

### University-Based Research Centers: Characteristics, Organization, and Administrative Implications

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#### Abstract

This paper examines the characteristics and organizational issues associated with university-based research centers. The first section sketches general characteristics and functions of centers. The second section examines major issues concerning the organization of centers, including funding and sustainability, center autonomy, and relations with academic units. Implications for central administration are considered.

*Keywords:* Research Universities, Research Centers, University Organization and Administration

#### Introduction

Research centers and institutes (“centers” hereafter) have become indispensable to U.S. universities. They have been created in greater numbers since the Second World War, as universities adapted to the rise of the federal government as the main sponsor of academic science (Geiger, 1990). Universities have created centers to advance research of interest to industry, state governments, policy makers, and community organizations. Federal agencies continue to provide incentives for universities to create centers, through a range of center grants and programs to induce boundary-crossing (inter-disciplinary, inter-departmental, inter-institutional) research (National Academies, 2005). While centers allow universities the opportunity to advance innovative research and gather resources, they also raise organizational and administrative issues. This paper examines some of the key characteristics, challenges and opportunities associated with university-based research centers. It draws on a review of the literature and on empirical data obtained from a larger research project. Sources of evidence include policy and planning documents, reports on centers from the leading 100 research universities, and 45 interviews with senior administrators and center directors in six campuses.

The section below sketches general characteristics of centers, focusing on functions and organization. The following section examines three interrelated themes that underscore much of the previous debates on the administrative challenges that centers bring to universities. Implications for research administrators are considered next, and the final section concludes the paper.

## General Characteristics of Centers

Unlike schools and departments, centers are dedicated primarily to sponsored research and derive legitimacy from the resources they control (Ikenberry and Friedman, 1972). They extend the academic mission of universities by rearranging and re-directing the research efforts of faculty towards areas that are deemed important by external agents. Centers usually form to mobilize experts in different fields to address scientific and real world problems that may not be adequately addressed from the perspective of a single discipline. Centers may involve the formation of interdisciplinary teams, academic-industrial partnerships, and other interactions with knowledge users (e.g., policy makers, doctors, educators). Surveys of centers report multiple roles and functions in addition to research, including support to academic units in instructional and training activities, consulting, and outreach (Friedman & Friedman, 1982; 1986; Melnick, 1999; Mallon and Bunton, 2005). Despite the huge resource differentials, this occurs across fields: centers in areas of industrial technology, biomedical research, policy studies, and the arts and humanities are common among research universities.

Structurally, centers take multiple and variegated forms (Ikenberry & Friedman, 1972; Alpert, 1985; Geiger, 1990; Mallon and Bunton, 2005). Some centers are networks of scientists from multiple departments that count on little or shared infrastructure. These units typically emerge from the bottom up and rely on the common interests of participants and some discretionary resources accrued from the academic units with which they are affiliated, or from external sources.

Other centers are organized around a dedicated laboratory, which might host teams of investigators on a more or less permanent basis. Centers providing core facilities to a range of users on campus have become common, as universities attempt to rationalize investments in the research infrastructure. These units provide equipment, services and temporary lab space for faculty and, in some cases, to external collaborators. A number of universities have in recent years invested in such cross-disciplinary facilities (Sá, 2007). Yet other centers based in dedicated labs manage specialized, sophisticated instrumentation such as nanofabrication units. These centers fulfill a service role to internal and external users.

Alternatively, some centers have an academic identity and behave as schools without walls, partnering with academic units to offer joint degrees, co-recruit faculty, select post-docs and graduate students. Some of these units evolve to become departments or schools.

Centers may also be created to meet external expectations and requirements of sponsors. Federal agencies have consistently funded research through center programs, such as the NSF Engineering Research Centers and the NIH P30 grants. The organizational requirements of these programs vary substantially within and among agencies, contributing to the diversity of forms centers take. Some of these agency-funded centers involve multiple universities and other public and private organizations (Bozeman & Boardman, 2003).

Finally, other centers are umbrella organizations that coordinate several units in a broad area of research, encompassing many of the units described above. These forms described here are not mutually exclusive and can be found in different combinations in a single center. In summary, it is no easy task to define what centers are, but it is possible to observe patterned variation across campuses along the lines described above.

Senior administrators often support the establishment of centers in areas perceived to be important because of the organizational flexibility they afford (Mallon, 2006). Centers allow a university to explore emerging research fronts without making the long-term resource commitments associated with a new college or department. Through the establishment of a center, not only do academic scientists gain an organizational framework to access information and resources, but universities also increase the visibility of the campus research that takes place in multiple schools and departments. Over time, centers may develop a unique identity and become a significant source of funding, student and faculty talent, and prestige. A strong record of achievement over long periods of time of units such as the MIT Media Lab and the University of Michigan Institute for Social Research enhances the reputation of the respective universities as places conducive to interdisciplinary investigation (University of Michigan, 2000).

Tied to the issue of organizational flexibility is the fact that centers rely to a much greater extent than academic units on the director's leadership, as reported in previous studies (Ikenberry & Friedman, 1972; Friedman & Friedman, 1982; Mallon, 2006). Center directors need scientific credibility to command the respect of peers and the scientific community, and to attract personnel to the unit. But they also need managerial and political skills to build alliances inside and outside the university, to aggregate resources, and use them effectively. As scientists rarely have any formal training to fulfill managerial roles, center directors rely on practical experience to acquire these relevant skills.

### **Administrative and Organizational Issues**

Three interrelated issues concern university administrators and center directors alike: (1) funding and sustainability, (2) center autonomy and (3) relations with academic units.

#### ***Funding and Sustainability***

As units predicated on gathering extramural support, the issues of funding and long-term financial sustainability are a central concern for senior administrators and center directors alike. While centers are created to secure sponsored research, the inputs required to establish research programs are increasingly expensive as the costs of science grow (Ehrenberg, Rizzo, & Jakubson, 2003). Moreover, universities face on-going fiscal challenges with declining public support for higher education and enhanced competition in the national research market, which has led to growing pressures on the budgets of research-intensive institutions.

Universities have sought to diversify sources of revenue to cope with the current environment. Securing gifts and endowments for centers alleviates the pressure on institutional budgets and allows centers to grow and develop. Some high profile successes in recent years of universities obtaining support for centers from private donors and foundations include Stanford's Clark Center and the joint

Harvard-MIT Broad Institute. Several universities have also obtained funding for research centers of excellence from state governments as part of technology-based economic development initiatives over the past decade (Geiger & Sá, 2005).

It is often stated that the resource dependence of centers on external sponsors shapes center creation and continuation (Geiger, 1990; Stahler & Tash, 1994). That is the market test of centers: provided there are buyers for their research services, they are likely to form and persist. However, it is often the case that centers will be created and sustained regardless of market conditions. Demand ceases to exist for some centers, but they persist nonetheless through organizational inertia and lack of campus review mechanisms. Once-prolific centers decline as scientists leave or exhaust the possibilities of a given line of research, but directors may be reluctant to terminate the unit. These are some instances in which centers survive regardless of changing circumstances. Universities find that centers are easier to create than to terminate, despite the widespread existence of policies for periodical review. Oftentimes centers are created and subsist for idiosyncratic reasons -- to support a scientist's pet project, retain a faculty member, or deal with power conflicts, for example (Friedman & Friedman, 1982; Mallon, 2006).

It is also important to note that, although most centers rely on some form of external funding, universities, schools and departments support some units partially or entirely with institutional funds. This may happen provisionally to get some units started, or permanently as a subsidy to centers. Moreover, not all centers are expected to pursue external grants. As highlighted in the section above, some units support the research enterprise through the provision of facilities and instrumentation. These units usually attempt to be self-supporting through service fees, but they often receive central support. Other umbrella units may accrue no external funding on their own, and rely on central allocations to fulfill their coordination roles.

While there may be legitimate academic and administrative reasons to allow centers to continue their activities for long periods of time irrespective of external support, this raises problems as well. Ever-increasing numbers of centers with varying levels of productivity and quality drain institutional resources over time and constrain the ability of the university to make further investments. This often occurs in an incremental fashion, through scattered provisions of funding, infrastructure, space, and staff for centers large and small, throughout the university. Considering the on-going demand for novel forms of research organization and the constant rise of external opportunities, the dispersion of campus resources to on-going units creates opportunity costs. As stimulating innovation and response to external opportunities underscore the establishment of centers, universities are likely to benefit from scrutinizing the contributions of their units periodically and rigorously.

Institutional decisions about initial and continuing funding for centers thus rely on probabilistic judgments about the likelihood of future success in attracting external funding, as well as qualitative appraisals of the functions they perform and the value they add to the university. As evidenced by an examination of institutional documents, a number of universities are embedding decisions about support for new centers in their strategic planning exercises. Creating centers strategically to exploit external research opportunities is one of the mantras of academic plans across the country.

### ***Autonomy***

University administrators face a balancing act concerning how much autonomy to give to centers. On one hand, greater autonomy with control over resources makes it more likely that center directors will have the ability to attract strong scientists and build a successful research program. But this may occur at the risk of fostering insularity and competition with academic units. On the other hand, too little autonomy may preempt centers from any meaningful role in creating novel conditions for research. Too great a reliance on academic units may breed not cooperation but subordination, in which departmental norms and priorities overtake those of the center.

Size and control over resources are key variables here. As centers grow larger they tend to develop their own administrative capacity to handle the greater complexity of the enterprise. A distinctive organizational culture may emerge, and the center may steer its own course. Taken to the extreme, some independent research institutes such as SRI International were once affiliated with a university (Stanford), but became independent because they grew away from the parent campus (Orlans, 1972). But one does not need to go that far to consider how centers may veer off from cooperating synergistically with academic units. Some centers have their own facilities and full-blown staff on campuses, and rather than lowering barriers to collaboration they create new boundaries among units. Centers may become bureaucratic organizations at the cost of vibrancy and innovativeness. Nonetheless, centers need control over resources and delegated authority to operate effectively and be perceived as legitimate on campuses.

Universities, of course, make very distinct choices about how to organize centers, considering their resource endowments, reputations, cultures, and traditions. Some opt for fostering integration among centers and academic units; others place greater emphasis on autonomous and entrepreneurial centers. Over the past decade, Duke University has created a number of interdisciplinary centers oriented toward fostering innovative research and re-invigorating the activities of academic units. Centers' strategies for accomplishing this integration, along with their success in obtaining external funding, are examined during five-year reviews (Sá, 2007). Conversely, MIT has historically organized very successful interdisciplinary labs that operate with much autonomy (Geiger, 1990). Arizona State University has sought to follow MIT's path by targeting new state revenues aggressively towards building a few large, autonomous centers such as the BioDesign Institute. The university aims at increasing extramural funding through these units, which are likely to become permanent as they rise as key research performers and become central players in the recruitment of scientists to the university.

### ***Relations with Academic Units***

As centers draw on resources conventionally associated with schools and departments, particularly scientists themselves, it is not unusual for centers to develop strained relationships with academic units. Depending on organizational cultures, climates, histories, incentive and reward structures, and leadership characteristics, strained and even antagonistic relations may develop among centers and departments. Scientists may be pulled in different directions, or explicitly coerced not to take research projects outside of the home unit, if a climate exists that curbs collaboration

and favors territorial behaviors. Center directors and department chairs may engage in disputes over power and resources.

Administrative practices and structures may help or hinder internal collaboration. For example, at Pennsylvania State University, the relationship between major campus centers and academic units has been overhauled since the 1990s. Previously, the university had autonomous centers organized separately from the academic units that were responsible for their own resources and were expected to be self-sustainable. Realizing that units competed for credit and recognition, the university implemented a series of changes. It coupled the objectives of colleges and centers through common governance structures. Centers were given central funding and resources to promote collaborative activity across colleges and departments. Centers and departments co-recruit faculty and share facilities and equipment. New administrative systems assign credit to centers and departments for the participation of their faculty in research grants (Sá, in press).

As mentioned above, many centers that operate large facilities are expected to support themselves through overhead accruing from research grants. Specific targets are set for sponsored research performance that will generate the needed indirect cost recoveries to cover operating costs or recoup upfront investments in facilities and infrastructure (Goodman & Weissberger, 2006). This requires reliable financial plans and sound projections of the research productivity of scientific teams using center space and facilities, a business model based on economic rationality and efficiency. Most university scientists, however, are rooted in schools and departments where the logics of productivity and resource allocation are not as tightly coupled. Dealing with the transition of scientists and graduate students between these two environments is an administrative issue for centers and central administrators alike.

### Implications for Research Administration

Viewed as a whole, the issues examined above are not unique to universities. They tend to arise in organizations employing matrix structures, the arrangement through which one set of problem-oriented units is created in parallel to functional departments. Matrix structures have usually proven complex to administer and prone to conflict (Scott, 2003). The use of matrix structures does not necessarily solve these conflicts as much as it creates champions for the problem-oriented centers and provides them with institutional legitimacy. Fine-tuning the relative priority accorded to functional departments and a problem-based unit is the key managerial challenge in matrix structures.

A university research enterprise that increasingly blends traditional academic units with a growing number and diversification of centers for collaborative science brings challenges for the administration of research. There are often gaps between advances in the organizations of centers and continuity of older university and disciplinary norms and practices. Traditional university structures and reward systems were built to support and account for single-investigator, discipline-based research. With the growing emphasis on collaborative and interdisciplinary science, universities often find that their management systems and administrative routines are poorly equipped to monitor such activity.

For example, research accounting systems that only allow for the assignment of credit for the principal investigator in a research grant and to her school and department make it hard for academic administrators to capture the relative

contributions of collaborating scientists from other units. If departments and centers alike are evaluated and rewarded on the basis of external grants obtained under such a system that fails to capture boundary-spanning efforts, disincentives arise for units to cooperate and for scientists to freely move their activities to and from centers. Centers may have a hard time attracting researchers, or they may become silos of their own to become recognized. While part of the problem is technical, e.g. research accounting procedures and related computer software, it is important to recognize the political, cultural, and symbolic dimensions of decisions about who gets resources and credit. At the time of this research, one of the universities visited had changed its research accounting system to better capture and account for collaborative research, and two had plans to do so in the short run. Some universities allow centers to claim credit and overhead on external awards, others prefer to maintain the primacy of schools and departments.

In general, there needs to be clarity of the costs and benefits that accrue to individuals and organizational units when scientists spend their time in centers where collaborative science is conducted. Sanctions, or the perception thereof, on team-based research across organizational and disciplinary boundaries send a warning to researchers and administrators interested in such activities. Junior faculty are particularly vulnerable to such sanctions, especially when participation in centers is viewed as threatening promotion and tenure prospects.

Both formal and informal mechanisms can be used to align the goals of centers and academic units. Among the former, universities commonly adopt governance boards for centers that include deans and department chairs of key units involved, in addition to senior research administrators. Such structures are intended to help align the goals of centers with school and departmental goals. Strategic planning processes that require academic units and related centers to develop shared goals are another mechanism used to foster synergies and collaboration. Finally, institutional seed funds may also be provided for initiatives that involve centers and academic units alike.

Informal mechanisms are related to institutional cultures, understood as the shared norms, values and assumptions upheld by the campus community. Campus cultures influence how faculty and administrators view centers and collaborative activity. A culture of trust among deans, department chairs, center directors, and senior administrators can translate into patterns of fruitful cooperation, where opportunities to enhance the research enterprise of the institution are not missed because of turf battles among its sub-units. For example, centers are often used to recruit outstanding scientists, but parochial interests and disagreement among units have been reported by administrators as undermining efforts to recruit researchers with joint appointments, or making searches and hiring decisions more challenging than they could otherwise be. Conversely, where collaboration and trust are viewed as core aspects of the institutional culture, administrators seem to downplay the need for formal planning processes and policies to link centers and departments, and rely on the unspoken rules of good campus citizenship.

Some research administrators believe that culture change is the ultimate barrier to fostering greater collaboration among units and interdisciplinary research. Cultures indeed change slowly, as opposed to the more circumstantial and transient climates. Nonetheless, it is important to recognize that organizational change entails more than simply altering formal structures. Attitudes, perceptions and beliefs

also need to be taken into account in attempts to bring about changes in campus behaviors.

Creating organizational conditions, through centers and otherwise, that reflect the needs of the emerging fields of science is one of the key contemporary challenges universities face (National Academies, 2005). In the fiercely competitive academic research market, universities more adept at organizational learning are likely to adapt their structures and cultures more swiftly to shifting conditions. Such learning involves constantly assessing the ritualized ways of doing things and questioning longstanding and often implicit assumptions about the proper ways of organizing.

## Conclusion

Centers allow for a mediation of the intrinsic logics of academic science and the interests of society, which may produce the sort of use-inspired fundamental research that Stokes (1997) famously associated with the work of Louis Pasteur. By clustering researchers around problems, centers balance the traditional emphasis on discipline-oriented basic research with the considerations of external users. Through centers, American universities have diversified the types and modes of research performed, the clienteles served, and the organizational environment for advanced research training. Centers provide academic scientists the means to pursue new relationships, sources of ideas, funding opportunities, and audiences for their research outputs. That being said, centers are no panacea. They raise administrative and organizational issues that require universities to learn new ways of understanding and assessing research performance, inter-unit collaboration, individual merit, and research governance. Choices about the relative priority given to centers and departments and the relationship among these units are and will be central in a university research enterprise that moves towards collaborative and interdisciplinary science.

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