co-Chairs of the Task Force**

Date: March 27, 2006 (final revisions May 1, 2006)

I. Executive Summary

Mission

To create a plan to identify and promote interdisciplinary, interprofessional, interscholastic, and inter-institutional partnerships/programs/activities, consistent with the University's goal to become one of the top three public research universities in the world.

Deliverables:

- A. *Recommendations regarding the role of interdisciplinary, interprofessional, interscholastic, and inter-institutional partnerships/programs/activities in achieving the University's goal of becoming one of the three public research universities in the world.*
- B. *Identification of the research areas (current and emerging) that will require or benefit most from interdisciplinary or team-oriented approaches, including the following:*
 - *How should future opportunities be identified, evaluated, and prioritized?*
 - *For which of the anticipated opportunities does the University currently enjoy a comparative advantage?*
 - *Which areas should be considered a priority for development?*
 - *What promising large-scale research areas require special attention and investment?*
- C. *Recommendations regarding how the University can optimally encourage increased interactions and collaborations among researchers across departmental, disciplinary, and collegiate boundaries, including identification of current impediments (cultural, administrative, structural, infrastructure) to such collaborations and recommendations for overcoming these impediments.*
- D. *Recommendations regarding the financial resources that will be necessary to support interdisciplinary or collaborative research, and how such resources should be identified and allocated.*
- E. *Recommendations regarding "best practices" from other institutions that should be considered for implementation at the University of Minnesota, including a comparison of the University's current practices with the recommendations of the National Academies with respect to facilitating interdisciplinary research.*

Task Force Members

Frances P. Lawrenz, Co-Chair, Associate Dean for Research, College of Education and Human Development and Wallace Professor of Teaching and Learning, Educational Psychology

Mark S. Paller, Co-Chair, Assistant Vice President for Research, AHC, and Professor, Medicine

John E. Connett, Division Head and Professor, Biostatistics

Donna Gabaccia, Director, Immigration History Research Center and Rudolph J. Vecoli
Professor, History

Dorothy K. Hatsukami, Professor, Psychiatry

Joachim V. Heberlein, Professor, Mechanical Engineering

Shaun P. Kennedy, Associate Program Director, Center for Animal Health and Food
Safety

Jon Kenning, Graduate Student, Ecology, Evolution and Behavior

Kristopher McNeill, Assistant Professor, Chemistry

Steven Ruggles, Director, Minnesota Population Center and Distinguished McKnight
University Professor

Claudia Schmidt-Dannert, Associate Professor, Biochemistry, Molecular
Biology/Biophysics

II. Introduction

The task force anticipates that its recommendations will promote the opening up of currently unimagined venues of inquiry (NIH - Interdisciplinary Research Consortium, 2006) as well as complementing and supporting extensive, existing efforts. In order to accomplish this, the task force intends that its recommendations be broadly encompassing and meaningful to the wide range of types of research and scholarly activity. To further clarify what we mean by breadth, we offer the following definitions.

- When using the term “collaborative,” the task force means to embrace all types of collaborative work including interdisciplinary, inter-professional, interscholastic and inter-institutional partnerships/programs/activities. Although the task force did not specifically focus on intra-disciplinary or intra-departmental collaboration, many of its recommendations apply to those types of collaborations as well.
- “Inter-institutional” refers to the full range of institutions including, for example, coordinate campuses, regional centers, and community organizations, in addition to other universities. The University must be prepared to embrace the development of national and international collaborations.
- Use of the term “research” is intended to represent the variety of research and scholarly inquiries, including those with major educational or public engagement components. Similarly the term “laboratory” is meant to be any place research investigations are conducted. Additionally, the term “researcher” refers to anyone engaged in the research enterprise, including faculty, staff, and students at all levels from undergraduates to postdoctoral associates.
- Although the task force was asked to focus on research issues, it recognizes the close and necessary relationship between education and research. Many of the strongest collaborative and/or interdisciplinary research programs also have integral educational components. The task force’s recommendations for collaborative research should be combined with those of other task forces that are

specifically addressing collaborative and interdisciplinary education. Furthermore, the task force's recommendations should be applied whenever possible to strengthen and support collaborative and interdisciplinary educational activities.

The task force envisions a University that will be known internationally for its innovation and excellence in collaborative research and scholarship and for the ease with which collaborations are established. This substantive and culturally supportive environment will attract highly talented investigators and team leaders from all over the world. Our vision requires a new model which incorporates supportive policies and procedures and an infrastructure with facilities, equipment, and resources that fosters interaction and removes administrative and logistical barriers.

To achieve this vision the University must

- enhance the value of collaborative research and foster a culture in which it can flourish
- provide incentives and recognition for collaborative work
- develop mechanisms for bringing scholars together to promote the synergy provided by collaborative work
- develop, recruit, retain, and provide opportunities for highly talented researchers to lead and administer important collaborative projects
- support educational and training opportunities to make collaborative research understood and accessible to all participants
- publicize internally and externally the important findings and outcomes of collaborative work

Ensuring development of these aspects of our vision will require a robust background of support, both financial and cultural, from the State and from the University's governing bodies, administrators, and research leaders.

The following responses to the five deliverables further define our vision and provide guidance for how best to achieve it.

III. Responses to Deliverables

***Deliverable A:** Recommendations regarding the role of interdisciplinary, inter-professional, interscholastic and inter-institutional partnerships/programs/activities in achieving the University's goal of becoming one of the top three public research universities in the world.*

The task force recommends that collaborative research play a significant role in achieving the University's goal because emphasizing collaborative research will allow the University

- to capitalize on the intellectual energy and synergy provided through these types of interactions
- to develop and provide national/international leadership in new fields

- to align with the increasing emphasis on these types of activities in major funding agencies and the increasing recognition of the complexity inherent in modern research

The task force acknowledges and recognizes the amount of collaboration that is already a vital part of the University, often with minimal institutional support. The potential for enhancing and expanding on our current successes is enormous given the breadth of disciplines and faculty interests. The task force believes university departments/areas should aspire to have a diverse portfolio of research.

***Deliverable B:** Identification of the research areas (current and emerging) that will require or benefit most from interdisciplinary, large-scale or team-oriented approaches, including the following: How should future opportunities be identified, evaluated and prioritized?*

Rather than identifying specific projects, the task force focused on developing an ongoing process to identify those research areas that would benefit most from collaborative approaches. This was because the task force felt no one can reliably predict which new research initiatives will prove to be successful or transformative. The university should be willing to accept risk and anticipate that some research projects that it seeds will not succeed ultimately. For this reason, the university should develop a portfolio of collaborative projects. Nevertheless, there are criteria through which the University could select potentially successful projects. Some of these projects might prove to be truly transformative, but all of those undertaken should be judged to be worthy efforts. In other words, although it is acceptable for some projects to ultimately fail, it is not acceptable for them to be poorly operated or administered. This process was designed to more effectively allocate central University resources for collaborative research, such as Presidential Initiative funds or compact funds. This process is not meant to be applied to collaborative teams and projects that are able to secure sufficient funds from other sources.

To be successful collaborations must be guided and carried out by energetic, committed researchers. Most often collaborations will emerge through a grass roots process, although top down efforts may also be organized.

Although much collaborative work emerges and obtains support independently, in some cases selection of proposals to conduct collaborative work may be warranted. The task force believes it would be most appropriate that this type of selection be conducted by a researcher-driven review committee. Additionally, the appropriate level of support should be considered, ranging from seed through sustaining. The following questions are offered to help guide the selection of potentially productive collaborative proposals, whether large or small scale and from all areas including science, engineering, social sciences, health sciences and humanities. These criteria can be applied to intercollegiate and to interinstitutional collaborations.

- 1) What is the nature of the proposed opportunity?
 - a. What is the potential scientific or scholarly impact?
 - b. Is the impact dependent on, or at least enhanced through, the collaborative nature of the proposed activity?
 - c. How will the University's reputation be affected (enhanced)?
 - d. What are the specific possibilities for future outside funding?
 - e. Does it hold the potential for becoming a new disciplinary focal point/new discipline?

- 2) How well does the proposed project fit within the University of Minnesota?
 - a. Is there substantial faculty commitment?
 - b. Does the University have appropriate expertise? Who will be the core members of the new team and what will be their roles?
 - c. Does the project have appropriate leadership and a leadership plan that addresses intellectual, educational, and managerial leadership?
 - d. What is the strategic fit of the proposed project?
 - e. Does the proposal align with Presidential Initiatives or compact priorities?
 - f. What other resources and considerations are relevant?
 - g. What are the expectations and plans for continued funding of the effort? Does it open up new funding opportunities?

- 3) How will the project be evaluated after it is initiated? The applicants should define these evaluation criteria as part of the application process. The plan for evaluation should consider criteria such as:
 - a. Milestones
 - b. Reputation
 - c. Impact
 - d. Identification and engagement of stakeholders and end users
 - e. Ability to attract outside funding (return on investment)
 - f. Plans for continuous evaluation
 - g. Criteria for termination of the project

The university should also support other models of collaborative research, including small scale and short-term projects as well as consortia of centers or institutions. Investigator-initiated research that does not require new university resources should continue to be judged on its scholarly importance and by the ability of the research team to accomplish its goals, but need not be strictly aligned with the university's strategic initiatives.

Deliverable C: Recommendations regarding how the University can optimally encourage increased interactions and collaborations among researchers across departmental, disciplinary, and collegiate boundaries, including identification of current impediments (cultural, administrative, structural, infrastructure) to such collaborations and recommendations for overcoming these impediments.

1. Change the culture

The Task Force on Collaborative research recommends that the culture of the University be changed to be more supportive of collaborative research by changing the reward structure for individuals involved in collaborative research and for departments/colleges contributing to it. The task force does not intend that an emphasis on collaboration detract from the important work within disciplines and by researchers working independently. Striking an appropriate balance will be a continuous challenge for researchers, departments and colleges.

The task force recommends that the Senior Vice President and Provost and the Senior Vice President for Health Sciences ensure the review and revision of the language in the 7.11 and all 7.12 statements to acknowledge the value of collaborative, especially interdisciplinary, research by

- expanding the notion of “professional distinction in research (7.11 criterion)” to include outcome measures such as patents, success of team work and stakeholder implementation/utilization
- allowing the inclusion of perceptions of nondepartmental collaborators on the creativity and significance of a research team member’s contributions as important evidence in tenure, promotion and merit decisions. These perceptions could be provided through written statements, membership on mentoring committees or inclusion in discussions and votes
- considering as independent contributions those particular skills or disciplinary expertise that a team member brings if acting independently in that capacity

Changing the wording in the 7.11 and 7.12 statements will not be sufficient to change the culture. Therefore, we recommend that in addition the University community

- recognize the substantive contributions of members of research teams
- document substantial roles of team members in obtaining funding and producing publications
- clarify how the collaborative work reflects focus and research coherency for each of the team members
- facilitate the recruitment of new researchers who are supportive of collaborative research through development of suggested wording to be used in the criteria for selection of new hires
- coordinate hiring across departments and centers, possibly through pooling faculty lines and startup funds or central resources, to maximize collaborative research and teaming possibilities

There needs to be heightened recognition of the important role played by collaborative research through the provision of incentives such as

- an award for collaborative research (e.g., for leadership or team functioning)
- strengthening collaboration as a criterion in grant-in-aid or other internal competitions
- guaranteeing a certain percent of funding be allocated to collaborative research
- making collaboration one criterion for capital investment planning

It is critical that the home department of collaborative researchers view collaborations as valuable. Therefore it is vital to balance the needs of the home department and the collaborations through

- transparent and sustainable sharing of ICR and buyout compensation plans
- new incentive systems
- sharing of any prestige associated with the collaborative work
- enhancing the departmental infrastructure with external support for collaborative work

2. Form a new office to further support collaborative research

The University needs both an office and a responsible official to promote collaborative research beyond existing support. The position should be assigned to one University administrator with the authority and resources to accomplish the following purposes, as well as to revise and develop policies as appropriate based on sound data (e.g., the Vice President for Research).

The purpose of the office is to stimulate, support and provide motivation for collaborative research and to serve as a responsible entity for removing institutional barriers. When requested to do so, the office would provide support for collaborative teams, from proposal development through set-up of projects when awarded (see below). The Office of Collaborative Research could also become the administrative home for some established collaborative programs and centers, if desired by the leadership involved. Consideration should be given to making the office a tenure home for faculty who spend more time on collaborative projects than in their home disciplines. The result would be an academic structure that would allow researchers to be associated with different traditional disciplines and “organized around problems rather than disciplines.” (Facilitating Interdisciplinary Research) The Office must promote transparency in the development and maintenance of collaborative work and work effectively with participating collegiate deans on issues of

- budgets (including revenue sharing, e.g. ICR, tuition and salary savings)
- reporting structures
- promotion and tenure

Besides addressing administrative barriers, the Office would provide the following services when requested by collaborators

- facilitate nucleation of collaborative activities by providing a forum for information exchange, e.g., through formal seminars and informal gatherings, and raising faculty awareness of opportunities for scientific or humanities-related breakthroughs through collaboration
- assist faculty in identifying potential collaborators with specific expertise or interests from other colleges and campuses

- coordinate the selection of collaborative research efforts for initial seed funding by the University
- assist in identifying funding sources
- inform faculty about anticipated research opportunities prior to announced RFAs through liaisons in Washington
- assist in proposal preparation
- assist in setting up the infrastructure for funded research activities
- arrange and insure leadership training
- facilitate visits by outside scholars from other colleges and campuses (logistics and temporary space)
- publicize outcomes of activities

The Office of Collaborative Research would be expected to provide the same types of support for interinstitutional research collaborations. An activity would be to help faculty develop and/or participate in research consortia involving other institutions. Liaison activities in Washington should also seek to identify potential partners for new research opportunities.

3. Develop an interdisciplinary incubator

As suggested in the discussion of the Office of Collaborative Research, the University should develop and support structures that advance collaborative work, including research groups, centers, programs, consortia, etc. and provide space and funding for researchers to gather for planning and performing collaborative work. The former Interdisciplinary Research, Scholarship, and Creative Activities (IRSCA) program, which supported these types of initiatives generated several continuingly successful collaborations. In addition, other existing efforts that support collaborative research, such as the Institute for Advanced Study, should continue to be supported.

In addition to the above types of continuing support, an interdisciplinary research incubator should be initiated. This incubator would provide initial support for selected collaborative research activities following the selection criteria put forth under Deliverable B. This incubator design is best suited for the developmental stage of new collaborative research projects. Some projects may not require or merit continuation beyond this initial stage. As successful teams mature, they would find a permanent home outside of the incubator. In some cases, this would be within one college or another. In other cases, it might be desirable to identify a permanent neutral space or administrative home, perhaps through the Office of Collaborative Research.

The incubator would provide the last three of the following four major components of collaborative research: ideas, researchers, space and money.

- Researchers need to have adequate time to advance their collaborative work. Therefore researchers' work on incubator supported projects should be focused and substantial. For example, key researchers might be expected to devote 50% effort over several years.

- Students and post-doctoral assistants play a variety of roles integral to the overall success of collaborative projects. More experienced researchers who are involved in these incubator supported collaborative projects should be proactive in engaging and mentoring students and post-doctoral assistants.
- Contiguous space is necessary where researchers can work together. Ideally, several collaborative efforts can be pursued in proximity because it is anticipated that such proximity will spawn new efforts.
 - Short-term plan – Unused, but desirable space, should be designated for this purpose. As the overall program grows to include multiple projects, additional space can be identified. If necessary, nearby off-campus space could be rented. Multiple locations could be utilized until a single designated location is available.
 - Long-term plans should provide for larger, identifiable locations for these interdisciplinary projects to be housed. An entire floor (or even an entire building) of a desirable research facility should be developed that is readily re-configurable to accommodate a range of programmatic needs.

Additional funding is necessary to support the incubator effort.

- Operating expenses (e.g., supplies) should be provided for at least the first two years and ideally first five years of any selected projects. Continuation of funding would be determined through yearly reviews based on the continuous evaluation criteria submitted as suggested under Deliverable B.
- Compensation for researcher time should be provided to relieve researchers of competing research and teaching demands.
- Sufficient continuing support for students and post-doctoral assistants should be a substantial consideration.
- The assumption would be that extramural grant funding would be obtained to sustain the projects.
- Funds should not be used to create or duplicate core facilities. Existing core facilities should be incorporated into successful collaborative proposals.

4. Nurture leadership

Effective leadership is indispensable for the success of collaborative efforts. In addition collaborative work provides an ideal environment for growth of understanding. Nurturing leadership and education through the Office of Collaborative Research and other initiatives would not only promote successful research, but would also contribute to changing the University culture as suggested in recommendation 1.

Most importantly, the University should develop a culture where education about management and collaboration is valued. While this is important in general, it is critically needed to help leaders meet the unique challenges of collaborative teams. The provision

of education, in and of itself, could promote collaboration if it is creatively provided across teams and disciplines.

Whatever education is provided must be transmitted to all the members of the teams and to the university community if the culture toward collaboration is to change.

Transmission of educational opportunities and understandings is especially important for the students and less experienced members of collaborative teams since they are the next generation of collaborative leaders. In this regard, it might be possible to institute fellowships that would span different disciplines.

To be successful a collaborative team requires intellectual, educational and managerial leadership. Leadership within a collaborative group requires motivating participants, directing their efforts, focusing on team outcomes, facilitating the teams' operation through appropriate selection of staff, meeting administrative requirements, and establishing and maintaining communications. Success in the three components of leadership could be ensured through education, incentives and careful selection.

- Education about leadership could be provided by management consultants on an individualized basis.
- Incentives could be provided through metrics for group success, rewards for effective leadership, release time, staff support, or development opportunities, such as internal leaves for study of a new discipline.
- Leaders could be identified on the basis of demonstrated track records.
- Differentiated staffing could be considered with different people playing the different leadership roles.

Even the most cohesive collaborative group will not succeed without external incentives and support. University administrators (department chairs, deans, provosts) need to be proactive in fostering the growth of leadership. This could be accomplished through identifying, nurturing and rewarding effective leadership.

- Leaders could be identified from the outside and enticed to come here, or through “try out leadership” opportunities, or through step in and out of leadership opportunities.
- Nurturing could be provided through collaborations with other regionally located centers, seminar series, sessions for administrators on how to identify leaders, and through annual reviews.
- Incentives could take the form of preemptive raises or awards.
- Convening a conference on the difficulties and barriers in doing collaborative research (Graduate School Dean Gail Dubrow has proposed sponsoring this conference).

In order for education to fulfill its vital role, it must be high quality and address the specific needs of collaborative researchers in higher educational settings. In other words, it must focus on collaborative research and be presented in an engaging, active, and relevant manner. For example, education could

- take the form of short courses for team building for larger collaborative efforts

- be offered through modules to raise the awareness of differences in approach for collaborative compared to single investigator research
- focus on communication skills between participants speaking different research languages

5. Infrastructure support for collaborative work

Although the quality of the research infrastructure impacts individual as well as collaborative research, some elements affect collaboration more critically. The University should therefore consider the following:

- The information technology required to support collaborative activities is often more complex. It must provide easy sharing of data to multiple users and maximize access to and use of multiple communication forms, including web conferencing. Technology could help build networks by identifying researchers with certain areas of expertise or research interests. Enhancing technology goes beyond equipment and requires a professional, well trained staff to deliver the technical knowledge and assistance.
- Communication efforts in support of attaining high visibility for collaborative research need to be adequately funded, professionally staffed and centrally supported. There is a need to raise the visibility of opportunities for collaborative research within the University, as well as a need to build the University's reputation as a leader in collaborative work. Visibility requires active, strategically planned engagement with potential partners, stakeholders and funders, who need to be pursued at both the individual and the institutional level.
- Some aspects of the regulatory environment, such as the Minnesota Data Practices Act and federal export controls, impact collaborative work disproportionately. Best practices to meet the requirements using standardized forms and procedures can only go so far. The University must work locally and through national forums to demonstrate the high negative impact and reduce the regulatory burden.
- Achieving internal administrative efficiencies is vital in sustaining a high level of collaborative productivity. Administrative units, such as Sponsored Projects Administration and Sponsored Financial Reporting, will need to develop and maintain special expertise in handling collaborative projects.

Deliverable D: Recommendations regarding the financial resources that will be necessary to support interdisciplinary or collaborative research, and how such resources should be identified and allocated

Budget for the Office of Collaborative Research

The Office of Collaborative Research should be a model for high quality delivery of services. It should facilitate faculty interaction and streamline processes working

effectively with existing resources in departments and colleges and providing complementary support, as described in Deliverable C, recommendation 2. To be effective the new office cannot be under-resourced. As service needs are identified and addressed, the staffing should be expanded appropriately. Initially, the office would need a budget of approximately \$750,000, including cost of space rental for collaborative gatherings.

Budget for the interdisciplinary research incubator

Utilization of under-utilized or vacant space would be less expensive than construction of a new interdisciplinary incubator building, but would also be much less flexible in its deployment. Renovation of existing space would cost \$50-250 per sq. foot, depending upon existing conditions. Construction of a new, showcase facility for interdisciplinary research incubation would cost between \$40 and \$80 million, depending upon size and location. Such a building should have considerable flexibility in configuring and re-configuring wet labs, dry labs, and meeting spaces for interdisciplinary teams to meet the changing requirements of new teams.

Each large funded project could require up to \$1 million total support for a two year project. This upper limit would accommodate 2-3 faculty members at 50% effort, 3 graduate students, plus up to \$200,000 annually for supplies. The costs of some types of research programs, such as in the humanities, could be substantially less. There should also be funding for smaller projects and the possibility of incremental funding using the criteria outlined in Deliverable B.

Ongoing or transition support would be an additional expense.

In-kind contributions

For collaborative research to succeed at the university, the university community and its partners need to recognize and value substantial in-kind contributions of the following types

- department or college incentive systems that promote collaborative research
- transparent, sustainable buyout or compensation plans with clear workload guidelines that remove departmental disincentives for collaboration
- space, staff and other support provided by departments and colleges for interdepartmental and intercollegiate projects

Allocation of existing funds

Many University programs already exist to foster research excellence. In some cases, interdisciplinarity is already recognized as a desirable feature of fundable research.

- Grants-in-aid and other graduate school initiatives should emphasize collaboration as a highly fundable category.
- Interdisciplinary should be made an additional criterion for capital investment planning and requests.

***Deliverable E:** Recommendations regarding “best practices” from other institutions that should be considered for implementation at the U of MN including a comparison of the University’s current practices with the recommendations of the National Academies with respect to facilitating interdisciplinary research.*

The task force examined interdisciplinary and collaborative initiatives at other institutions, but did not emphasize this exercise. The success of a program is the consequence of a complex interplay between concept and execution. Although it is relatively easy to understand the underlying concept for another university’s program, it is very difficult to dissect the subtleties of leadership and implementation skills given the task force’s limited time and resources. Instead, we chose to examine more carefully our own institution and to consider what would best succeed in this unique environment.

There are some best practices that the University of Minnesota should emulate. We have matched our ideas with those outlined by the National Academies of Sciences (*Facilitating Interdisciplinary Research*, 2005), the Association of American Universities (*Report of the Interdisciplinary Task Force*, 2005), and other university white papers, such as, *Riding the Momentum: Interdisciplinary Research Centers to Interdisciplinary Graduate Programs* (Roberts, J. In Rice, M.L., 2004), and others cited in Appendix D, References. Several universities have departments of interdisciplinary studies, or advanced research institutes at the college level, providing both an infrastructure for collaborative research projects and a tenure home for faculty. In some cases, faculty can be associated with a traditional department as well. Another effort to cultivate interdisciplinary collaboration that has been pursued at several universities has involved providing a separate building. The University of Minnesota’s Shepherd Lab building began as such a space, and it continues to house some multi-user or interdisciplinary facilities. To make optimal use of such a laboratory space for interdisciplinary research, it should be administered by the Office of Collaborative Research.

A direct comparison of the recommendations of the Committee on Facilitating Interdisciplinary Research of the National Academies is included as Appendix F.

Demonstrate how the recommendation/conclusion as to each deliverable addresses/considers the five strategic areas included in the charge

Interdisciplinary work should be targeted to specific areas of study such as the President’s initiatives or perhaps to regional collaborations. These centrally supported initiatives should not preclude individual investigator initiated work.

Collaborations should be invested in strategically.

The recommendations in this report address the five strategic action areas.

1. Recruit, nurture, challenge, and educate outstanding students who are bright, curious, and highly motivated.

Our recommendations for supporting collaborative research will challenge students and their advisors to think from new, cross disciplinary perspectives and will provide direct support for collaborative projects in ways that will nurture both students and faculty. The recommendations for changes to the faculty culture and for attention to education and the development of leadership will make the environment at the U of MN more attractive to high quality students motivated by settings which encourage innovative thinking.

2. Recruit, mentor, reward and retain world-class faculty and staff who are innovative, energetic, and dedicated to the highest standards of excellence.

Our recommendations for changes in the faculty culture, especially in the 7.12 statements, and for the Office for Collaborative Research will contribute significantly to attracting and retaining innovative faculty members. The recommended research incubator would provide direct support for pioneering collaborative work. Finally the recommendations for recruiting, retaining and supporting leaders of collaborative research will also help to obtain and keep high quality faculty. Implementation of these recommendations will also promote attainment of the highest standards while at the same time supporting and nurturing new faculty.

3. Promote an effective organizational culture that is committed to excellence and responsive to change.

The recommendations for an Office for Collaborative Research and the incubator would provide for substantial changes in the existing organizational structure. The mechanisms proposed for these structures would allow them to be nimble in response to changing needs and environments. The proposed administrative innovations would be supported by the recommendations for changes in faculty culture and in leadership and education. Taken together our recommendations would produce a culture operating at the cutting edge of change.

4. Exercise responsible stewardship by setting priorities, and enhancing and effectively utilizing resources and infrastructure.

Our recommendations include a judicious mix of high cost and in-kind types of expenditures. We suggest using elements of the existing administrative and faculty support structures as well as bold, new ventures. Furthermore, we provide careful criteria for the identification of priorities for expenditures and clear sunset rules.

5. Communicate clearly and credibly with all of our constituencies and practice public engagement responsive to the public good.

We specifically address communication and visibility issues in our recommendations. It is our belief that the University has not clearly communicated its value in the past and our suggestions will help to remedy that situation.

IV. Recommendations for prioritizing deliverables

The Deliverables are in prioritized order. Deliverable A affirms the critical role that collaborative research will play in meeting the University's overall strategic goals. Deliverable B recommends an effective process to identify and manage significant collaborative projects building on the creativity and dedication of faculty. Deliverable C describes specific recommendations in priority order. Finally, Deliverable D provides information on financial resources and Deliverable E relates the task force recommendations to the five strategic action areas.

V. Appendices

- Appendix A – Methods followed
- Appendix B - Consultations and communications
- Appendix C - Copy of charge letter
- Appendix D - Other references
- Appendix E - Strengths, weaknesses, opportunities & threats analysis and key objectives to achieve vision
- Appendix F – Comparison of recommendations of the Committee on Facilitating Interdisciplinary Research of the National Academies with those of the task force.

Appendix A Methodology

The Collaborative Research Task Force met biweekly from September through December and weekly from January through March. Meetings were used for discussion of the charge, issues and deliverables, as well as consultation with members of the University community and ongoing integration of stakeholders' feedback into the draft report.

The task force began its work by conducting an analysis of the University's strengths, weaknesses, opportunities and threats (SWOT). The task force developed a vision of collaborative research and scholarship. The vision statement and SWOT analysis can be found in Appendix E. These documents were shared electronically with a broad set of stakeholders (see Appendix B, Consultation and Communication) during the week of November 14, 2005.

The task force examined articles, reports, and studies on collaborative issues from other universities and national committees. The task force also gathered information about the University of Minnesota practices and policies, including current collegiate practices on distribution of funds from indirect cost recovery and data on intercollegiate and interdepartmental externally funded projects. Appendix D, References, lists the internal and external reports and materials reviewed by the task force.

Using feedback from the first round of consultation, the task force identified the major objectives that would be necessary in order to achieve the vision (see Appendix E). Each of these major objectives was explored in greater detail by smaller groups of task force members. Each subgroup developed specific action items to achieve the objectives and reported back to the task force. Although the objectives are diverse, ranging from values to visibility, the action items contained many similarities.

The task force conducted group interviews with center directors (Appendix B). A cross-section of collaborative centers was selected based on a variety of criteria: large, small, established, fledgling, financially supported by colleges, outside collegiate reporting lines, nationally recognized, locally active, etc. The task force sought information focused on mission, financial and administrative support, faculty participation, allegiance and tenure, and barriers to success. The task force also consulted with other task forces having similar charges.

Through analysis, consultation, and discussion the task force derived a set of preliminary recommendations that formed the substance of the Final Report. The task force again solicited comments and feedback both in person and electronically. This comment period extended from the end of February when a DRAFT preliminary report was distributed electronically during the week of February 20, 2006, until the last in-person session on March 23, 2006. Consultations, in-person as well as electronic, are listed in Appendix B.

This final round of consultation provided suggestions which improved the clarity of the report, but the recommendations and their priority remained unchanged.

Appendix B

Consultations and Communications

I. CENTER DIRECTORS, DEC -- FEB

- Center for Advanced Studies
- Center for Excellence in Critical Care
- Center for Immunology
- Center for Integrated Resources & Agricultural Management
- Center for Interdisciplinary Applications in Magnetic Resonance
- Center for Plants & Human Health
- Center for Research on Developmental Education & Urban Literacy
- Center for the Study of Political Psychology

II. COMMITTEES, TASK FORCES, AND UMN

FACULTY LEADERS

- Academic Task Force Steering Committee
- AHC Council of Research Deans
- Council of Research Associate Deans
- Dean of the Graduate School
- Faculty Culture
- Graduate Reform: Disciplinary Evolution
- Consortium on Law and Values in Health, Environment and the Life Sciences
- Developmental Biology Center
- Digital Technology Center
- Institute for Advanced Study
- Institute for Community Integration
- Institute for Mathematics and its Applications
- Materials Research Science and Engineering Center
- Molecular Nanoscience Alliance for Interdisciplinary Studies and Activities
- Water Resources Center
- Public Forums
- Research Infrastructure
- Science/Engineering
- Senate Research Committee
- Twin Cities Deans Council
- UM Crookston Faculty Members
- UM Duluth Faculty Members
- UM Morris Faculty Members
- Vice President for Research

III. ELECTRONIC CONSULTATION

University-wide Committees and Councils, such as

- Council on Public Engagement
- Faculty Consultative Committee

Strategic Positioning Task Forces

Committees and councils representing collegiate faculty and academic leadership

Appendix C

September 14, 2005

To: Collaborative Research Task Force Co-Chairs and Members

From: R. Timothy Mulcahy, Vice President for Research

Subject: Task Force Charge Letter

Thank you for agreeing to serve on the Collaborative Research task force. This task force is assisting with the implementation of the University's 2005 strategic positioning recommendations entitled, "Transforming the University of Minnesota," endorsed by the Board of Regents on June 10, 2005. Frances Lawrenz and Mark Paller have agreed to serve as task force co-chairs.

Task Force Charge

The Collaborative Research task force is charged with developing recommendations that will enhance the conduct of interdisciplinary, interprofessional, inter-institutional and team-oriented research at the University of Minnesota. A specific set of tasks intended to serve as a guide for the task force in fulfillment of this charge is appended to this letter. The recommendations should be designed to help position the University as one of the top three public research universities in the world within ten years and should support the following five strategic action areas identified in the strategic positioning report:

1. Recruit, nurture, challenge and educate outstanding students who are bright, curious, and highly motivated.
2. Recruit, mentor, reward, and retain world-class faculty and staff who are innovative, energetic, and dedicated to the highest standards of excellence.
3. Promote an effective organizational culture that is committed to excellence and responsive to change.
4. Exercise responsible stewardship by setting priorities, and enhancing and effectively utilizing resource and infrastructure.
5. Communicate clearly and credibly with all of our constituencies and practice public engagement responsive to the public good.

For all areas, the President has asked that each task force assess critical and relevant trends. Your task force will not be responsible for on-the-ground operational and implementation decisions. Rather, it is expected that your team will function at a high level of visioning and strategic thinking, focusing on the long-term viability and future success of the University of Minnesota.

During the development of the University's strategic positioning plan, certain common themes have been identified that informed the goal to become one of the top three public research institutions in the world. These themes are important to keep in mind as we begin our work. The themes are:

- Strong academic programs and leadership.
- Improved access to success for students demonstrating that a better education leads directly to better results.
- Excellence in research.
- Lowered economic costs through improved services and strengthened core investments.
- Greater alignment across all programs and services.

Broad consultation with stakeholders is crucial to the strategic positioning effort. The task force is encouraged to consult widely with all segments of the University community during its analysis and development of recommendations. Consultation should include faculty, staff, students, deans, administrators, internal and external stakeholders, alumni, internal or external “experts” and any others the team deems appropriate.

Task Force Retreat

One of your first assignments as task force co-chairs and members is to attend the strategic positioning task force retreat and work day scheduled for Friday, September 16th. The retreat and work day will be held at the North Star Ballroom in the St. Paul Student Center. Task force co-chairs are expected to attend from 8:30 am-5:00 pm. Task force members are expected to attend from 1:00 pm-5:00 pm. An agenda and more detailed information will be forth coming.

Reporting Deadlines

The expected date for completion of your final report is **May 1, 2006**. The task force will also be expected to submit to me by **December 10, 2005**, a progress report summarizing the progress to date. I will also want you to establish regular and open communication with me throughout this process and would like to meet with you at 4-6 week intervals to review progress and to determine what, if any, resources the task force might need to satisfy its charge.

Resources Available to the Task Force

As you begin your work, I want to alert you to the resources and support available to your team. These include the Resource Alignment Team, a toolkit of documents and templates, and the professional staff of University Relations appointed to facilitate internal and external communication of progress through the strategic positioning process. The Resource Alignment Team is a consulting group charged with providing support to all task forces in areas of cross-functional alignment, change management, and subject matter expertise as needed. Two additional sources of support are the Steering Committee for our area and the Executive Strategic Positioning Team.

Win Ann Schumi will serve as Task Force coordinator representing the Office of the Vice President for Research and will work directly with the task force co-chairs to help

manage and coordinate the activities of the group. In addition, Peggy Sundermeyer and Amy Nordlander will staff the task force and will be responsible for recording of minutes, maintenance of data and records used by the task force, scheduling of meetings and collation and preparation of report drafts.

Managing Change

The University has entered an era of transformational change. Organizational change of this magnitude requires effective management, and the task forces being charged to bring the vision forward play a crucial role in change management. Open and timely consultation with the key stakeholders in your area is essential in this process. This includes recognition of potential barriers to change and thought toward overcoming areas of resistance. Attention to announced timelines for work completion and effective communication of progress toward goals are also vital to managing change at this level. There are resources available throughout the University community that can provide you with support in the area of change management. As task force coordinator, Win Ann Schumi is assigned this responsibility and will provide you with assistance in accessing that support as needed.

Thank you again for your willingness to assume this important role on behalf of the University community. Your participation is vital to the successful implementation of the 2005 strategic plan and to achieving the goal of becoming one of the top three public research universities in the world. Please feel free to contact me with questions, for clarifications or to request any other assistance you might need, now or during the course of the task force's work.

Your leadership and enthusiasm for this process are greatly appreciated.

Attachments

Cc: Frank Cerra, Senior Vice President of Health Sciences
E. Thomas Sullivan, Provost
Win Ann Schumi, Assistant Vice President for Research
Peggy Sundermeyer, Director, OVPR

Appendix D

INTERNAL REPORTS

- . (2005). *Centers – Total Funding*. Minneapolis: University of Minnesota.
- . (2006). *Centers and Institutes List* (not comprehensive). Minneapolis: University of Minnesota.
- . (2005). *Collegiate Practices for Distribution of ICR*. Minneapolis: University of Minnesota.
- . (2005). *Funding FY03 – FY05, by Amount of Award and Sponsor*. Minneapolis: University of Minnesota.
- . (2005). *Grant in Aid Category, 2003 – 2005 Awards*. Minneapolis: University of Minnesota.
- . (2005). *Intercollegiate Sponsored Projects*. Minneapolis: University of Minnesota.
- . (2005). *Interdepartmental Sponsored Projects*. Minneapolis: University of Minnesota.
- . (2005). *Interdisciplinary Research, Scholarship, and Creative Activity (IRSCA) Recipients, 1999-2003*. Minneapolis: University of Minnesota. (NTIS No. ---)
- . (2005). *Major University Research and Training Centers*. Minneapolis: University of Minnesota.
- Louis, C. (1995). *Evaluation of the Effectiveness of the University of Minnesota Grant-in-Aid of Research, Artistry and Scholarship Program*. Minneapolis: University of Minnesota.
- . (2006). *OVPR Matching Funds Report, FY00 – FY05*. Minneapolis: University of Minnesota.

REFERENCES

- Begley, S. (2004). Research Push: Anxious for Cures, Grant Givers Turn More Demanding; To Speed Discovery Process, Scientists Must Share Data As Condition for Funding; An Ex-CEO Tackles His Illness. *Wall Street Journal*, New York, NY, September 29, 2004, A.1.
- Bioengineering Consortium. (2003). *Catalyzing Team Science*. Natcher Conference Center, National Institutes of Health, Bethesda, Maryland, June 23-24, 2003.

Cech, T. & Rubin, S. (2004). Nurturing Interdisciplinary Research. *Nature Structural & Molecular Biology*, 11(12), 1166-1169.

Frost, S., Jean, P., Teodorescu, D., & Brown, A. (2004). Research at the Crossroads: How Intellectual Initiatives Across Disciplines Evolve. *The Review of Higher Education*, 27(4), 461-479.

Haggin, J. (1995). Illinois' Beckman Institute Targets Disciplinary Barriers to Collaboration. *Chemical and Engineering News*, March 6, 32-39.

Interdisciplinary Task Force. (2005). Report of the Interdisciplinary Task Force. Association of American Universities, October 2005, Washington, D.C., 1-18.

Kezar, A. (2005). Redesigning for Collaboration within Higher Education Institutions: An Exploration into the Developmental Process. *Research in Higher Education*, 46(7), 831-861.

McCarthy, J. (2004). Tackling the Challenges of Interdisciplinary Bioscience. *Molecular Cell Biology*, 5, November, 933-937.

National Academies. (2005). *Facilitating Interdisciplinary Research*. The National Academies Press, Washington, DC.

National Institute of Health, Department of Health & Human Services. (2006). Interdisciplinary Research Consortium, 1- 49. Retrieved from <http://grants.nih.gov/grants/guide/rfa-files/RFA-RM-06-008.html>

--. (2003). Who'd Want To Work in a Team? *Nature*, 424(6944), 1.

Roberts, J. (2004). Riding the Momentum: Interdisciplinary Research Centers to Interdisciplinary Graduate Programs. In Rice, M.L. (Ed.). *Riding the Momentum of Research: Leadership Challenges in Public Research Universities*. (MASC Report No. 108). Lawrence, Kansas: University of Kansas Merrill Advanced Studies Center.

Scafidi, G. & Krieger, D. (2004). How Many Academics Does it Take? *USC Trogan Family Magazine*, Autumn, 39-45.

Appendix E Analysis and Vision

Strengths, Weaknesses, Opportunities, and Threats Analysis

Strengths

- Wide range of recognized disciplinary expertise
- A corresponding general research and scholarship infrastructure
- Several special or one-of-a-kind facilities (*identifying all of them*)
- Experience with interdisciplinary research and large scale successful projects (*developing a list*)
- Existing examples of internal and external collaborations
- Strong interest of University to create a culture of interdisciplinary research and scholarship
- In some circumstances, organizational structure facilitates collaboration.
- Interest and willingness of many individual faculty members to work together
- There are *some* monetary resources to support interdisciplinary collaborations. (*Data is needed to assess whether the amount is sufficient to be considered a strength.*)

Weaknesses

- Promotion and tenure follow collegiate lines and the process does not adequately credit extra-disciplinary (interdisciplinary) work.
- Financial models (e.g., indirect cost return - ICR) are not conducive to interdisciplinary work.
- Lack of resources, infrastructure, and space to support new large scale collaborative projects
- In some instances, the collegiate structure hinders intercollegiate sharing of resources for both financial and cultural reasons.
- Principal Investigator-as-empire mentality hinders collaboration when it is present.
- Center directors are often more skilled in grant getting than in leadership and administrative skill.
- Our accomplishments are not highly visible, either within or outside the University.

Opportunities

- Can have a larger impact on science and knowledge through collaborative research
- Emphasis by many funding agencies and foundations on interdisciplinary research (NSF, NIH, USDA, DHS, but not all)

- Other universities are thinking along the same lines and there are opportunities to establish collaborative regional and national networks (Goal would be establishing the University of Minnesota as a hub).
- Opportunity to develop and, therefore, dominate a new field

Threats

- Competing institutions are developing new mechanisms and devoting substantial resources to support interdisciplinary research and have long had interdisciplinary institutional structures (e.g., the Institute for Social Research at Michigan), and are way ahead of us.
- Less and less money available
- Some national ranking systems do not adequately value interdisciplinary work.

Collaborative Research Vision Statement

We envision a University that will be known internationally for its innovation and excellence in interdisciplinary research and scholarship and for the ease with which collaborations are established. This substantive and culturally supportive environment will attract highly talented investigators and team leaders from all over the world.

Objectives: necessary elements and conditions to achieve vision

1. fosters, values, rewards and provides incentives for collaborative research;
2. recruits and retains highly talented investigators who can lead and administer important collaborative projects;
3. develops mechanisms in the form of, for example, centers, seminar series, and symposia which bring together researchers who have common interests from various disciplines;
4. removes administrative and logistic barriers to collaborative work;
5. provides the infrastructure, facilities, space, and equipment needed to carry out interdisciplinary research;
6. publicizes and ensures appropriate recognition and implementation of important collaborative research findings; and
7. supports educational and training opportunities to make collaborative research understood and accessible to all participants.

Recommendations from *Facilitating Interdisciplinary Research* *

	Current Practice but Should Be Enhanced	Addressed in Task Force Report	Not Addressed in Report	Notes
P-1 Postdoctoral scholars can gain interdisciplinary experiences through networking events and internships in industrial and nonacademic settings.	X			This practice is encouraged in some departments but not uniformly. Participation should be encouraged by office of collaborative services.
P-2 Postdoctoral scholars interested in interdisciplinary work should seek to identify institutions and mentors favorable to IDR.			X	Task force agreed that visibility and recognition of interdisciplinary opportunities is important for recruiting graduate students and postdocs
R-1 Faculty members desiring to work on interdisciplinary research, education, training should immerse themselves in those languages, cultures, and knowledge		X		See deliverable C, recommendation 2
R-2 Faculty members who hire postdocs from other fields should educate them in their specialties and become acquainted with the postdocs knowledge and techniques		X		See deliverable C, recommendation 2
A-1 Educators should facilitate IDR through educational opportunities for students and postdoctoral scholars, foundation courses, data gathering and analysis, and research activities in other fields of study		X		See deliverable C, recommendation 4
I-1 Academic institutions should develop new and strengthen existing policies and practices to lower or remove barriers to interdisciplinary research and scholarship, including programs with industry, government and non-government organizations.		X		See deliverable C, recommendation 1 and 5
Examples:				
• Provide more flexibility in promotion and tenure procedures, recognizing contributions may differ in IDR from in a single discipline project		X		See deliverable C, recommendation 1
Institutions could:				
-- Establish interdisciplinary committees to evaluate faculty who are conducting IDR.		X		See deliverable C, recommendation 1
-- Extend the venue for review of interdisciplinary scholars beyond the department.		X		See deliverable C, recommendation 1
-- Increase recognition of co-PI research activities during P&T decisions		X		See deliverable C, recommendation 1
-- Develop mechanisms to evaluate the contribution of each member of an IDR team.		X		See deliverable C, recommendation 1
• Establish institutional advisory committees of researchers successful in IDR to evaluate new proposals prior to implementation.		X		See deliverable B
• Require regular reviews of IDR centers and institutes and establish sunset provisions, where appropriate, when they are initiated.		X		See deliverable B
• Give high priority to recruitment of faculty whose focus is interdisciplinary; by allocating substantial resources to centrally funded, multidepartmental hiring of faculty and postdoctoral scholars and admission of graduate students.		X		Partially addressed in report -- see deliverable C, recommendation 1

* Edited for brevity. Committee on Science, Engineering, and Public Policy. (2005). *Facilitating Interdisciplinary Research*. Washington, D.C.: The National Academies Press

Recommendations from *Facilitating Interdisciplinary Research* *

	Current Practice but Should Be Enhanced	Addressed in Task Force Report	Not Addressed in Report	Notes
• Coordinate hiring across departments and centers to maximize collaborative research and teaching possibilities.		X		See deliverable C, recommendation 1
• Develop joint IDR programs and internships with industry.	X			
• Allow for the longer startup time required by some IDR programs.		X		See deliverable C, recommendation 3
• Gather information about the extent, quality, and importance of IDR in the institution and make the information available to faculty.		X		See deliverable C, recommendation 2
• Provide mechanisms to build a community of interdisciplinary scholars across the institution similar to the community that is in a department.		X		See deliverable C, recommendations 2 and 3
I-2 Institutions should experiment with more innovative policies and structures to facilitate IDR, making appropriate use of lessons learned from the performance of IDR in industrial and national laboratories.		X		See examples that follow
For example, institutions can:				
• Experiment with alternatives to departmental tenure through new modes of employment, retention, and promotion.		X		See deliverable C, recommendation 1
• Selectively apply pooled faculty lines and funds available for startup costs for new faculty toward recruitment of faculty with interdisciplinary interests and credentials.		X		See deliverable C, recommendation 1
• Experiment with administrative structures that lower administrative and funding walls between departments and other academic units.		X		See deliverable C, recommendation 1
• Create laboratory facilities with reassign able spaces and equipment for people performing IDR.		X		See deliverable C, recommendation 3
• Create specific IDR grants and training programs for distinct career stages to assist in learning new disciplines and participating in IDR .			X	
• Create mechanisms to fund graduate students and postdoctoral scholars whose research draws on multiple fields and may not be considered central to any one department.		X		See deliverable C, recommendation 3
• Develop a process for dealing with intellectual property allocation that is consistent with encouraging IDR.		X		See deliverable C, recommendation 1
• Increase "porosity" across organizational boundaries by:				
-- Encouraging joint recruitment and appointment of faculty through resources available centrally.		X		See deliverable C, recommendation 2
-- Creating competitive internal leave for study in a new discipline, allowing faculty to take courses, training, and additional advanced degrees in their own universities.		X		See deliverable C, recommendation 4

* Edited for brevity. Committee on Science, Engineering, and Public Policy. (2005). *Facilitating Interdisciplinary Research*. Washington, D.C.: The National Academies Press

Recommendations from *Facilitating Interdisciplinary Research* *

	Current Practice but Should Be Enhanced	Addressed in Task Force Report	Not Addressed in Report	Notes
-- Encouraging departments and colleges to work with IDR centers and institutes in hiring faculty with interdisciplinary backgrounds.		X		See deliverable C, recommendation 1
-- Providing fellowships that are portable within the institution.		X		See deliverable C, recommendation 4
-- Allowing courtesy appointments that recognize interactions and collaborations across departments but that do not have the formal split responsibility of a joint appointment.	X			
-- Placing departments near one another to take advantage of their potential for interdisciplinary collaborations.		X		See deliverable C, recommendations 2 and 3
I-3 Institutions should support interdisciplinary education and training for students, postdoctoral scholars, researchers, and faculty providing such mechanisms as undergraduate research opportunities, team teaching credit, and IDR management training.		X		See deliverable C, recommendation 4
• Such education and training could cover interdisciplinary research techniques, interdisciplinary team management skills, methods for teaching nonmajors, etc. For example institutions can:		X		See deliverable C, recommendation 4
• Provide more opportunities for undergraduate research experiences.			X	Addressed by another task force
• Allow faculty to receive full credit for team teaching in interdisciplinary courses.			X	Addressed by another task force
• Encourage multiple mentors for students and pairing of appropriate senior interdisciplinary faculty with junior faculty interested in IDR.		X		See deliverable C, recommendation 4
• Provide opportunities (such as sabbaticals) for students and faculty members to learn the content, languages, and cultures of disciplines other than their own, both within and outside their home institution.		X		See deliverable C, recommendation 4
• Support formal programs on the management of IDR programs, including leadership and team forming activities.		X		See deliverable C, recommendation 4
I-4 Institutions should develop equitable and flexible budgetary and cost sharing policies that support IDR.		X		See deliverable 3, recommendation 2
For example, institutions can:				
• Streamline fair and equitable budgeting procedures across department or school lines to allocate resources to interdisciplinary units outside the departments or schools.		X		See deliverable C, recommendations 1 and 2
• Create a campus wide inventory of equipment to enhance sharing and underwrite centralized equipment and instrument facilities for use by IDR projects and by multiple disciplines.			X	Addressed by another task force

* Edited for brevity. Committee on Science, Engineering, and Public Policy. (2005). *Facilitating Interdisciplinary Research*. Washington, D.C.: The National Academies Press

Recommendations from <i>Facilitating Interdisciplinary Research</i> *	Current Practice but Should Be Enhanced	Addressed in Task Force Report	Not Addressed in Report	Notes
<ul style="list-style-type: none"> • Allocate research space to projects, as well as departments. 	X			See deliverable C, recommendation 3
<ul style="list-style-type: none"> • Deploy a substantial fraction of flexible resources such as seed money, support staff, and space in support of IDR. 	X			See deliverable C, recommendations 2, 3, and 4
T-1 To facilitate the work of an IDR team, its leaders should bring together potential research collaborators early in the process and work toward agreement on key issues.	X			See deliverable C, recommendations 2 and 4
T-2 IDR leaders should seek to ensure that each participant strikes a balance between leading & following and between contributing to & benefiting from team efforts			X	
U-1 Institutions should explore alternative administrative structures and business models that facilitate IDR across traditional organizational structures.	X			See deliverable C, recommendation 2
<ul style="list-style-type: none"> • Experiment with alternative administrative structures, such as the matrix model, in which people move freely among disciplinary departments that are bridged and linked by interdisciplinary centers, offices, programs, and curricula or, alternatively, create institutions "without walls" that have no disciplinary departments and are organized around problems rather than disciplines. 			X	Addressed by another task force
<ul style="list-style-type: none"> • Create numerous interdisciplinary courses for mentors, provide graduate students with multiple mentors, and offer faculty numerous opportunities for continuing education. 			X	Addressed by another task force
<ul style="list-style-type: none"> • Oversee interdisciplinary programs at the university level rather than that of a single college. 			X	Addressed by another task force
<ul style="list-style-type: none"> • Review programs periodically with the option of terminating those no longer of high priority so that there is flexibility to respond to emerging opportunities. 			X	Addressed by another task force
U-2 Allocations of resources from high-level administration to interdisciplinary units, to further their formation and continued operation, should be considered in addition to resource allocations of discipline-driven departments and colleges. Such allocations should be driven by the inherent intellectual values of the research and by the promise of IDR in addressing urgent societal problems.	X			See deliverable C, recommendation 2
<ul style="list-style-type: none"> • Put in place policies that allow the return of some indirect cost revenues to research units such that interdisciplinary centers and program with external funding are not disadvantaged. 	X			See deliverable C, recommendations 1 and 2
<ul style="list-style-type: none"> • Provide support for graduate students who choose to study interdisciplinary fields with mentoring by more than a single faculty member. 			X	Addressed by another task force
<ul style="list-style-type: none"> • Provide support for generative technologies (for example, shared whiteboard software) that allow the sharing of information and ideas virtually. 			X	Addressed by another task force

* Edited for brevity. Committee on Science, Engineering, and Public Policy. (2005). *Facilitating Interdisciplinary Research*. Washington, D.C.: The National Academies Press

Recommendations from *Facilitating Interdisciplinary Research* *

	Current Practice but Should Be Enhanced	Addressed in Task Force Report	Not Addressed in Report	Notes
<ul style="list-style-type: none"> Invest federal funds in activities that lead to the design and implementation of research activities that take full advantage of a distributed information technology infrastructure to coordinate research across institutional lines. 			X	
U-3 Recruitment practices, from recruitment of graduate students to hiring of faculty, should be revised to include recruitment across department and college lines. <ul style="list-style-type: none"> Admit graduate students into broad fields (for example, biological sciences as opposed to microbiology; engineering as opposed to mechanical engineering) with no requirement to specialize until the end of the first or second year. Increase the number of joint faculty appointments and PhD programs from a few to many. 			X	
<ul style="list-style-type: none"> Recruit faculty for positions in both programs and departments so they can teach both within the special sphere of a program and in foundation courses in traditional areas. 		X		
U-4 The traditional practices and norms in hiring of faculty and in making tenure decisions should be revised to take into account more fully the values inherent in IDR activities. <ul style="list-style-type: none"> Provide robust mechanisms for allocating faculty positions to areas of IDR. Provide cross-departmental mechanisms for tenure and promotion review. Monitor a tenure-track faculty member's progress toward tenure with both mentors from the faculty member's program and senior faculty in traditional fields of special interest to that faculty member. 		X		See deliverable C, recommendation 1
<ul style="list-style-type: none"> Provide cross-departmental mechanisms for tenure and promotion review. 		X		See deliverable C, recommendation 1
<ul style="list-style-type: none"> Monitor a tenure-track faculty member's progress toward tenure with both mentors from the faculty member's program and senior faculty in traditional fields of special interest to that faculty member. 		X		See deliverable C, recommendation 1
U-5 Continuing social science, humanities, and information-science based studies of the complex social and intellectual processes that make for successful IDR are needed to deepen the understanding of these processes and to enhance the prospects for the creation and management of successful programs in specific fields and local institutions. <ul style="list-style-type: none"> Monitor a tenure-track faculty member's progress toward tenure with both mentors from the faculty member's program and senior faculty in traditional fields of special interest to that faculty member. 		X		See deliverable C, recommendation 2

* Edited for brevity. Committee on Science, Engineering, and Public Policy. (2005). *Facilitating Interdisciplinary Research*. Washington, D.C.: The National Academies Press