

Report of Committee on Barriers to Interdisciplinarity

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Background

In winter quarter 2004, Provost Barbara Snyder invited us, as a small group of faculty representing six Colleges, to serve on a committee to examine barriers to interdisciplinary research and teaching at The Ohio State University. Barriers could include but not be restricted to the recent budget restructuring at the University. At the committee's first meeting on January 29, 2004, Provost Snyder gave the committee its charge to look at non-financial barriers to interdisciplinary research and to think through solutions to reduce these barriers. A short report was suggested by the end of spring quarter 2004. The committee met on February 16 and 23, March 15, April 5 and 26, and May 3, 2004, where discussions were held on the nature of the barriers and recommendations on how the University can remove or minimize their effects. This is our report.

I. INTRODUCTION

Interdisciplinary research and teaching at a major research university like The Ohio State University are not just nice things to do from time to time; they are essential for its success. The cutting edges of teaching and research often occur when two or more fields that have developed almost in isolation find that they have general principles that unite the fields or share problems that require expertise from several disciplines. The whole field of General Systems Theory is founded on this realization. There is the real need in describing and solving problems such as urban decay and environmental pollution to use tools previously developed in several distinct fields. Students become enthused with courses that cross fields and thereby give their disciplinary fields more meaning. Finally, the Federal government has recognized the

importance of interdisciplinary teams for competitive research programs (e.g., the Biocomplexity Program in the National Science Foundation). Almost every major federal and industrial source of research funding encourages the growth of interdisciplinary research and this presents a great opportunity for Ohio State to build its reputation.

There are difficulties inherent in the University department structure for starting and carrying out interdisciplinary research, particularly in a large institution like Ohio State. Conversely, it could be argued that there is no place on the planet with better opportunities for interdisciplinary studies since every field imaginable is represented. For example, we are one of only a handful of universities that is comprehensive in one location, with colleges of engineering, agriculture, veterinary medicine, pharmacy, and medicine on the same campus.

Despite this, the difficulties for interdisciplinary work at Ohio State, particularly in budget restructuring, are significant. Promotion and tenure decisions can become cumbersome and even detrimental with split appointments. Professors attempting to start interdisciplinary centers risk isolation because some chairs specifically discourage their faculty from venturing too far from home base, especially when those faculty are generating needed overhead recovery and teaching credit for the home department. Campus bureaucracy sometimes limits procedures such as research proposal submissions and cross-listing of courses. Interdisciplinary research centers often “compete” with departments for both faculty and resource recovery. The sharing of lab space by one faculty member with others for teaching and outreach is now being questioned if dollars do not follow because space is now being taxed. Additional difficulties present themselves when academic decisions become fiscal decisions in times of tight budgets and budget restructuring.

It is the intent of this report to point out problems that arise when interdisciplinarity is attempted in teaching and research at Ohio State. While trying to stay out of fiscal issues and solutions that might cost resources, we found it nearly impossible for our committee to neglect this issue, as many of the committee members are directors of research centers. Although our report deals mainly with non-fiscal barriers to interdisciplinary research and teaching, a quote from a report by the University Senate Fiscal Committee hits to the heart of our concern regarding the impact of new fiscal procedures initiated at The Ohio State University (referred to here as “budget restructuring”) on interdisciplinary research: “It was feared that paralyzing conflicts might emerge among academic units and interdisciplinary centers concerning the division of IDC (indirect cost recovery) generated by the relevant external grants.” In the end, that committee found no evidence that interdisciplinary teaching and research initiatives had suffered in the first year of the new budget system. However, our report reviews possible long-term and non-budgetary impacts on interdisciplinarity at Ohio State.

Interdisciplinarity

We will not attempt to define interdisciplinarity except to make a few observations. In one sense, a professor from physics and chemistry working together are engaged in interdisciplinary research; however, these are closely linked disciplines with a distinguished shared history and collaboration should require little encouragement. If the physics professor starts to work with a sociologist, this may open a true interdisciplinary field. This kind of collaboration often requires

institutional commitment before external funding agencies know enough to include this new field in their programs.

Another issue that complicates the academic definition of interdisciplinarity is that some departments, by definition, do not necessarily equate around a single discipline. There are some examples of departments and schools where the interdisciplinarity within the unit is as broad as that found in four or five traditional departments. For example, the School of Natural Resources in the College of Food, Agricultural, and Environmental Sciences has faculty in fields that range from molecular biology to education pedagogy. No institutional kudos result when faculty in such a program collaborate with each other. Our point is that interdisciplinary research and teaching are quite difficult to define in an academic setting, and without that definition, assessing whether there is something broken is that much more difficult. We will attempt to answer the charge given to us, namely to identify barriers to interdisciplinary research and think through solutions to reduce these problems.

Our report, prepared by a distinguished group of faculty, all of whom have been active in interdisciplinary research and teaching, falls into two major sections—challenges and recommendations:

IDENTIFICATION OF CHALLENGES

1. Promotion, Tenure, and Annual Reviews
2. Sponsored Research
3. Teaching and Unfunded Research
4. Centers
5. Facilities and Space Issues
6. Other Issues

RECOMMENDATIONS

II. IDENTIFICATION OF CHALLENGES

1. Promotion, Tenure, and Annual Reviews

The culture at Ohio State largely ignores interdisciplinary work in annual reviews of faculty and center directors and there is little interdisciplinary work reporting to upper administration by college deans in college annual reports. Promotion and tenure are rewarded on individual efforts within departments. There exists a sense of narrow ownership of knowledge. The system of instruction, and especially research, is so heavily weighted with personal reward and achievement that sharing ideas and work seems to create a watered down result in the eyes of promotion and tenure committees. Promotion, tenure, and annual reviews typically do not reward interdisciplinary research and teaching.

Junior faculty are routinely discouraged from interdisciplinary efforts and towards an "individual only" pursuit. So until tenure is achieved, it is currently viewed as a "risk" by some due to the following perceptions: interdisciplinary research represents a lack of research focus; interdisciplinary research does not really have a principal author or investigator; and

interdisciplinary research or teaching means one department loses monetary control. In fact, several of our committee members, despite their strong belief in interdisciplinary studies, told of warning young faculty to beware of venturing too far from their departments prior to tenure.

While there are exceptions, there is generally no clear reward system in place at department-level reviews for interdisciplinary work outside the department; thus there is the possibility of harm to interdisciplinary faculty during department-level reviews. For promotion and tenure, there is usually no clear reward system in place at the college level for interdisciplinary teaching and research that crosses to other colleges. In certain cases, the Colleges have begun to value interdisciplinary research. For example, the College of Engineering has an annual award—the Lumley Interdisciplinary Research Award—that is presented every spring. Only at the University review level is interdisciplinary research viewed as positive. Budget restructuring, where fiscal gains occur when courses are taught by one department or research grants remain in one department, has probably hampered or at most not encouraged interdisciplinary work.

2. Sponsored Research

Interdisciplinary research should be a faculty-driven endeavor that is guided by the particular problem that is to be researched. Thus, by definition, faculty from different disciplines who desire to come together for a common goal have a vested interest in making sure that all requirements, stipulations, and responsibilities regarding the various units are met. It should first be stated that there is no empirical evidence of less interdisciplinarity in proposals since budget restructuring was put in place (Figure 1). But, it may be too early for signs of such behavior in the academy, simply because departments and colleges are only now (spring 2004) determining the budgetary reality of budget restructuring.

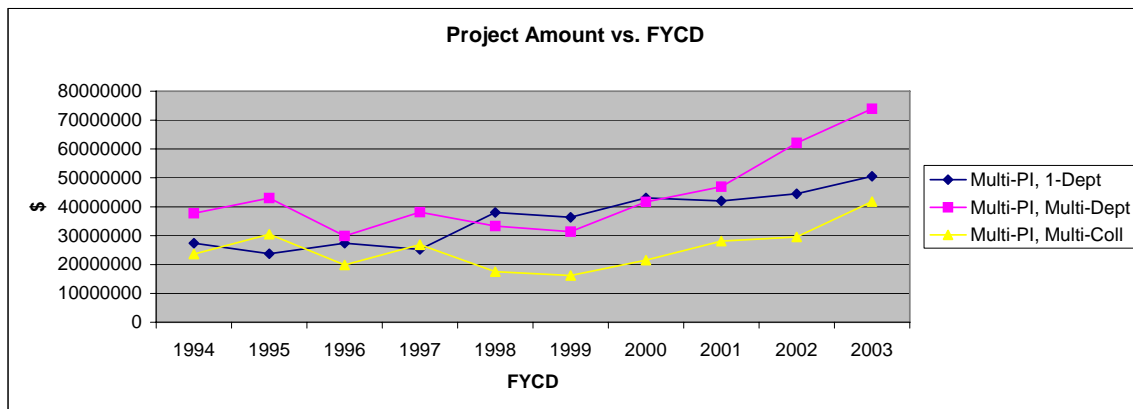


Figure 1. Pattern of multi-principal investigator (PI), multi-department, multi-college OSURF projects, 1994-2003 (data from Office of Research)

Indirect Cost Recovery

Documents from the Central Administration state that indirect cost recoveries “need to be reinvested in the research support infrastructure in order to grow our research activities and support the Academic Plan.” Interdisciplinary activities and centers have the potential to make

serious contributions towards this goal. Yet, there is the perception that when centers and departments “compete” for indirect cost returns, the center has little political support (see “Center” discussion below).

Sub-contracting Policy

A recent shift in policy now requires that full overhead be paid on subcontracts with other universities. In previous times, Ohio State’s policy was not to charge Facilities and Administrative (F&A) costs to University subcontractors. Current Ohio State policy states: “If a project *recovers F&A costs at the appropriate negotiated rate*, only the first \$25,000 of the subcontract is subject to F&A costs.” The new policy is a serious impediment for Ohio State obtaining credit for large multi-institutional interdisciplinary projects; i.e., the investigators will now just submit separate institutional face pages and budgets, as part of a larger project. Grant agencies are more than willing to make such arrangements so that grant dollars go further. The net effect will be that the main institution (whichever institution leads the project) will not receive the credit for a high-ticket research project. This policy could be penny-wise but pound-foolish, with an eventual decrease in the number of credited interdisciplinary projects at Ohio State.

Tuition and Student fees

Ohio State’s policy of providing cost-sharing to graduate student researchers employed on grants that bring full indirect costs has been the one big advantage we have enjoyed vs. our benchmark institutions. Now, the University has embarked on a policy to recover tuition from research grants. The President’s and Provost’s Advisory Committee (PPAC) recently prepared a report that considered the projected steep increases in the costs associated with supporting graduate students at Ohio State. The upshot of this report is that the magnitude of the increased costs currently proposed, coupled with other factors, could damage the quality of graduate programs and research. The fear expressed by some of our committee members is that this tuition and fees issue might seriously hinder investigators from different disciplines and academic cultures from coming together.

3. Teaching and Underfunded Research

Faculty Issues

Collaboration works when interested parties see their points of convergence and understand the value. Conducting interdisciplinary teaching and “underfunded research” i.e. research supported by departmental resources or student or faculty resources, presumes that people have time to conduct these activities. Interdisciplinary undertakings usually require more time for the faculty since communication and collaboration become more difficult. Faculty rarely see people from other disciplines; when we mix, we quickly come up with ideas, but we mix infrequently. We must acknowledge that there is a cost for such mixing.

Often times, students serve as the primary bridges to finding connections between faculty across a university of this size. Thus interdisciplinary academic programs that are in place connect the faculty by getting them together at student committee meetings and exams. We have all seen examples of where cross-disciplinary programs get a start during a graduate student oral

examination. It would be helpful if there were more and better mechanisms for faculty from different disciplines to discover shared/complementary interests.

Effects on Students

In many disciplines students have extremely tight schedules with little open time for the study of other disciplines. When they do use some of their free time to explore, they find it very hard to compete. The current budget model has a disciplinary focus, i.e., offering courses to increase FTE and keeping students in the department. Departments are now financially penalized for encouraging students to take courses in other departments, instead of courses within their department.

Differential tuition fees hurts as well; it deters students from making the connections between departments or colleges with curriculum that would benefit interdisciplinary research and learning.

Overall Effect on Interdisciplinary Teaching

Budget restructuring rewards those who can keep money within their walls (and especially within their colleges) and discourages sharing wealth and knowledge with others.

4. Centers

A *center* at Ohio State is defined as a non-degree granting unit that is focused on academics. Interdisciplinary research naturally promotes the concept of centers by fostering research that crosses traditional boundaries of departments and colleges. Centers naturally promote interdisciplinary research and are often in a much better position to capture large Federal grants than are departments. A recent study identified 140 centers and institutes at The Ohio State University.

However, under the current budget restructuring model at Ohio State, obstacles to interdisciplinary research have been created that impact these potentially unlimited possibilities created by centers. Indirect cost allocations to centers were not considered in the budget restructuring model. Faculty members find it difficult to get agreement with departments and colleges on the percentage of sharing indirect costs when gathering signatures on the PA-005 form. Departments and colleges want a larger portion of the indirect costs for their operation, and centers also need these indirect costs to continue functioning under the present budget environment. Perhaps one reason for not coming to an agreement could be a lack of understanding of chairs and deans on the nature and cost of interdisciplinary research.

5. Facilities and Space Issues

The committee identified the four following barriers to interdisciplinary research relative to facilities and space.

Inappropriate Use of F&A Return

Initial committee discussions clearly pointed out that there is a disparity across campus in the level of knowledge about the components of Facilities and Administrative (F&A) cost rates and

their proper distribution. Some units on campus require a 50/50 split of F&A between two collaborating units, regardless of where the research is done. Other units require a 5% return if their faculty are associated with grants from a center. The F&A is broken down as 22.3% for facilities (building use/depreciation, equipment use/depreciation, interest and operations/maintenance), 1.2% for the library and 26% for administrative costs, for a negotiated rate of 49.5%. Under budget restructuring, the annual change in a College's F&A is distributed to the College. It is clear that Colleges may view these monies as a steady income stream that pays the bills and not as monies to use strategically to seek out opportunities to engage in interdisciplinary research. Some colleges' ideas about maximizing their stream of F&A is to set rigid and inflexible percentages in exchange for participation of their faculty in research. One principle to be articulated as we go forward with budget restructuring is that the resource flow should follow the expense. For example, the unit providing the research space should receive that portion of the F&A return devoted to facilities and should receive the expenditure credit on the PA-005 form. On the other hand, that unit providing the administrative support for a given project should receive the "administrative" portion of the F&A.

Uneven Facility Maintenance

A second issue that could interfere with the conduct of interdisciplinary research involves the cooperation of units with different standards for the maintenance of their research facilities. Prior to budget restructuring, all F&A was returned centrally and research facilities were maintained via a central resource pool (with repairs and maintenance performed largely by Physical Facilities). It is clear that in some parts of campus, very little was done to maintain research buildings and extensive deterioration has taken place. With the advent of budget restructuring and F&A returned to the colleges, the expectation now is that it is largely the College's responsibility to maintain their own facilities. New models are starting to emerge on campus whereby preventive maintenance contracts are being put in place with outside contractors rather than relying on Physical Facilities. It is anticipated that there may be difficulties that arise when several units (crossing college boundaries) cooperate on a research project wherein one unit is in a college that pays for facilities contracts and other units do not. Those colleges that have been able to grow their research portfolio and maximize F&A will have more to invest in their own research infrastructure.

New Institution-wide Facilities

One of the great benefits to a University like Ohio State is the breadth of its research programs. This breadth has been viewed as positive by most since it allows for some useful duplication (i.e., multiple biochemistry units or statistics units, for example). The real strength of our breadth is that it allows cross-disciplinary research to be fostered providing that the cooperating units can work out the administrative arrangements by which those collaborations can be realized. The committee's collective experience is that these collaborations work very well at the faculty level where the scholarly activity is performed. However, it is at the administrative level where some of the difficulties emerge. These difficulties will be particularly strained when it comes to the construction of new or specialized research facilities. Rather than focusing institution-wide on facilities that could be utilized for interdisciplinary research, the priorities will be more narrowly defined and set by the unit paying for the facility at the expense of interdisciplinary work.

Sharing Space

Interdisciplinary teaching and unfunded research require shared space and resources for both faculty and students. The breakdown costs of space for research or instruction when split between two financial units across several colleges also makes the accounting of each unit a waning task and sometimes a losing one as well with regards to a budget model that stresses minimum instructor cost vs. class size FTE. It is difficult to provide interdisciplinary courses across departments because one of the overwhelming obstacles is space. Most of our buildings are maxed out and rental of space from the University is actually more than it costs for downtown space at market value. In response to lack of College space and high University space costs, the College of the Arts, for example, is pursuing options with developers outside of the University for space to run interdisciplinary studios. This response to lack of affordable space makes the physical proximity problem even larger.

6. Other Issues

Lack of Clarity

Many on our committee shared stories of situations where administrators at the college and department level were generally “circling the wagons” because of perceived threats caused by new fiscal policies in the University, especially budget restructuring. Faculty are being told to teach more courses within the department, “load up” on graduate students, and only go after traditional sources of grants and contracts that pay full overhead. In some departments, faculty are being told they are responsible for paying for their space with formulae based on their salary and graduate students or TAs. The downside of this activity is that the faculty member is now often less willing to “share” a grant with others, for fear of costing the department returned overhead. In general, strong departments mean weaker centers; it is a zero-sum gain for the University in one sense; but it is the loss of an interdisciplinary working environment that often results. One of the unintended consequences of this concern in times of tight budgets is that programs and centers that attempt to cross disciplinary boundaries have become that much more difficult to maintain.

Part of the blame of this overreaction in some cases is that the new fiscal system is not being described well by the Administration. Reports that were provided to the committee and that are being circulated to administrators appear to lack vision, are not specific enough to help with decisions, are outdated, or are often dismissed as being inconsequential and causing little impact. The impact of many of these changes in policy could be more perception than reality. However, deans and chairs either do not know this or choose to use the “pending doom” as a way to rally departments and colleges to “win one for the Gipper.” Interdisciplinary research often suffers as a result.

Communication

When people from different disciplines first try to work together, there are usually difficulties learning each other's languages and processes. Since this is particularly difficult the first time (or first few times), it might discourage future collaboration attempts. Some of the researchers on this committee have experienced interdisciplinary meetings where languages that have developed in fields over a long period of time make conversations difficult or incomprehensible. Interdisciplinary committees that review post-doctoral nominees or candidates for University

Scholar have distinct problems in comparing apples and oranges because of the complex languages that have developed in every field. This is an overall national and international issue, particularly in the sciences, and it cannot be solved completely at Ohio State; but assistance might be possible to facilitate translation of fields for interdisciplinary efforts.

III. RECOMMENDATIONS

If the intent of this study is to truly encourage interdisciplinary research and teaching, since these are the driving forces that lead our globalized world, then financial, spatial and reward structures should be put in place to encourage and allow easy implementation of this pursuit. Below are several recommendations that resulted from our committee's discussions. → Arrows identify areas of highest priority.

General

1. The University must foster a culture of interdisciplinary teaching and research. One way is establish a model of rewarding faculty and centers for this interdisciplinary work that fits with the current "business" model of accounting for grants, student tuition, and space. In businesses, rewards are based on synthesizing much information and creating value systems that set up prioritization of worth. The new Ohio State budget model has implemented a "business" model of accounting without a complete "business" model of reward.
 - Departments that excel in interdisciplinary research and teaching should be rewarded in the same way that teams in businesses are rewarded with bonuses or incentives when collective achievements are tallied and exceed expectations.
 - Just as in businesses, departments could be more "fluid" and not own faculty. Without tenure-initiating-units (TIU), faculty could be free to transfer to different departments as needs and times change, just as employees routinely do in the business world. Their tenure could follow them. It is well known that it is easier to move to another university than within a university if one wishes to change departments.
2. Administrative leadership and encouragement is needed to stimulate faculty to develop new ways to identify emerging research trends. In other words, Ohio State needs to have leadership on identifying new areas of research before they are identified by funding agencies and educational leaders, not afterwards.

Promotion/Tenure, Reviews, and Recognition

3. Collaborative research and teaching done with colleagues should have value equal to those activities done individually if the collaboration is significant.

4. The Provost should encourage deans and the Office of Research to support interdisciplinary research by earmarking some fraction of Special Research Assignments (SRAs), Faculty Professional Leaves (FPLs), seed grant funding, and other forms of internal funding for interdisciplinary work, using as an example the recent Office of Research/Arts and Sciences special funding for multidisciplinary projects in Arts and Humanities).
5. The administration should encourage one and not two reviews of split appointments during college tenure review.
6. → The Provost should regularly publicize and reward deans, directors, and chairs who make joint appointments, courtesy appointments, or cluster hires that support interdisciplinary teaching or research.
 - a. The university should decide publicly whether or not junior faculty will be rewarded for participation in interdisciplinary research and teaching and clarify to all junior faculty what the expectations and rewards or penalties will be for this type of work.
 - b. The Provost should ensure that the spirit of Faculty Rule 3335-47-02 (D) is echoed in all college and departmental AP&T documents; the Rule expresses the belief that research and teaching can be pursued in other than disciplinary ways.
 - c. The Provost should ensure that faculty who do interdisciplinary work are represented on the Office of Academic Affairs (OAA) and College P&T committees; the Provost and deans should hold deans and chairs accountable for supporting and evaluating interdisciplinary work; and the Provost should require that in their annual reports deans, directors, and chairs describe and evaluate interdisciplinary activity in their units.
 - d. Faculty engaged in interdisciplinary programs and projects should be regularly publicized in *OnCampus*, on OSU Today, and before groups such as the Board of Trustees. Annual awards for distinguished interdisciplinary research should be instituted at the University level.
7. A campus-wide standing interdisciplinary committee should be established; among other things, it would convene regular meetings of all directors of interdisciplinary programs and annually report to OAA and Office of Research on the state of interdisciplinary activity at Ohio State.

Research

8. The University should foster interdisciplinary activities and encourage large project grants. Incentives to participate in interdisciplinary activities could include larger return on indirect costs, reduced indirect costing, or any other feasible financial stimulus for such projects.

9. The Office of Research and the President should expand funding for interdisciplinary competition such as the recent Multidisciplinary Grants in Arts and Humanities.
10. The Office of Research and OSURF should streamline proposal routing procedures including the PA-005 when two or more departments are involved by making on-line filing a reality.
11. → OSURF and Colleges should expand efforts to provide strategic assistance on interdisciplinary research grant preparation, e.g., grant paperwork, project management, and human resource issues.

Teaching

12. The university should promote degree tracks that encourage exploration beyond just one department's discipline.
13. The university should support "outreach" GAA positions as well as traditional TA positions and provide funding to hire students from other departments to import relevant external knowledge to a department.
14. → The university should increase opportunities for high-visibility, campus-wide research and teaching forums to foster interdisciplinary connections.

Centers

15. → A policy should be explored that returns appropriate and significant percentage of indirect costs to interdisciplinary centers. A few representative centers – small, medium, and large – should be selected to run simulations for determining the feasibility of returning indirect costs directly to the center and to pilot the concept as part of the budget restructuring process.
16. The committee supports the proposed regular research track faculty appointment being considered at Ohio State. Creative joint hiring positions between departments/schools and centers can also allow for developing research faculty positions in cases of spousal hire situations.

Space

17. → Faculty who wish to use facilities in other departments or colleges should easily do so with the University providing support to the "used" facility to make it worthwhile.
18. A document entitled "Facilities and Administrative costs associated with sponsored research" dated June 14, 2002 from Ed Ray, Brad Moore and William Shkurts sets forth principles and gives useful scenarios about the conduct of interdisciplinary research.

This document should be updated to reflect the new F&A rate and revised for redistribution to chairs and deans, as it is very instructive.

19. Research space that is shared among disciplines should be rented at a reduced rate, making it an advantage to have labs where multiple disciplines work and share ideas, space, and equipment.

Communication

20. → Additional training sessions should be implemented for educating department chairs and deans about the implications of budget restructuring on interdisciplinary activities.
21. Encourage existing interdisciplinary centers to serve as "translators" of disciplinary languages.
22. Development or deployment of existing technology tools that can foster face-to-face meetings, conversation, and translation among disciplinary faculty could help remove some of the time and space barriers to interdisciplinary research.