Institutional Challenges of Interdisciplinary Research Centers

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Abstract

Interdisciplinarity has become the model of scholarly inquiry generally espoused by many who seek federal research funding. Interdisciplinary research centers pose challenges to academic settings and to investigators. In a conference of directors of diverse research centers at a single research university we found that the challenges facing centers and their universities fell into three major categories: fiscal sustainability, recruiting and retaining faculty, and leadership sustainability. These challenges are discussed, and institutional recommendations are proposed to address these challenges.

Key Words: Academic Health Centers, Interdisciplinary Research, Research Centers

Introduction

Throughout the academic and research community, interdisciplinary research has become a catch phrase (Giacomini, 2004; Robertson, Martin, & Singer, 2003). With the recent emphasis in the NIH Roadmap initiative (http://www.ncrr.nih.gov/ roadmapnewsecir.asp) on interdisciplinary and translational sciences, interdisciplinarity has become the model of scholarly inquiry generally espoused by many who seek and receive federal research funding. Despite this, there are major gaps in our general understanding of interdisciplinary research

and how it can be successfully integrated and sustained in academic health science centers and universities (Mallon & Bunton, 2005).

Entities designated as interdisciplinary research centers abound in large universities and academic health centers, but in many settings the mantra of interdisciplinary research may be no more than lip service. Such centers have been described as follows (Committee on Facilitating Interdisciplinary Research, 2004):

> Some are bigger and intellectually more influential than some academic departments. Others are highly specialized and narrow. Some have existed for decades, others disappear after only a few years, and still others merge to create new units or emerge when one interdisciplinary unit is split. Some have retained their original purpose throughout their lifetimes; others have substantially shifted their academic focus. (p. 20)

Considerable ongoing resources and efforts are being expended in these research centers. Although they are highly variable in their goals, administrative structure, funding, and defined outcomes, it is likely that there are also many commonalities and potential interfaces or even overlaps among them. Unfortunately, however, those characteristics that are predictive of success of such centers have not been clearly articulated or codified. Research centers are different from other academic units, and are relatively independent of the existing structure of a university. This means that they can undertake innovative research agendas free of the regulations of accrediting organizations, the routine activities inherent in administering educational programs, and the obligations of participation in university administrative activities. They are – or are intended to be – interdisciplinary, so that

they can support research teams that cross disciplinary and departmental lines and their members can conduct research that falls outside the established bounds of a disciplinary department. Finally, centers are problem-responsive. They arise to confront specific issues and concerns, drawing together faculty whose work addresses these problems.

Interdisciplinarity, independence, and responsiveness are the principle strengths and rationales for the existence of research centers. At the same time, these features present centers, and the universities that house them, with several distinct challenges. In this paper, we report on the results of a conference of directors of diverse research centers at a single research university that focused on the challenges facing centers and their universities and the factors predicting their success.

The Conference
In 2004, the National Institutes of Health allocated funds for exploratory centers in interdisciplinary research (http://www.ncrr.nih.gov/roadmapnewsecir.asp). One of the 21 centers funded was the Center for Interdisciplinary Research on Antimicrobial Resistance (CIRAR, http://www.cumc.columbia.edu/dept/nursing/CIRAR/). CIRAR's core research collaborative team includes persons from the disciplines of epidemiology, microbiology, pediatrics, infectious disease, nursing, economics, health policy, education, statistics, economics, informatics, and public health. The goals of this Center were not only to develop a research agenda that would have an impact on the global problem of antimicrobial resistance, but also to establish a vital, sustainable interdisciplinary research

process. Despite the recognized need for interdisciplinary collaboration in biomedical research, there are structural and cultural disincentives within the academic setting that must be overcome. Hence, we developed a series of strategic initiatives to systematically examine the structure, processes, and outcomes necessary for an interdisciplinary research center to thrive.

One of our first orders of business was to review bodies of literature from business, education and health care to adapt and develop our own definition of interdisciplinarity which could then be used to identify the competencies needed for successful interdisciplinary research practice. From this literature review an initial definition was developed and small modifications were made after field testing. We defined *interdisciplinary research* as any study or group of studies undertaken by scholars from two or more distinct scientific disciplines. The research is based upon a conceptual model that links or integrates theoretical frameworks from those disciplines, uses study design and methodology that is not limited to any one field, and requires the use of perspectives and skills of the involved disciplines throughout multiple phases of the research process. The process we used to address the definitional aspects of interdisciplinary research has been described elsewhere (Aboelela et al., 2007).

Our second strategic initiative was to convene a group of directors of interdisciplinary research centers in a half-day symposium to accomplish five aims: (a) identify characteristics essential to successful interdisciplinary research centers; (b) assess challenges in the operation of a research center and strategies to deal with these challenges; (c) discuss mechanisms for sustainability of centers (e.g. funding); (d) increase networking and communication among interdisciplinary research centers; and (e) exchange successful strategies for enhancing minority and gender balance in interdisciplinary research centers, as well as the balance of junior and senior researchers. Because no list of such centers existed at the University, we searched websites and polled departments and schools to identify relevant centers, using the following criteria: the center had to be interdisciplinary with a major research mission and have current external funding from the government, foundations, and/or professional organizations. We identified 65 centers across Columbia University that met these criteria and contacted directors either directly by telephone or email.

While there was some initial skepticism among directors and academic administrators about whether such a meeting would yield a useful outcome, the majority of center directors were enthused and supportive, noting that there was little opportunity for such interface. The forum was convened in November 2005 with 59 attendees from 29 different centers. Also in attendance was a project officer from NIH, the vice president of the university, and several deans. Eight center directors and two moderators, who also serve as center directors, formed two panels to lead discussions responsive to each of the aims of the forum, and there was considerable input from the entire audience. Three professional staff members took extensive notes, panels were audiotaped, and consistent themes were summarized at the end of the day by a skilled facilitator. Summarized below are the thematic challenges identified by participants, discussion regarding the interface of the centers and the university, and a summary of issues and recommendations that emerged from this conference.

The Challenges Identified

The following represents a qualitative summary of the discussion that ensued. Our review of the conference proceedings suggests that the challenges to success facing research centers fall into 3 categories (Table 1): fiscal sustainability, recruiting and retaining faculty, and leadership sustainability.

Table 1

Summary of Challenges Identified by Interdisciplinary Research Center Directors

Challenge	Specific Issues
Fiscal sustainability	Need to continue seeking external funding; Loss of indirect cost recovery between grants or with some funding agencies; Extensive negotiations needed for new resources such as space, personnel, administrative support; Bridge funding during short unfunded intervals (i.e., between grants)
Recruiting and retaining faculty	Some faculty do not fare well in an interdisciplinary environment; Willingness to learn new language and constructs of other disciplines; Need to satisfy disciplinary departmental promotion criteria; Changing faculty needs over the lifespan of a center; Providing incentives for faculty involvement (e.g., pilot funds); Varying expectations of roles across disciplines; No mechanism for hiring faculty outside an established department
Leadership sustainability	Administrative demands interfere with time for science; Maintaining a center when a founding charismatic leader leaves or changes

Fiscal Sustainability

Many, but not all centers at the university began with a substantial research grant. A small number began with funding from school or university administration or from an outside gift. This initial funding allowed the centers to become established and to embark on their programs of research, and also financed or enabled a request for space and other resources, such as administrative support.

Over time, center financing evolved. Successful centers generally obtained additional outside grant support to continue or enlarge their research programs. These new grants, however, often raised challenges for the centers, especially when they were written by faculty from disciplinary departments who had joined the center. The new grants brought indirect cost recovery (ICR) funds, the distribution of which among the university, schools, departments, and the center itself had not always been clearly contemplated at the establishment of the center. Centers often required new resources – space, faculty, or administrative support – and center directors complained that obtaining these resources sometimes necessitated extensive negotiation.

Policies with respect to the distribution of ICR funds varied considerably across the University. Center directors noted that the ability to maintain control of some ICR funds facilitated the task of maintaining the center over time. Centers with well-established protocols for sharing ICR with disciplinary departments also found that this practice brought them needed support from the departments. Centers without access to ICR funds, especially those without an outside endowment, had to develop strategies that would allow them to make longer term commitments to participating faculty.

In some cases, centers experienced an interval between grants when funding was insufficient to maintain core resources. Generally, centers did not have guaranteed sources of bridge funds for these circumstances. Those larger centers that both held many grants simultaneously and obtained a share of ICR funds sometimes had some wiggle room, but centers with fewer grants found it difficult to set aside a share of funds (from whatever source) and had to negotiate bridge funding. Center directors agreed that reliance on direct federal grant funding alone was problematic. They noted that having a diversified portfolio of financial supporters (including a combination of government, industry, foundations, endowment, and university funds directly or through ICR) helped provide stability.

Recruiting and Retaining Faculty
The initial development of a center generally required identifying faculty across disciplines with an interest in a topic area. Successful centers had identified research areas where there was a widely shared sense of need for more collaborative work. Several center directors remarked that they had been flooded with requests to participate when the center was first developed.

Challenges around faculty arose for three reasons. First, the center directors agreed, excellent disciplinary researchers committed to a problem area and excited by the prospect of collaborating with others may nonetheless fail to thrive in an interdisciplinary research environment. Centers depend on faculty who are both rigorous scholars and can function well in an institutionally unusual environment. They must be willing to learn the language and constructs of other disciplines. They must have, as one center director put it, a high level of intellectual curiosity, tolerance for ambiguity, and ability to play with others.

Center directors struggled with identifying such individuals and with the problems created by members who did not fit this bill. Some faculty members were simply not interested in spending the time necessary to work across disciplines or sharing their perspectives and research interests with others, i.e. they were not cut out for an interdisciplinary environment. Many found that younger faculty members were more malleable and fit into the center better than did more established scholars. The need to satisfy disciplinary department promotion criteria, however, can make participation in an interdisciplinary center difficult for junior faculty. Moreover, centers cannot function exclusively with young faculty. They need more senior faculty members to act as "heavy hitters" and obtain substantial grants, as well as to manage the administrative tasks of the center even though some may be less accommodating than junior faculty.

Second, centers needed to retain and replenish the ranks of their faculty over time. Center directors needed strategies for faculty recruitment and retention throughout the life of a center. They reported that the establishment of core facilities often acted as a magnet that drew and held faculty to the center. Many centers offered pilot grants and seed money to investigators.

Moving beyond pilot projects required new kinds of collaboration and communication among center members. Conference participants pointed out that such communication can be difficult. For example, the culture of the private sector where interdisciplinary collaboration has been most successful emphasizes discovery and application of profitable products, while academics may be more interested in mechanisms and new discoveries. In other cases, collaborators may have very different styles of communication, as well as different perspectives on sharing and ownership. Because of the nature of the work, some disciplines may have varying vocabularies and methods, expectations about the pace or hours to be worked and standards of proof. Some investigators favor rapid publication of each new finding; others prefer to amass a body of work for a single large publication. Some are open to large teams and data sharing while others prefer to minimize interactions. Thus, working and communication styles played important roles in attracting or failing to attract and retain faculty over time.

The need to recruit new faculty often generated a third problem. At this university, as at most others, only disciplinary departments may make faculty appointments and promotions. In some cases, centers may appoint researchers using non-professorial titles. Several center directors noted that these titles were less valued in the university than traditional titles. Center directors often needed to work with disciplinary department leadership to recruit faculty who were expected to participate exclusively in center activities. One center director suggested that permitting joint appointments between a department and a center might facilitate such recruitments.

In some cases, centers draw in most of the faculty of a given disciplinary department.

The center may saturate a department with faculty. In these situations, the boundaries between the department and the center may disappear altogether. One university administrator noted that in this situation it might make more sense to convert the center into a department of its own.

Leadership Sustainability
The final set of challenges facing centers concerned leadership. Center directors must be charismatic advocates for their research areas and for the enterprise of interdisciplinary research. They must be able negotiators, finessing arrangements with university administrators, department chairs, and both accommodating and less accommodating center members. The nature of interdisciplinary work means that they must do all this in a collaborative rather than a dictatorial style. Finally, they must be skilled administrators. Several directors understandably complained that the administrative demands of managing a center were very time consuming.

Centers are generally developed because an individual with this rare combination of qualities initiates them. Problems may arise over time, however, when these pioneering leaders seek to share the burden of management or leave their positions. Center directors noted that new leadership was likely to be drawn from the ranks of senior center members who viewed this role as a professional obligation.

Centers and the Institution
All three of the challenges we identified arise from the problem of establishing the natural lifecycle of a center. Problem-responsive centers are fundamentally different from existing university institutions. They occupy a place between academic departments and individual grant-funded projects, both institutional forms with well-understood lifecycles. Our university, and we suspect most others, does

not have established criteria for defining when centers should be established, how they should be sustained, and when they should be closed. Individual grants are initiated by faculty and usually managed in the context of an academic department. They begin on the funding date and end (usually) when the grant expires. Financing, personnel, and leadership throughout the grant period are clearly specified in the grant proposal and funding statements.

Departments are developed very slowly. Generally, the formation of a department requires several layers of academic approval from the school, the university administration, the faculty senate, the board of trustees, and sometimes the State. To initiate a department, a school must clearly define the discipline represented, the teaching need and academic mission, and availability of appropriate resources to meet the articulated needs. Once established, a department is built on the financial and scholarly bedrock of its teaching mission. Sufficient faculty must, at the very least, be retained to teach courses required by accrediting agencies. These agencies, in turn, provide an outside force prompting the university to maintain the viability of the department. Teaching revenue, while often limited, provides a stable backstop against volatile outside "soft money" funding. Closing a department, a very rare event, likewise requires a series of steps, and the academic institution usually remains responsible for compensating any tenured faculty in a department that is closed.

Demands from students, accrediting agencies, and others, and the existence of teaching revenues, require that universities have well-established procedures for evaluating and maintaining their academic departments. Procedures exist to recruit faculty when positions become available, and to promote faculty through promotions committees. Universities also have procedures for recruiting departmental leadership, whether through a system of rotation or a search process. Finally, most universities have formal systems of departmental review, during which outside committees periodically assess the performance of each department.

Centers fall somewhere between individual grants and departments. They begin with much more university buy-in than would an individual faculty member's grant proposal. Since interdisciplinary research centers exist to address a new area of research, they do not require all the steps needed to establish a department. Centers generally have a specific mission statement and aims defining the proposed scope of the center. Unlike the case of a grant, however, this statement generally does not specify when the work of the center will be completed or what the criteria would be to close the center.

Research centers, unlike academic departments, often do not collect teaching revenue. Most depend on the school or university administration to help them maintain fiscal sustainability, either through ICR sharing or direct commitments. Without pre-specified guidelines about what constitutes center success and what the university's commitment to the center will be, center directors cannot always rely upon these potential funds. This lack of dependable funding leads center directors to seek independent endowment support. This, in turn, can pose challenges to the university if the rationale for the existence of the center no longer exists or if centers compete with other university priorities for outside funding.

Further, centers usually do not have a natural constituency, unlike departments, which can depend on their current students and alumni, as well as accrediting agencies,

to advocate on their behalf. Several of the center directors at our conference spoke of their efforts to develop a constituency in the outside community to provide them with leverage as they built their centers. An outside constituency relieves some of a center director's burden to continuously justify the university's commitment.

There is generally no established procedure for sustaining leadership in centers. In the case of a single grant, the life of the grant is coincident with the participation of the lead investigator. In the case of a department, the existence of the department is independent of the present leadership. In the case of a center, leadership and existence are intertwined. If a university has no systematic procedures for deciding when a center is successful or should be perpetuated, the decision to maintain leadership for a center is made separately in each case.

Centers should not be departments. They should come into and out of existence more easily and fulfill missions that departments cannot. But as centers become an increasingly important component of the university's institutional life, more formal procedures are needed to monitor their establishment, continuation, and termination. These procedures will help the university control its overall operations and ensure the quality of the centers. It will also help center directors, who will be able to rely on a set of defined privileges and obligations as they strive to build their faculties and research programs.

Summary and Recommendations

The process of collaboration requires institutional and individual commitment, but formal partnerships such as research centers are regulated primarily at the institutional level. Nearly all institutions have rules and guidelines for interdisciplinary research

to govern ownership of work products and data, material transfer, and academic-industrial agreements. In general, external collaboration cannot proceed without involving the institution. Although guidelines or regulations do not explicitly cover many aspects of collaboration, the goal should be communication that clarifies expectations of all parties involved. For these reasons, policies, procedures and principles for management of interdisciplinary research centers need to be explicit.

The challenges of interdisciplinary research centers highlighted by participants in this conference—fiscal sustainability, recruiting and retaining faculty, and leadership—have been recently summarized in a report published by the National Academy of Sciences (2004). To our knowledge, however, our symposium was the first formal meeting of a large cadre of research center directors to address the aims we articulated. While there remain at many universities structural challenges to interdisciplinary research (e.g. policies and processes for sharing of ICR funds), we recognized that the major challenges as well as the major sources of gratification associated with research centers are interpersonal as well as institutional.

This conference served to facilitate and support an institutional shift towards an environment in which interdisciplinary efforts thrive. This is well within the ethos of the university whose faculty strive to work in collaboration with those outside of their own disciplines. Following this conference, a senior staff member was hired by the university to focus on the development and support of interdisciplinary research. Based on the proceedings of the conference, we make the following recommendations for institutions in which interdisciplinary research centers

are housed:(a) maintain a database of interdisciplinary research centers within a centralized office (e.g. grants and contracts or research office) for the purposes of networking and tracking; (b) provide an ongoing forum for interaction among directors and members of interdisciplinary research centers; (c) establish criteria for defining when centers should be established, how they should be sustained, and when they should be closed (i.e., what the natural lifecycle of a center should look like); (d) clearly identify individuals/offices within the institution that are responsible for policies regarding issues such as indirect cost sharing, faculty recruitment into centers and/or departments, and other administrative policies that influence center operations and success; (e) provide support for development of interdisciplinary leadership skills; (f) develop formalized mechanisms to assure that interdisciplinary activities are acknowledged and rewarded in the faculty promotion and tenure process; and (g) explore the role of interdisciplinary centers in developing and contributing to coursework designed to prepare researchers with interdisciplinary expertise.

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