Joint Task Force on Transdisciplinary and Interdisciplinary Work

Report and Recommendations

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Executive Summary

The Joint Task Force on Transdisciplinary and Interdisciplinary Work was established by the Faculty Senate and the Provost's Office to identify ways that Binghamton University can facilitate and better support transdisciplinary and interdisciplinary research and teaching. The Task Force was charged with both identifying limitations and constraints associated with such work and exploring and proposing means by which such limitations can be mitigated or eliminated. The Task Force met several times from October 2017 through February 2018 and explored the issues both from the experiences of those on the task force and by consulting research and information from other institutions.

The University has a long tradition of supporting interdisciplinary work dating back to the institution's early days as Harpur College. Nonetheless, a number of challenges to interdisciplinary and transdisciplinary work were identified. Such challenges, while not unique to Binghamton, include: impediments to interdisciplinary teaching, the creation and support of interdisciplinary programs, support of interdisciplinary research, and faculty support and development (including tenure and promotion). While the details of these challenges and our suggested strategies for mitigating these challenges are discussed in detail in this report, our key recommendations are that the University should:

- Establish a Center for Faculty Development to be broadly focused on network-based mentoring with a special attention to transdisciplinary and interdisciplinary

scholarship. The Center could be in parallel to the Center for Learning and Teaching and would focus on both faculty service and scholarship. Some of the services could include the development of a panel of senior faculty advisors to serve as non-disciplinary mentors to junior and mid-career faculty, as well as support for the development of external mentors.

- Establish clear guidance for the consideration of transdisciplinary and interdisciplinary work in tenure and promotion decisions through the All-University Personnel Committee. This should include the development of individual memoranda of understanding, which clarify the expectations for faculty (and tenure and associated departments) who are hired for their work transdisciplinary or interdisciplinary areas.
- Develop new and improve current processes for facilitating interdisciplinary teaching and degree programs, including mechanisms for incentivizing faculty, departments, and deans to contribute to interdisciplinary offerings.
- Establish guidelines and procedures for mentoring of doctoral students across departments and colleges/schools, including support for departments to facilitate student course enrollments across departments and colleges/schools.
- Subscribe to technologies and software that facilitates the identification of interdisciplinary collaborators and funding opportunities.

Introduction

As institutions of higher education increasingly turn their attention to analyzing and addressing solutions to problems of national and international scope, the necessity of working across traditional academic and intellectual boundaries has become manifest. Universities from Arizona State University to the University at Buffalo to Southern Illinois University, and many others, have reformulated (or considered restructuring) their academic units and/or focused their areas of intellectual inquiry and hiring on topics that transcend established academic departments and/or disciplines. While some of these (e.g. Southern Illinois) have been developed in response to financial constraints, others (ASU, University of California Merced) were undertaken intentionally to eliminate disciplinary strictures. It is not our intention to call for or advocate eliminating or weakening departmental structures. In fact, the goal would be to maintain and strengthen our disciplinary core even as Binghamton University addresses impediments to transdisciplinary and interdisciplinary inquiry. Employing transdisciplinary approaches to address global challenges in innovative ways, institutions of higher education can broaden their impact and demonstrate their relevance to society in the 21st century.

In 2013 Binghamton University instituted such an approach to fostering transdisciplinary scholarship through the development of the Transdisciplinary Areas of Excellence (TAE)

initiative. We note that the development of the TAEs has been the subject of an extensive review by the Faculty Senate. It is not our intention to evaluate the TAE process, nor was that part of our charge.

The TAEs built upon a long history of interdisciplinary and transdisciplinary scholarship and teaching that has been a hallmark of BU. For example, the Center for Medieval and Renaissance Studies was established in 1966 to foster interdisciplinary scholarship across departments, and now scholars from 14 departments at Binghamton engage in both teaching and scholarship across traditional disciplinary boundaries. More recently, the Center for Collective Dynamics of Complex Systems grew from an informal affiliation to an Organized Research Center, with more than 11 department and 4 schools participating. Binghamton University also has a long history of interdisciplinary artistic collaborations, including the recent music/theater collaboration for the *Postcard from Morocco* opera, and the interdisciplinary exhibitions that have been staged by the Art Museum. There is a long history of seminal work across cultural, critical, and social theory involving Art History, Sociology, Comparative literature, Cinema, and others. Three of the ten largest majors in Harpur College are interdisciplinary programs (Integrative Neuroscience; Philosophy, Politics, and Law; Environmental Studies). The Environmental Studies Program was established in 1974. The interdisciplinary Africana Studies Department was established in 1969 as the Department of Afro-American Studies. The College of Community and Public Affairs developed an interdisciplinary, cross-department Ph.D. program in Community Action and Research, and the M.A./M.S. program in Sustainable Communities is shared across CCPA and Harpur College. These examples are illustrative of the long-term and recent commitments that Binghamton University has made to transdisciplinary and interdisciplinary scholarship and teaching but is not meant to be comprehensive.

Arguably, transdisciplinary and/or interdisciplinary scholarship and teaching are the future of higher education. This is not a new notion, with arguments that the future of scholarship must be interdisciplinary extending back several decades. The editors of *Nature* in 2007 went so far as to say: "much of the most important research is now interdisciplinary in nature. And there is a sense that, notwithstanding years of efforts to adapt to this change by encouraging interdisciplinary collaboration, the department-based structure of the university is essentially at odds with such collaboration." This may well be an overstatement, but it points to the structural challenges that can provide barricades to interdisciplinary work.

Research by social scientists suggests that there may be a differential impact on women who engage in interdisciplinary work. For example, Rhoten and Pfirman (2007) found evidence that women scientists, particularly early in their career, are more likely than male colleagues to seek to engage in various forms of interdisciplinary research. However, Smith-Doerr and Croissant (2016) have found that women, particularly junior scholars, in

the chemical sciences are discouraged from undertaking interdisciplinary collaborations, even though such collaborations are generally recognized as essential to successful work in science.

It was in these contexts that the Faculty Senate and Provost worked in Spring 2017 to empanel a Task Force to examine the challenges and opportunities for transdisciplinary and interdisciplinary teaching and scholarship at Binghamton University. The committee began its work in October 2017, and this report is the culmination of the committee's discussions and recommendations.

Committee Charge and Membership

Provost Donald Nieman and Professor John Starks, Chair of the Faculty Senate Executive Committee, charged the committee on October 10, 2017, as follows:

> [Binghamton University's] commitment to push beyond disciplinary boundaries and promote collaboration is vitally important at a time when universities are being challenged to provide solutions to global challenges that can only be answered through collaboration among faculty from multiple disciplines, funding agencies place ever greater emphasis on assembling transdisciplinary and interdisciplinary teams, faculty seek broader intellectual communities, and students demand a more holistic approach to the subjects they study.

> While Binghamton is at the forefront of transdisciplinary and interdisciplinary collaboration, challenges remain, and there are additional steps that we can take to break down barriers to collaborations that cross-disciplinary boundaries.

> [We] ask the task force to investigate and understand the aspirations for and challenges to interdisciplinary and transdisciplinary teaching, scholarship, and creative projects to:

> • Identify limitations and constraints, whether systemic, institutional, or professional, on interdisciplinary and transdisciplinary work.
> • Explore and propose means by which those limitations and constraints can be mitigated or eliminated.
> • Offer methods, programs, and plans to foster, sustain, and further interdisciplinary and transdisciplinary work.

> Specific issues that [we] hope the committee will consider are not limited to but include:

> • Practices, policies, and procedures that would facilitate cross-disciplinary collaboration in research as well as graduate and undergraduate programs.

- How we might better balance the needs of departments with our goal of facilitating transdisciplinary and interdisciplinary collaboration.
- How we can assure that our tenure and promotion guidelines and processes promote collaborations that advance interdisciplinary and transdisciplinary research.
- How we might open more opportunities for transdisciplinary work to graduate students.
- How we might provide undergraduate students more holistic, transdisciplinary educational experiences.
- Other issues that the task force identifies."

This broad agenda was addressed by a 14–member committee co-chaired by Peter Knuepfer (Geological Sciences and Environmental Studies) and Elizabeth Chilton (Dean, Harpur College of Arts and Sciences), with membership as noted above. We are grateful to Kaitlin Maynard from the Harpur Dean's office for taking minutes of all minutes for the Task Force and to Jennifer Nolan for assistance with scheduling.

Approach

The committee met on October 10, 2017, to accept the charge from the Provost and Faculty Senate, and then bi-weekly for the remainder of the fall semester as well as the early spring semester. Given the wide range of possible topics and information that could inform the committee, we elected to focus on the following subtopics in turn:

- Teaching across disciplines and departments.
- Development and administration of inter-/transdisciplinary degree programs.
- Tenure home, tenure and promotion criteria.
- Research and scholarship across disciplinary boundaries.
- Faculty development.
- Graduate education, facilitation of transdisciplinary graduate student scholarship .

In the remainder of this report we summarize the committee's assessment of some of the challenges and impediments to transdisciplinary and interdisciplinary work in each of these areas, informed by relevant literature and experiences at other institutions along with our experiences at Binghamton. We also offer a set of possible solutions for addressing these challenges.

Teaching

Transdisciplinary and interdisciplinary teaching is the development and delivery of courses that range across traditional departmental boundaries, whether taught by an individual or team-taught by two or more faculty. The emergence of interprofessional

education in the health-science fields (as exemplified in our School of Pharmacy and Pharmaceutical Sciences, Decker School of Nursing, and Department of Social Work in the College of Community and Public Affairs) is one such recent development. But Binghamton has long supported transdisciplinary and interdisciplinary teaching, as exemplified by the large number of interdisciplinary majors and programs, not to mention the long history of cross-listing courses across departments and programs.

The importance of interdisciplinary curricula and transdisciplinary learning environments for our students is clear. However, there are a number of challenges and impediments that can stand in the way of transdisciplinary and interdisciplinary teaching and course development, including:

1. How should transdisciplinary teaching be "counted" across departments? Example: class jointly taught by faculty from two different departments or (even more complicated) schools. This leads to a series of practical questions of concern to departments and individual instructors.
   o Who is credited as instructor, and which department is "credited" for the course?
   o How much of a faculty member's teaching obligation is covered?
   o Does this get in the way of a department's need to mount its curriculum?
   o How are contact hours allocated?
   o Who supplies TAs?
   To some extent, these questions and concerns reflect faculty assumptions that hiring decisions, support for departments and programs, and other administrative decisions are based on explicit monetizing or "crediting" of enrollments to individual departments. There is also the recognition that, at least in some cases, department chairs consider that any course taught by a faculty member "outside" the department should be done as an elective add-on by the faculty member rather than be considered part of her/his "normal" teaching load.
2. Faculty are concerned that there is little recognition that the development of a true team-taught course is equivalent to a full course, not just half a course, in terms of faculty commitment. This is an extension of the points noted above.
3. Some faculty are unwilling or at least wary of teaching transdisciplinary courses:
   o Wary of not seeming fully committed to department.
   o Departments may have to offer specific courses, and it is difficult to fit in the generally more elective courses that allow for co-teaching or cross-listing.
     o Particularly relevant for externally accredited professional programs.
     o Need to staff core courses in departments.
   o Concern by faculty or departments that cross-listing might lead students to other majors.

- Department may appear overstaffed if faculty are teaching in other departments but their home department has few majors.

We considered a number of possible mechanisms to address some of the concerns that we identified. A key theme that threads through these recommendations is leadership from the top, adoption from the bottom—that is, administrative support and encouragement, but development of interdisciplinary teaching by the faculty.

1. Create a dedicated funding stream for interdisciplinary and transdisciplinary courses. We understand there had previously been funding to develop new co-taught interdisciplinary courses through the Provost's office or the Center for Learning and Teaching, and perhaps this could be reinstated. The Data Science Course Development Grant and the Institute for Genocide and Mass Atrocity Prevention (IGMAP) Curriculum Development Grant programs are current examples of how this might be done.
2. Create and communicate broadly a campus-wide policy on the methods and procedures for "counting" courses, in terms of both faculty work load and departmental credit for student credit hours.
3. Include inter- and transdisciplinary goals in faculty reports to express that they are a university priority. Questions might include:
   - Are you engaged in interdisciplinary teaching?
   - Did you teach courses this year that were cross-listed with other departments?
4. Broad dissemination of materials from the Provost outlining methods of cross-listing and co-teaching courses, and guidance for how these should be considered in departmental responsibilities.
   - Tone should be encouraging, and incentives for development of such courses should be established.
5. Inter- and transdisciplinary teaching needs to be clearly expressed as a university-level mission.
6. Explore different methods of collaboration, such as
   - Accelerated degree programs that feed into specific schools and departments.
   - Identification of different techniques that are shared by and with faculty through the Center for Learning and Teaching.
   - Making interdisciplinary teaching part of "contributions to mission" for departments.
7. Identify faculty who would be willing to teach in other departments and arrange for teaching exchanges between departments. What we envision here is a formal, short-term (1 semester or 1 year) teaching exchange between departments and/or schools/colleges, wherein professors exchange teaching obligations in order to expand the breadth of their teaching.

8. Focus on helping students work inter-professionally across disciplines and schools.
9. Establish a small pool of funds (perhaps through external funding) for interdisciplinary TAs, adjuncts or postdocs. This would alleviate pressures on departments to use existing departmental resources for extradepartmental activities.
10. Have Departments and programs develop course projections for three years hence so that students and other departments and programs can plan accordingly.

<u>Degree Programs</u>

Binghamton has a rich history of interdisciplinary majors and programs, including Africana Studies, Environmental Studies, Philosophy Politics and Law, Integrative Neuroscience, Sustainable Communities, Materials Science and Engineering, and others. These programs are highly enrolled, and in fact comprise some of the largest majors on campus. Yet, just as with the development and teaching of individual classes, the development and staffing of interdisciplinary degrees has remained challenging. Our discussions identified a number of such challenges, including:

1. The allocation of human resources necessary to teach and advise students in trans- and interdisciplinary programs, particularly if faculty are not dedicated to or do not have tenure berths in the program.
2. Funding.
   o Difficult to finance shared programs across colleges as schools have separate budgets.
   o Limited funds; need to cut one area to grow another.
3. Structural impediments - Where will programs be housed? This has tended to be resolved on an *ad hoc* basis (such as under the direction of the Graduate School, or administratively housed in a somewhat-related department structure), and commonly with program leadership by faculty who are, in essence on "loan" from a home/tenure department.
4. Some departments appear unwilling to work with interdisciplinary programs to facilitate student enrollments across departmental boundaries.
5. Additional cost of co-teaching.
6. GA/TA assignments.
   o Will departments have to redistribute existing GAs, and are they willing or able to spare these resources? We addressed this question in the Teaching section of this report, although resolving this resource question is of particular importance in the development of new interdisciplinary programs.

7. Expectations for meeting graduate enrollment targets can discourage the development of innovative interdisciplinary programs, which may require several years to develop a large enough enrollment.

We recognize that trans- and interdisciplinary programs need champions to promote them and to support faculty who propose and/or develop innovative academic programs. Our overall recommendations are:

1. Base enrollment targets for both undergraduate and graduate programs that provide sufficient flexibility for innovative programs to develop and evolve.
2. Count student enrollment in a way that shares credit across colleges and programs. Where appropriate, establish cross-college targets—rather than assigning targets to specific programs or colleges—to encourage collaboration.
3. Incentivize faculty to participate in the development of new, innovative programs.
   o They should not be penalized for trying something new. Accordingly, models should be devised that allow for a certain amount of risk.
   o Incentives might be financial or administrative.
4. Facilitate early enrollment of current BU students into interdisciplinary graduate programs.
5. Restructure budget allocation to reflect areas of growth and shrinkage.
6. Ensure that staff in departments and programs (including chairs and directors) are incentivized to support the interdisciplinary and transdisciplinary mission of the university, and that they have the appropriate training and information to do so.

We discussed at length the appropriate place to incubate new interdisciplinary degree programs. On the one hand, a program will be most sustainable if it can have a commitment from a dean or deans from the start and throughout its development. Currently if there is not a clear home for a graduate degree program it is incubated in the graduate school or, in rare cases, at the Provost's level. The Task Force agreed that we needed a clear process for incubating these degrees programs, even if there is not a one-size-fits all approach. There are a number of innovative models of cross-disciplinary degree programs at other institutions that address some of the structural/administrative challenges that exist in developing and implementing transdisciplinary or interdisciplinary programs. Many of these involve the blurring, or even elimination, of traditional departmental structures, similar to how Harpur was originally organized into divisions instead of departments. Arizona State University developed "super-departments" that bring together faculty from across traditional disciplines into units that are more thematic than disciplinary, with non-traditional departmental units such as Interdisciplinary Humanities and Communication or Science and Mathematics. The University of California at Merced chose not to organize in traditional departments as the campus evolved, instead having non-departmentalized schools, even though the majority of their undergraduate majors have familiar names like

Anthropology or Physics. The Colleges of Nanoscale Science and Engineering of SUNY's Polytechnic Institute organized into "ecosystems" in nanoscale engineering and science, choosing to avoid traditional departments in favor of college-level interdisciplinary structures. Not all of these (or similar) efforts have been successful, but they offer alternatives to traditional departmental models that have facilitated development of innovative curricula and programs. While we are not proposing any of these particular models or approaches, we recommend the exploration of means to mitigate the challenges of our current structure and processes.

<u>Tenure Home and Criteria</u>

Issues of tenure and promotion are probably the greatest area of concern about the opportunity and fate of faculty who engage in transdisciplinary and interdisciplinary scholarship and teaching. Indeed, concerns about tenure and promotion permeated the committee's discussions in all areas that we considered. In particular, we identified several significant challenges.

1. It can be difficult for an Initiating Personnel Committee to evaluate scholarship and teaching that stretch across departmental boundaries, even in diverse departments where faculty hold degrees in many traditional disciplines.
   o Some areas of study do not fit comfortably within a given niche or traditional department-based expectation and may require review from people in multiple or peripheral areas of study, complicating the role of an IPC and perhaps necessitating the development of a special IPC.
   o Departments may not value scholarly work that does not coincide with typical scholarly products within a given discipline.
      o For example, the location and types of publications that an individual pursues may be difficult to reconcile between a core department and a candidate with interdisciplinary interests.
      o Also, if it is traditional within one discipline to list authors by relative contribution, but an interdisciplinary project may list them alphabetically, the contribution of a late-alphabet author may be under-recognized.
2. Joint appointments are one mechanism to recognize the interdisciplinarity of a faculty member's teaching and scholarship, but they present their own set of challenges.
   o Faculty members are under pressure to perform for multiple departments, some of which may not have a vote in tenure case.
   o There may be a lack of firm understanding regarding a faculty member's responsibilities to each department.
      o What is expected of faculty by each department and/or school/college.

- o Which department houses tenure.
- o What specifics are required to obtain tenure.
- o Reasonable service and teaching allocations/expectations for departments without tenure vote.

3. The departmental structure of having a "tenure home" can lead to a lack of flexibility for a faculty member who may have shifting interests
   - o Faculty may wish to change focus of study from time of initial appointment.
     - o This may look disloyal to department, and it may draw faculty away from core classes, leaving gaps in instruction.
     - o The Chair has the ability to assign faculty to teach particular courses.
   - o Needs of department may not allow faculty to pursue interdisciplinary interests.
     - o If a faculty member has reached an agreement with the chair and department regarding interdisciplinary activities and the chair changes, interdisciplinary and transdisciplinary collaborations already in process could be threatened.
   - o A faculty member's inability to pursue interests outside of a departmental structure may hinder faculty retention in addition to issues with tenure and promotion.

4. One source of concern regarding the TAE process that has been undertaken at Binghamton is that faculty may be brought into a department without the normal level of input by the department, and outside of the areas of need which the department itself has identified.
   - o Disaffection with the TAE process (both in the hiring process and the influence of TAEs in promotion/tenure review) could lead to implicit biases and more difficult tenure/promotion cases, even if IPCs do not intentionally voice their disaffection.
   - o The role of TAE committees in promotion and tenure recommendations is unclear.

We considered a wide range of possible solutions. The extent of these recommendations reflects the committee's belief that issues around tenure and promotion of faculty engaged in transdisciplinary and interdisciplinary work constitute the greatest challenges to current and future development of teaching and scholarship that moves across traditional disciplinary boundaries. This was one of the areas highlighted for further exploration in the report of the Transdisciplinary Areas of Excellence Committee that was delivered to Faculty Senate Executive Committee in March, so we offer here some suggestions for further development.

1. A memorandum of understanding (MOU) should codify department and university expectations and should be presented to faculty at the time of hire or at a point where the faculty member identifies a change in their trajectory toward more inter-

or transdisciplinary work. While on the one hand, the MOU should not be overly prescriptive, it could detail where the tenure home is, the expectations of departments or research clusters, and the expected division of time and labor. The MOU should clearly state details, such as:

- o the number of courses taught for each department.
- o any specific courses faculty will always, or never, teach.
- o how the department will be "made whole" if a faculty member teaches in another department

We recognize that this could cause a challenge at the department level; if all faculty members have protected courses, there may be no one left to teach core department courses, or to cover for faculty on leave. Accordingly, such arrangements should be (generally) limited to joint appointments and faculty hired with interdisciplinary intent. Additional considerations:

- o MOU should be reviewed, updated, and presented to the faculty member at the 3-year review in order to reevaluate priorities, suggest strategies moving towards tenure, and make clear which efforts will benefit tenure case and which will not.
- o The more detailed the report the more beneficial it will be to junior faculty.

2. Include the option of a joint or interdisciplinary IPC, identified at the time of hire
   - o IPC consisting of members from all departments to which the faculty member is obligated.
     - o We recognize that this could create issues if departments are not in agreement on tenure decision. But such disagreements would be addressed at the Dean's, UPC's and/or Provost's level.
   - o Alternatively, make provisions in the Provost's criteria for tenure and promotion that allow experts from other areas to be brought into an IPC of the tenure-home department to evaluate work that may span multiple departments or areas of study. While we know this is done in some cases, we recommend that the process be set forth at the time of hire so that the candidate and potential IPC members can be part of the mentoring process for new faculty, and that appropriate criteria be developed by the All University Personnel Committee to provide campus-wide guidance.

3. Mentoring junior faculty is critical and must be particularly well developed when more complicated tenure criteria or IPCs are being employed.
   - o While mentoring should ideally begin from day one, more formal mentoring can be done most clearly at the time of the 3rd year review. At that time the faculty member could be informed of changes they need to make, which direction their study should be headed, what tasks they need to undertake, etc., to build a strong tenure case.

- A mentor would ideally include colleagues from outside of the tenure-home department to avoid any internal issues.
  - The disadvantage may be that an outside faculty member may not be able to tell a faculty member exactly what the tenure-home department IPC is looking for, but could extrapolate on the general practices of tenure cases. They may not be able to help a faculty member understand:
    - How to defend their work.
    - What questions they should be asking.
    - How to negotiate with a chair or dean.
  - Ideally, an external mentor would be part of the IPC that evaluates the tenure/promotion case.

4. Mentoring mid-career faculty as they progress toward promotion to professor should follow the same approach. This is particularly important in cases where a faculty member begins to engage in trans- or interdisciplinary scholarship and/or teaching after tenure.

5. Reevaluate how much weight collaborative and interdisciplinary efforts carry towards tenure.
   - Recognize that the role or contribution of individual scholars in interdisciplinary collaborations and multi-authored papers may depart from the way these are typically attributed within a discipline, and properly reward such collaboration.
   - Establish clearer expectations/criteria in the Procedures for Personnel Cases (see below).

6. Provide training for department chairs and IPC chairs on the value that Binghamton places on interdisciplinary and transdisciplinary scholarship, and methods of evaluating such work..

7. Codify any changes in faculty requirements, expectations and allowances.
   - Create a paper trail for these changes to ensure they are recognized and upheld.

Many other institutions have addressed the question of how to include interdisciplinary and transdisciplinary work in tenure and promotion decisions. The Association of Interdisciplinary Studies (2016) has prepared a set of guidelines to help institutions evaluate interdisciplinary scholars. Michigan Technical University undertook a cluster-hiring initiative some years ago and developed guidance for how interdisciplinary work should be included in the tenure and promotion processes. Their language provides a useful model:

"Interdisciplinary scholarship and teaching are recognized as having special value within the Michigan Tech community. The University acknowledges that additional time and effort are required for successful interdisciplinary collaboration and is committed to rewarding these efforts. In particular, promotion and tenure evaluations shall recognize

interdisciplinary teaching and scholarship as indicators of leadership in going beyond traditional boundaries, and worthy of special consideration." (Michigan Technical University, 2016; wording adopted in 1995).

<u>Research and Scholarship Across Disciplinary Boundaries</u>

Transdisciplinary and interdisciplinary research and scholarship (TIR) has long been a hallmark of Binghamton University. The TAEs are simply the latest manifestation of an approach that has included long-term organized research centers that generally transcend disciplinary structures and the Interdisciplinary Collaborative Research Grant program, which has been sponsored by the Division of Research for many years. Yet challenges remain in the support for TIR. The committee identified a number of issues.

1. It is difficult to codify methods of measuring or evaluating trans and interdisciplinary work, whether in tenure/promotion, as previously noted, or in evaluating research productivity and significance.
   o Standards of evaluation may vary in different areas and fields.
   o Difficult to measure value of impact; journals focused more on TIR may have lower impact factors.
   o The approach to publication that is typical in each discipline may not be the same when moving across disciplines.
     o For example, how authors are credited or listed on publications varies by discipline, and this may impact how the contribution of one author is weighed.
   o Different types of funding are available in different areas of scholarship, and some funding agencies are more supportive of TIR than others. However, major Federal funding agencies have shifted to favor interdisciplinary teams rather than individual researchers. Pursuing this type of research may open up new, less traditional funding opportunities.
2. TIR collaboration takes considerable time and effort, which may not be sustainable for an individual faculty member.
3. There often is a lack of knowledge and training on how to establish TIR collaboration.
4. Currently there are limited tools to find collaborators outside of home discipline.
5. Depending on the field, collaborative work may be viewed as less meritorious than individual research.
   o Junior faculty may view this work as a distraction from their individual work and detrimental to their tenure case.

The committee recognizes that an implementation strategy that includes top-down institutional support coupled with grass-roots approaches could alleviate some of these challenges.

1. Develop a communication strategy that demonstrates broad institutional support for TIR with the goal of building a climate of acceptance and encouragement of collaborative work across the campus and within individual schools and departments.
2. Create opportunities for faculty to meet others outside of their disciplines, develop common interests, and pursue collaborative efforts across disciplines and campuses, whether through formal interdisciplinary groups or informal structures.
   - Social events where faculty display their own research and are exposed to others', with a focus on finding collaborators and events which focus on promoting collaborative opportunities across the organized research centers.
   - Conferences that focus on collaborative and interdisciplinary research.
   - Lunch meetings where members of various disciplines come together to discuss a topic, which could be fostered over the course of a semester or several meetings to allow more time for evolution and development of ideas.
   - Enable opportunities for casual "water cooler" conversations between faculty of different disciplines.

   We recognize that Binghamton already does this to a considerable extent, but increased facilitation of TIR networking opportunities, including outside of formal structures like the organized research centers or TAEs, would help foster greater internal collaboration. Support for convening TIR-focused conferences, including scholars from outside BU, would also provide important opportunities for collaboration.
3. Make funding available for:
   - Faculty travel to events and conferences outside their discipline, perhaps by regularly including interdisciplinary work as an award criterion for college- and university-level awards.
   - Research expo for those with focus on and/or interest in interdisciplinary work.

   We encourage the expansion of efforts like the Interdisciplinary Collaboration Grants and TAE Seed Grants programs to facilitate intra-campus collaborations.
4. Develop tool kits for faculty to find potential collaborators and manage TIR projects.
   - Subscribe to expertise profile technology platform(s) that can be used to find potential collaborators.
   - Share best practices from the field of Team Science on conduct, management, and support of effective and efficient team-based research and scholarship.

- Engage in dialogue with the Road Map SP1 subcommittee on development of best metrics to measure campus' interdisciplinary collaboration.

Although most faculty are able to identify potential collaborators through disciplinary conferences, it can often be more challenging to identify potential collaborators outside of one's primary discipline. While some tools exist that are readily available, we believe that more can be done to help in the development of potential TIR collaborations. Binghamton has a strong base in terms of campus-based ORCs and TAEs, and we believe that modest additional efforts could greatly strengthen BU's collaborations and recognition.

<u>Faculty Development</u>

Many of the items already cited revolve around mechanisms to increase access of faculty to opportunities for transdisciplinary and interdisciplinary work. Here we consider opportunities for increasing faculty development in these areas. The committee's conversation on this topic overlapped considerably with our discussion on tenure and promotion. The following challenges were identified as particularly significant for early- and mid-career faculty:

1. Lack of clear, formalized standards for faculty with interdisciplinary work or joint appointments.
2. Differing tenure and promotion guidelines between schools and departments that can be particularly challenging for faculty who engage in scholarship and/or teaching that crosses boundaries, especially those with joint appointments.
3. Lack of guidance and mentoring for faculty, particularly as it applies to transdisciplinary and interdisciplinary work.
   - Mentors who work too closely with a faculty member may have to recuse themselves from the IPC, even if they are best suited to review the candidate's work.
4. Even when an interdisciplinary IPC has been established, members may not be knowledgeable in the areas they are being asked to review.
5. Definition of a "worthy body of work" varies amongst reviewers and may not be compatible with the candidate's focuses or fields of research.
6. TAE core hires: Even if the TAE identifies a worthy candidate, a tenure-berth department may not be supportive or provide the mentoring necessary for success. For example, a TAE core faculty member may end up doing departmental work and not benefitting the TAE, or they may be pulled in too many directions to be effective. Furthermore, we recognize that there may be differing levels of willingness on the part of chairs/departments to count the transdisciplinary/interdisciplinary work as

much as departmental work due to lack of understanding or their own pressures and goals.

Our discussion on potential solutions to these issues also focused on mentoring and issues around promotion and tenure. We note here those initiatives and ideas we had not already considered in the discussion around tenure and promotion.

1. Develop transparent and formalized mentoring models at the college and/or university level. The model may be different for faculty who have a transdisciplinary or interdisciplinary focus, but mentoring is important for all faculty across the university.
   o Joint and interdisciplinary appointments could have multiple mentors, such as one mentor in each department (joint appt), or one mentor from the tenure home, one from a different department, or department-selected mentor and mentor selected by individual.
2. Establish a Center for Faculty Development to be broadly focused on network-based mentoring with a special attention to transdisciplinary and interdisciplinary scholarship. The Center could be in parallel to the Center for Teaching and would focus on both faculty service and scholarship. Some of the services could include the development of a panel of senior faculty advisors to serve as non-disciplinary mentors to junior and mid-career faculty, as well as support for the development of external mentors.
   o Establish a standing mentoring committee for interdisciplinary work within the Center that would be
     o University wide.
     o Composed of senior faculty who regularly encounter interdisciplinary work.
     o Resource for junior faculty as well as departments. For example, the committee could be charged with developing materials on identifying, reaching out to, and evaluating external reviewers. The committee might also help junior and mid-career faculty develop research plans in consultation with department or division chairs.
     o **This is not an evaluative body** but instead a broadly-based mentoring group.
     o The committee would allow for more open and honest communication, as it would not be involved in any tenure/promotion decisions (and in fact if a committee member were likely to be on an IPC, that individual would need to recuse themselves from any discussions involving that faculty member).
     o Multiple perspectives and variety of experiences provides the candidate a wider knowledge base.

We envision that such an approach would eliminate the evaluative aspect in the mentor/mentee relationship, instead providing a resource to junior and mid-career faculty as they develop transdisciplinary or interdisciplinary scholarship.

3. Develop and promote a culture of understanding within departments about how to evaluate interdisciplinary colleagues and guidance (established, perhaps, by the aforementioned Center for Faculty Development) on how to consider their teaching, scholarship, and service roles across departments and schools/colleges.

4. Develop strategies to assuage fears of interdisciplinary or joint appointment faculty before they apply.

We view effective mentoring, including the engagement of faculty from outside an individual's area(s) of scholarship, as a critical element in the faculty development for all faculty, but especially those engaged in transdisciplinary and interdisciplinary work, particularly given the challenges that such individuals face in tenure and promotion.

<u>Transdisciplinary Graduate Education and Scholarship</u>

We observe national trends that doctoral students are blurring disciplinary boundaries in their own scholarship, and that masters students are seeking dual degrees across disciplines. Binghamton University has recognized this in a number of ways, including in the development of interdisciplinary certificates like the Certificate in Watershed Studies, interdisciplinary graduate programs like Materials Science and Engineering, Sustainable Communities, or Community Research and Action. Binghamton University also affords the opportunity to doctoral students to develop a personally tailored interdisciplinary doctoral program and presents masters students with a growing number of opportunities to pursue dual or double degrees. Yet as students become themselves more interested in transdisciplinary and interdisciplinary scholarship, the question remains as to whether Binghamton in fact offers the kinds of support that can foster such approaches.

We have identified a number of challenges and impediments to trans- and interdisciplinary graduate education, despite the variety of opportunities that already exist.

1. Degrees that are less formalized or not easily recognized may not be valued in academia.
   o May hinder student progress along academic career paths; studies and anecdotal information offer conflicting evidence of whether or not interdisciplinary doctoral degrees enhance or limit the candidate in the academic job market. On the other hand, interdisciplinary degrees may enhance a candidate's value in the non-academic sectors.
   o Degrees that are too specific or unique may not be recognizable to those outside their University.

- Hiring departments want candidates who can step in to teach department courses and thus are more comfortable with those with degrees that directly correspond to their department.
2. Traditional discipline-based doctoral programs may limit the number of credits students can take outside of their degree department.
   - Departments encourage students to take classes that "count" towards their degree, within their discipline.
   - Classes may be limited to degree students, decreasing opportunities for students to take classes outside their discipline.
   - Departments need to maintain class sizes to run their courses.
     - May deny students' requests to take outside classes to maintain enough students to fill departmental classes.
3. Advising graduate students.
   - A significant portion of students identify as having done interdisciplinary work even if their degrees are departmental; do these students have access to advisors who are experienced in and willing to advise interdisciplinary work?
   - Co-advisors may offer students differing perspectives; however could hinder students if they are caught between opposing viewpoints.
4. Publishing.
   - Departments require students to publish in top publications, usually focused on a discipline.
   - Students with multiple disciplines may be expected to publish in more than one field.
     - This would require students to master multiple areas of study in order to claim an interdisciplinary degree.

This focus on the ability of departments and the university as a whole to provide sufficient mentoring to graduate students, especially doctoral students, whose scholarship transcends traditional disciplinary boundaries leads us to a number of possible solutions.

1. Advising
   - Provide access to capable mentors with an understanding of interdisciplinary study.
   - Formal recognition by the Graduate School of co-dissertation directors, whether or not from the same department.
2. Increase the development of interdisciplinary certificate programs.
3. Provide incentives for faculty, departments, and programs to allow students from other programs to enroll in their classes.
4. Establish criteria for interdisciplinary dissertation committees, perhaps parallel to Special IPCs that can be established for interdisciplinary faculty.

- o Committee made up of members from different disciplines, with each section of research overseen by members who specialize in the corresponding field.
5. Establish broad interdisciplinary majors/programs with specialized focus.
6. Guidance for students upon finishing their degree. Students need a clear picture of how the degree can be utilized to advance their career.
   - o Engage the Fleishman Center in providing services for students upon graduation, particularly in identifying harder-to-find interdisciplinary opportunities.

Concluding Comments

Binghamton University has long supported transdisciplinary and interdisciplinary inquiry and teaching. Yet impediments remain, some of which are structural, some of which are cultural. We believe that strong leadership from the top, recognizing the value and importance of transdisciplinary and interdisciplinary work, remains a critical component. Equally important is recognition at the faculty level that the important problems facing society require scholarship that transcends our traditional disciplinary and departmental structures. Our principal recommendations are:

- Establish a Center for Faculty Development to be focused on network-based mentoring, with a special focus on transdisciplinary and interdisciplinary scholarship across the university.
- Establish clear guidance for both faculty and departments on the consideration of transdisciplinary and interdisciplinary work in tenure and promotion decisions.
- Develop new and improve current methods for facilitating interdisciplinary teaching and degree programs, including mechanisms for incentivizing faculty, departments, and deans to contribute to interdisciplinary offerings.
- Establish guidelines and procedures for mentoring of doctoral students across departments and colleges/schools.
- Subscribe to technologies and software that facilitate the identification and management of interdisciplinary collaborations.

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