When times are good, there is little urgency to evaluate fundamental assumptions, as investments can be made in new projects and structures while the old continue. Constrained resources do not allow this luxury. The current economic crisis and associated budget woes in universities requires us to be open to more radical and rapid change than we are used to. What follows is a description of a method to transform the academic organization of the university to fit the current mode of intellectual inquiry—which is broader, more individualistic, and more interdisciplinary than previous modes—and at the same time to conserve university resources.

Customarily, universities organize their academic operations into departments constructed around disciplines, whose standards and boundaries the departments patrol. In response to the growth of knowledge and the proliferation of disciplines as the sum total of knowledge has increased, the number of academic departments has risen dramatically since they were first introduced in the United States. Columbia University had 42 departments at the beginning of the 20th century and started the 21st century with more than 85 (Friedman, 2001), for instance, with traditional departments such as history and literature dividing into ones focused on specific areas: Asian Studies, African Studies, and so on.

However, the discipline-based mode of organization is no longer the optimal way to support the work of the contemporary faculty or accomplish the aims of graduate and undergraduate education, never mind to solve the problems facing the planet. The method described below offers an alternative: to reduce the number of academic departments by combining faculty and their related intellectual interests into larger multidisciplinary groups. Such a strategy, not incidentally, also conserves university resources in hard times.

**Current Academic Organization**

Departments typically have the following functions:

- undergraduate education, including advising students in the major, assigning faculty to courses, and designing the curriculum;
- graduate education, including admitting students to the graduate program, assigning teaching assistants to faculty and faculty to courses, evaluating graduate students, recommending faculty members for the graduate faculty, and certifying graduate student eligibility for degrees;
- hiring faculty;
- evaluating faculty for tenure, promotion, and raises; and
- assigning space to faculty and students.

Each department in a large research university typically has a chair, faculty, administrative help, a business office, and possibly a publications function and/or a personnel office. While some of the business operations may be centralized in a small liberal arts college or small department, the faculty and staff exist even there, as their functions are independent of size. Large departments (those with greater than 30 or so faculty) often subdivide into smaller academic units to run the graduate program, assign teaching, and perform support functions for the specialization.

Departmental status is a sign of maturity for a field. For example, biomedical engineering is sometimes a program and sometimes a department. But between 1990 and 2006, the Whitaker Foundation funded universities to strengthen biomedical programs and encouraged them to form departments of biomedical engineering, in order to signal that it had become recognized as a separate discipline.

Because of the prestige associated with departmental status, there is continual pressure from new fields to become departments. Faculty feel, rightly, that this establishes their longevity and their ability to compete for resources within the university. The budget, the catalogue, the graduate faculty, and university buildings are all organized around academic departments. And large departments have more clout and prestige than small ones. So departments will resist any attempt to eliminate or shrink them in response to developments in the disciplines or to declining student interest.

**Defects of Departments**

While a program may garner prestige, longevity, visibility, and resources when it becomes a department, the generation of departments is expensive for the university. And even while the number of disciplines and of departments has grown, the boundaries between the disciplines have become weaker and their arbitrariness more obvious.

Studies of research practices in the digital environment by Houghton et al. (2003, 2004) found considerable evidence for a
At ASU we created graduate faculties comprised of all those qualified to supervise graduate work with a given field. This separates the nature of biology, psychology, and other disciplines. Most basic science departments in medical schools went to this model years ago because of the interdisciplinary nature of these fields. Instead, the graduate faculty in, say, psychology, can be all those at the university qualified to supervise graduate work in psychology, and related fields. Graduate faculty members can serve on dissertation and masters' committees, evaluating the credentials of their peers and making recommendations to a graduate dean or provost. But there is no need for them to be located within particular departments.

There must be a graduate faculty certified as qualified to direct dissertations or master's theses and to serve on graduate committees. Traditionally these faculty members evaluate the credentials of their peers for these purposes and send these recommendations to a graduate dean or provost. Faculty who teach outside the main lines of their own discipline are also frequently not valued by a home department that needs the disciplinary courses covered and the financial credit for its activities added to its budget. Students too may suffer from rigid educational silos, when too much depth within too many majors leaves them unaware of the nature of knowledge and broader perspectives.

Van Leeuwen and Tijssen (2000) identified how closely fields are related by looking at citations; in doing so they found an increase in interdisciplinarity— as did Herring (2002) when looking at electronic publications. Rigid departmental structures can interfere with this kind of work. It is true that core disciplinary expertise is critical in order to have rigorous interdisciplinary scholarship, and many faculty still operate within a single discipline. But this can become a problem when faculty who publish in interdisciplinary journals find their scholarship disparaged by those who are not familiar with those journals. Faculty who teach outside the main lines of their own discipline are also frequently not valued by a home department that needs the disciplinary courses covered and the financial credit for its activities added to its budget. Students too may suffer from rigid educational silos, when too much depth within too many majors leaves them unaware of the nature of knowledge and broader perspectives.

A certain amount of inefficiency, unaffordable in times of budget stress, is inevitable within a rigid departmental structure. Departments often duplicate course offerings and compete for students, especially if funding follows credit hours. While these problems can be solved in part by crediting teaching hours to the unit that pays for them, challenges having to do with faculty commitment to building departmental strengths rather than optimizing the university's investment in the instructional program are harder to address (Massey and Zemskys, 1994).

Analysts have suggested various ways to improve the administration of universities by minimizing the negative effects of departments. Edwards (1999) suggested that interdisciplinary work could be encouraged within the structure of the traditional academic department by creating new departments that straddle the traditional ones—a solution that would seem to exacerbate the problem. More viably, Edwards also suggested that research institutes and pooled teaching assignments could help replace the department. Gazzaniga (1998) suggested a totally flexible approach where faculty might arrange themselves in any configuration they want at any time.

At Arizona State University (ASU) we considered all of these approaches when we undertook the restructuring of our academic operations.

A Transformed Academic Organization

Faculty groupings should reflect the composition and interests of the faculty at any particular time and place. Some administrator needs to assign faculty work and be responsible for managing the processes associated with hiring, promotion, and tenure. But assignments of faculty work do not need to be limited to one department or discipline.

What follows are some ways each of the functions traditionally performed via academic departments can be handled in a university with a more flexible administrative structure: graduate education, undergraduate education, and faculty work. These alternative forms of organization improve the delivery of education and research and, in addition, save the university administrative resources.

Graduate Education

There must be a graduate faculty certified as qualified to direct dissertations or master's theses and to serve on graduate committees. Traditionally these faculty members evaluate the credentials of their peers for these purposes and send these recommendations to a graduate dean or provost. But there is no need for them to be located within particular departments. Instead, the graduate faculty in, say, psychology, can be all those at the university qualified to supervise graduate work in psychology. Most basic science departments in medical schools went to this model years ago because of the interdisciplinary nature of biology.

At ASU we created graduate faculties comprised of all those qualified to supervise graduate work with a given field. This separates graduate education from departmental control and makes it a university -wide function. The graduate faculty establish fields that have a domain of some rigor and differentiation, justifying the awarding of a Ph.D. in that domain. These domains supplement the disciplinary doctorates.

The implementation of the university -wide ASU graduate faculty model in 2007 had several immediate effects. First, because faculty could be members of several graduate faculty groups at once, there was a 72 percent increase in the listings of faculty in doctoral programs across the university. Second, whereas only a few faculty members had served on multiple doctoral committees previously, the reorganization led to over 620 faculty members' officially being recognized as members of multiple graduate programs—over half the doctoral faculty. Third, as ASU launched new interdisciplinary Ph.D.s, the graduate faculty model became central to their structure and success. New Ph.D. programs in sustainability, biological design, neuroscience, media arts and sciences, social science and health, social science and the environment, and applied linguistics have as many as 70
graduate faculty members from as many as eight departments. This model has broadened faculty thinking about degree programs and has also increased the intellectual capacity and experience available to our students.

Institutions can get help in making this transformation. The National Science Foundation has funded the Integrative Graduate Education and Research Traineeship Program (IGERT) to help institutions produce graduate students who can bridge more than one discipline. The foundation did this in recognition of the fact that increasingly, research is shaped by problems—or, as the National Academy of Engineering terms them, “grand challenges”—that are solved by researchers working in teams organized around problems, not disciplines.

**Undergraduate Education**

Undergraduate education requires a curriculum designed by faculty whose expertise is relevant to the degree program. But here too there is no necessary tie between degree programs and departments, and many academic units can and do administer a number of undergraduate degree programs. Once the relevant faculty design the curriculum, the administration of undergraduate education requires advisors, course schedulers, and enrollment managers, all of whom can operate independent of departments.

As one example, the School of Life Sciences at ASU created six flexible faculties from five different departments with differing cultures, modes of working, and resources. The merged school produced 11 separate degree offerings, giving a broad and comprehensive menu to students who wish to either generalize or specialize in their undergraduate careers. There is no direct relationship between the six faculties and the 11 degree offerings. Individual faculty with specialties needed for a particular course are spread across the school. For example, there are microbiologists in at least four of the six faculties and conservation biologists in at least three out of six.

So if there is a need for a course in microbiology, the associate director for undergraduate programs cannot go to a single faculty leader. Instead each year he sits down with each faculty leader to discuss the teaching portfolio of each of the 100+ faculty members, and then he tries to even out teaching loads, address all curricular needs, and plan for increases in enrollment.

For many decades prior to the formation of the school, reviews had found inefficiencies in the delivery of the undergraduate curriculum. The creation of the school eliminated these inefficiencies and has been praised by recent reviewers. Of course, the advising staff is critical to the success of this approach, since they must understand the complexities of advising students in 11 different degree programs.

Many universities fund departments based on majors or credit hours, which encourages the duplication of required courses across departments. Examples include statistics and methods courses; mathematics courses designed for particular majors, with little difference in content; writing courses; and other courses that could be taught more generally and more efficiently without the disincentives created by departmental interests. At ASU we fund course enrollments, with money going to whichever unit paid the person teaching the course, regardless of topic. This treats interdisciplinary and disciplinary teaching the same. This model enables interdisciplinary schools such as the School of Sustainability, which crosses all units on campus, to teach its courses.

In the traditional system, undergraduates do not understand the department structure and often get lost between departments or caught in the wrong ones. To make things easier in the new one, ASU has expanded its advising system to include E*Advisor, which can tailor a program of study to an individual’s interests, to support the institution’s 250 majors. (E*Advisor was described in an article in the July/August 2006 Change.)

No student can truly “explore” all of these majors. Instead, the technology helps students assess their interests and abilities and offers possible majors that might suit them. Student paths to a degree can be presented to them individually on line, and they are advised into a new major as soon as their performance, or their own interests, indicate they are currently enrolled in one in which they are not likely to succeed. This improves not only student satisfaction but retention and graduation rates. At Florida the four-year graduation rate increased 20 percent after 14 years of the program, and the six-year graduation rate increased 12 percent over the same period. At ASU, the increase in retention so far has been 2.5 percent after the first year.

The information that the system collects can also allow precision enrollment management. The university can guarantee seats in classes when students need them, as programs specify when courses are needed. None of this requires departmental intervention, and the organizational structure provides little incentive for duplication or inefficiency.

**Faculty Work**

Some academically qualified administrator must assign faculty work. By making academic units larger and more interdisciplinary, the unit administrator bridges more traditional units, but the work is the same. Earlier ASU had created the School of Earth and Space Exploration by combining the Departments of Geology and Astronomy, the School of Human Evolution and Social Change, some faculty from the Department of Anthropology, and some faculty from the Department of Sociology. The university also created the School of Family and Social Dynamics from the Department of Family and Human Development and some faculty from the Department of Sociology. These units, formed before the budget crisis, did not save money—that requires intentionality. Indeed, in some cases the staffs of the units were merely combined, continuing duplication.

More recently, ASU has created the interdisciplinary units listed in Table 1, in which the original units are also identified.
These new interdisciplinary academic units are headed by a school director or dean, who has the same responsibilities department chairs had previously for faculty hiring, faculty evaluation, and the assignment of faculty work.

As mentioned, in some of the units faculty members are organized into “faculties,” not departments. For example, prior to the creation of the School of Life Sciences, there were separate departments for biology, plant biology, microbiology, and molecular and cellular biology. Now, the School of Life Sciences has the following faculties: biomedicine and biotechnology; cellular and molecular biosciences; evolution, ecology, and environmental science; genomics and evolution; human dimensions of biology; and organismal, integrative, and systems biology. The objective was to form a structure that could be easily reorganized around big programs and engage in use-inspired research.

Unlike departments, the faculties are designed to be flexible and to respond rapidly to this evolving area of science. The creation of a department is normally a formal process requiring university or system board approval, but changing the number of faculties or their membership requires no approval from the university. In the School of Life Sciences, each faculty member belongs to a primary and a secondary faculty to avoid creating new silos. Every year the school looks at the faculties it has and evaluates their viability—does it need more or fewer; does it need to change them?

Faculty in the new units have all found synergies by interacting with colleagues in new ways, leading to new degree programs, organizational units, and research projects and configurations. Examples include the science, technology, and society graduate degree; the graduate degree in the environmental life sciences; the Center for Biology and Society; and the Center for Social Dynamics and Complexity. Digital culture that cuts across design and the arts was enabled by the merger of two colleges. Another merger of department and programs, in this case into the School of Social Transformation, came from a faculty initiative to approach some important issues from a variety of perspectives. Moving the Departments of Nutrition and Exercise Science into the School of Nursing produced a new unit that focuses on wellness and the prevention of disease in combination with health care. The reorganization of the Ira A. Fulton School of Engineering into focus areas around grand challenges has led that faculty to work together on research in a more meaningful way. Anecdotal evidence suggests that students recognize that engineering and technology provide the keys to solving the major problems facing the planet, and this inspires more of them to become engineers. The National Academy of Engineering supports this approach and now offers grand challenge scholarships to students (http://www.grandchallengescholars.org/).

The point is not that these particular combinations are necessarily the best in every institution but that the reorganization that produces appreciable savings also may lead to improvements in the quality and intellectual vitality of the programs that result from it.

**Budgetary Implications**

A much more effective use of university resources is one of the consequences of the optimal academic organization described here. This is significant whether the university faces the challenges of major revenue reductions or opportunities for additional investment in improvement. The elimination of small colleges at ASU saved approximately $500,000 of recurring expenses for each unit eliminated, and the total saved from the re-organizations in Table 1 was $13.4 million.
What is true at ASU is very likely to be true for higher education in general. While the total potential for savings is difficult to identify precisely, since academic expenses are lumped together in IPEDS reports under the “academic support” category, the potential saving made possible by merging large numbers of units likely rises into the millions.

Any budget savings from academic consolidation are significant, because the majority of the expenditures in colleges and universities are on the academic side, as shown in Figure 1. Academic expenditures (including student support) consume 82.4 percent of the tuition and state revenue at public colleges and universities. And most of this expense is for people, as shown in Figure 2.

**Figure 1. Tuition and State Support and Expenditures Per FTE**

![Figure 1. Tuition and State Support and Expenditures Per FTE](image1)

**Figure 2. Breakdown of Instructional Expenditures at Public Institutions**

![Figure 2. Breakdown of Instructional Expenditures at Public Institutions](image2)

Other strategies besides reorganization have been used to reduce academic expenditures. Tenure-track and tenured faculty represent the core of any institution; they produce the research and scholarship, develop the curriculum, participate in faculty governance, and carry a significant part of the teaching mission. But since they are also difficult to cut in times of budget crisis and more expensive than contract faculty, a common strategy in recent years has been to increase the proportion of contingent faculty in colleges and universities. This trend is shown in Figure 3.
Other methods of reducing direct expenditures on instruction include increasing the teaching productivity of faculty by increasing class size and/or by using technology in large classes (see Twigg, 2003); using tenured faculty only for course design and updating and employing less expensive faculty or student assistants for course delivery and grading (see Fried, 2008); offering fewer electives; or increasing teaching loads for those faculty who are less productive in research, thus reversing the academic ratchet (Massey & Zemsky, 1994). These techniques have led to decreased direct expenditures on teaching over the last 10 years, as shown in Figure 4.

But even in times of budget crisis, we must protect the academic core and maintain quality. Some classes must be small and cannot yet be taught via technology, and the highest level of course development in terms of content requires skilled and expensive faculty. At some point, increasing class size, using contingent faculty, and implementing other efficiencies reduces quality. The method of academic administration described above, on the other hand, provides a way to reduce expenditures as well as enhance academic quality by facilitating faculty work across disciplines and emphasizing student success.

All of the new interdisciplinary schools formed at ASU saved money by reducing staff duplication. At the Herberger Institute for Design and the Arts, for example, instead of two deans, two finance or business offices, two admissions offices, two directors of undergraduate education, and two directors of graduate education, there is now only one of each. The amount of increased workload for the remaining dean, financial officer, program director, and so on is not sufficient to require additional staff expenditures; much of the work of academic administration can be extended relatively easily to increased numbers of students and faculty. To the extent additional work requires additional personnel, an administrative assistant is still less costly than an additional dean or chair, with his or her accompanying office and office staff. ASU’s relatively simple combination of design and the arts into the new Institute for Design and the Arts, for instance, saved $1.5 million in recurring dollars.

One common suggestion for reducing expenses on the academic side of the budget is to eliminate programs. But at ASU, all degree programs are still in place following these reorganizations. Degree programs do not cost money—people do. Unless an expense-reduction mechanism eliminates people, academic program eliminations do not save money. Perhaps more important, unless a new program requires the addition of people, it does not increase costs. Adding programs with the same number of faculty and staff increases productivity.

Making it Work
For this free-flowing academic environment to function effectively and to protect faculty who work in many units, faculty assignments and responsibilities require careful definition. The critical dimension of the new organization is a focus on the
individual strengths of faculty and the optimal deployment of those strengths in academic activities. ASU has instituted a system using academic memoranda of understanding between the two (or more) units that share faculty members. These MOUs, signed by responsible faculty and administrators, explicitly define expectations and the FTE split, including funding from each source, the percentage of indirect cost recovery to each unit, and the division of research recognition. The MOUs also establish:

- Evaluative procedures for making joint recommendations regarding annual performance review; salary adjustments; and promotion, tenure, or reappointment reviews.
- Expectations regarding research or creative activity.
- Teaching/instructional responsibilities, including classroom teaching, mentoring of graduate and undergraduate students, service, and resource implications (e.g., space, buy-out of teaching, etc.).
- The duration of the agreement and the periodic schedule for reviews to identify any changes that may be required.

**Fluid Structures for Fluid Research**

Brew (2008) found that academics actually have more fluid identities than is suggested by pure disciplinary identification, with many defining their primary intellectual identity by their research. This finding resonates with my own experience. When, as head of the Department of Psychological Sciences at Purdue, I once led a discussion of where to affiliate the department—with the School of Humanities, Social Science and Education (where we were), or Science—it turned out that the physiological psychologists wanted to go into the School of Science, the industrial/organizational psychologists wanted to join the School of Business, our personality/humanist psychologist wanted to affiliate with the School of Humanities, and so on. That discussion illustrated that the department itself was an arbitrary administrative artifact, not an intellectually defined unit.

If one views the university as organized around the individual faculty member and student, both research and education can be tailored to those individuals by taking advantage of the potential of technology. Each faculty member actually needs journals and books that pertain to the specific requirements of his or her work. As one example, although I was trained as a psychologist, I now study psychology of eating. My main journal is *Appetite*, an interdisciplinary journal of factors affecting ingestion, and my main conference is the Society for the Study of Ingestive Behavior.

Online journal publication may provide a way to achieve a customization of research resources. Ideally each of us should be able to subscribe to journals in a way that gets us only the articles we need. Moreover, because the journals are too slow to change with our changing interests, we can anticipate continued increases in bypassing the slower academic journal publication cycle. In an ideal future, faculty could choose to subscribe to a certain number of articles from any source, allowing them to expand the reach of scholarly publications without the requirement to purchase the entire journal. We are just beginning discussions of how we might manage this at ASU.

Open-source publishing, blogs, and other Internet-enabled venues will continue to change the nature of archival scholarship. All of these new forms also weaken the traditional control of intellectual life by the narrowly defined disciplines and their academic departments. Although there are interdisciplinary journals, the ever-changing combinations of disciplines and widely varying structure of intellectual inquiry suggest that our publication outlets need to be more fluid, as do our academic organizations.

**Better Structures for a Better Future**

Over the last few years many have bemoaned the fact that universities are too rigid to accommodate rapid changes in knowledge. Most of this difficulty stems from an outmoded organizational structure that centers on the academic department. This traditional structure is not easy for undergraduates to negotiate. They often have difficulty finding a major or understanding the available choices. This structure also interferes with graduate education, as students now need to be educated more broadly with the skills to work across disciplines. Finally, it inhibits the many faculty who need to work on a problem with colleagues from other disciplines and who want to be more flexible in methods and approaches than a traditional disciplinary perspective would support.

The traditional structure also suboptimizes the university's resources, because it breeds wasteful competition, an inefficient use of resources, and a rigidity that discourages rapid responses to challenges and opportunities. Many federal agencies expect universities to help solve the "grand challenges" facing the planet, and many faculty and certainly students are ready to respond. Changing the traditional departmental structure to an organizational model focused on individual faculty grouped into easily modified clusters that match academic and intellectual interests will facilitate education and research and, at the same time, save a lot of money.

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