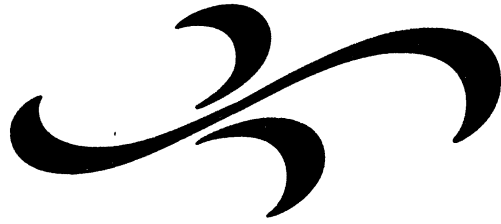


Intellectual Transformation

at The University of Michigan

Office of the President

Intellectual Transformation



Office of the President

EVOLVING FROM CONFORMITY: THE BIRTH OF THE MODERN RESEARCH UNIVERSITY

[In the 1840s, before Michigan became a true university] learning and culture were the [only] rewards for which we . . . strove. In addition to them, the scholar is now exhorted and stimulated to test his gifts for investigation and research and thought. No ambitious young teacher in our colleges now fails to make a strenuous effort to enlarge, if possible, the boundaries of knowledge.

– James Burrill Angell



In the early 1800s, before the invention of the “research university,” higher learning in America’s colleges was primarily religious and moral. Colleges trained the ministers of each generation, passing on “high culture” to a very small elite. Instead of embracing new knowledge, they looked to the past, teaching Latin, Greek, simple mathematics, theology, and some moral philosophy. Faculty saw little need to critique the classics, and their teachings were not meant, in Laurence Veysey’s terms, to have “utility” for the larger society.

As the nineteenth century advanced, knowledge began to expand at a staggering rate, driven by new scientific methods and responding to the demands of the industrial revolution. Scholars returning to America from Europe brought a new vision of research and academic freedom in higher education. It became increasingly difficult for colleges to teach an established and static base of learning.

The University of Michigan led the way in this new environment. Created from the beginning with the most advanced plan for a state institution, Michigan was in many respects the nation’s first comprehensive public university, and became a model for all subsequent institutions. Michigan was the first to address the “new” fields of modern languages and the sciences and established the first professorships in zoology and botany, chemistry, mineralogy, and geology.

Despite the promise of these early efforts, Michigan operated much like a traditional college until the arrival of President Henry Philip Tappan in 1852. Tappan expected his faculty to teach, to press at the frontiers of knowledge, and to initiate their students into a world of intellectual exploration. By 1900, the University participated in the founding of the Association of American Universities, an elite group of institutions whose members defined research as an integral part of their mission. Throughout this era, as researchers became more specialized, departments were created in a great burst of energy that lasted about two decades and then subsided, forming the basic geography of the university that is familiar to us today.

AN ENGINE OF ECONOMIC ADVANCEMENT AND NATIONAL SECURITY: RESEARCH AFTER WORLD WAR II

Whether we are talking of urban blight, environmental pollution, population control, resource allocation and conservation, mental health—name it—somewhere in the University of Michigan, someone is involved in the issue. Our task is to make that involvement as meaningful and beneficial to man and society as we can. We can do no more. Our purpose is to do no less.

—President Robben Fleming

A second period of great changes for universities came in the 1940s. During World War II, university research proved its national importance with its critical contributions to the success of the Allied war effort. At war's end, we found ourselves again in the midst of a radical paradigm shift, comparable to that of the late 1800s. Research activity on campus burgeoned, supported by vast increases in federal funding. The creation of the National Science Foundation (NSF) in 1950 epitomized the new partnership that came with this funding. The assumption of the NSF, contained in Vannevar Bush's 1945 *Science—The Endless Frontier*, was that by funding "pure" research, the government would create a storehouse of knowledge that would ultimately improve the quality of life for all Americans. Funding also expanded in areas of applied research, especially for military projects. The World War II-era made explicit the profound importance of university research to the larger society.

Michigan participated aggressively in this new environment. With the arrival, for example, of the first division of the Institute for Social Research (ISR) from the Department of Agriculture and the second division later from the Massachusetts Institute of Technology, we became a vibrant center for the study of social trends. The influence of ISR helped entice many social scientists across campus to study issues in the wider society. Since that time, Michigan has been a recognized leader in many areas of the social sciences. The natural sciences and the professional schools also took off, and have achieved world-class reputations. Our many schools and departments have achieved a combination of breadth of coverage and depth of expertise equal to the best in the world.

It was also during the post-World War II era, that Michigan became known as a world leader in interdisciplinary programs. Much older programs, such as

our many area studies programs and the Horace H. Rackham School of Graduate Studies, were joined by new ones, including the Michigan Memorial Phoenix Project, the Institute of Gerontology, the Howard Hughes Medical Research Institute, the Institute for Science and Technology, and literally hundreds of other institutes, centers, programs seminars, and other informal groups.

In the 1960s and 1970s, under President Robben Fleming, the University reviewed its research priorities. By that time, over half of the research funding at Michigan came from military projects, and a number of investigators were engaged in classified research. After much debate and campus demonstration, the faculty voted to restrict classified studies. At the same time, the University divested itself of the Willow Run laboratories, which were supported almost entirely by the military, dropping the level of military funding on campus to below 10 percent of the total. Finally, in another important decision, the faculty established the "end-use" rule, proscribing "any classified research contract the specific purpose of which is to destroy human life or to incapacitate human beings." This again represented a new post-war realization of the importance of university research to the rest of the world, and of the University's responsibility to consider the ultimate impact of its discoveries.

Although there were few new departments created during this period, the tendency toward specialization increased. Departments became more splintered, made up, in some cases, of loose confederations of faculty in rarefied subfields who had more in common with peers in their disciplines at other universities than with campus colleagues. Generous funding for the sciences also widened the already immense gulf between the social sciences, the natural sciences, and the humanities. 37

CREATING THE INTERDISCIPLINARY UNIVERSITY: BRINGING NEIGHBORHOODS TOGETHER

We need to think about both the intellectual and institutional aspects of interdisciplinary work . . . We do need scholarly conversations with some continuity—we can't start over again every day or even every decade. But the present organization of knowledge invests enormous and misleading power in certain kinds of boundaries. We need to recognize that differences within disciplines are sometimes as great as those between disciplines. And we need to value lots of different kinds of interdisciplinarity.

*—June Howard, Associate Professor of English,
Women's Studies, and American Culture*

The greater significance of our individual specialties lies not in the depth to which we can press them, but in the bearing they have, over time, on the broader sweep of human understanding—and upon informed social policy.

—Billy E. Frye, Former Provost



The focusing and specialization that began at the end of the nineteenth century and intensified after World War II was one of the great advancements in the history of higher education, allowing scholars to gain expertise and engage in coherent debate amid a growing cacophony of voices. Today, however, as the speed of change increases, it has become more and more evident that we need to make basic alterations in the disciplinary culture and structure of the University of Michigan. New funding policies have made this even more imperative, as agencies move increasingly toward supporting more multidisciplinary teams of scholars. We are entering a third era of change in higher education.

Concerns about the fragmentary nature of knowledge are not new. Calls for more fluidity in intellectual inquiry arose as soon as the disciplines began to form at the end of the nineteenth century, and some scholars cite evidence of "interdisciplinary" agendas in the work of Hegel, Kant, and even as far back as Plato and Aristotle. So why has today's effort to break down the barriers between the disciplines taken on special importance?

Partly, the new emphasis comes with the shifting nature of knowledge production. Never before has the speed of change itself become the central issue of intellectual life. Disciplinary configurations are changing so rapidly that departments have difficulty coping with new ways of seeing. Today, those who are at

the cutting edge of their fields are often those who travel across them. And new ideas are often birthed in the collision *between* disciplines.

At the same time, we can no longer ignore the importance of the knowledge we produce to the wider society. We began to realize the social impact of knowledge in the 1950s, but today information is replacing material objects as primary economic and social forces. English departments, for example, have become fundamentally concerned with issues that affect our culture, examining, among other issues, how power and ideologies structure the way we see the world. And the complexities of internationalism challenge daily our attempts to define what we mean by these words "culture" and "world," as national and cultural boundaries become more permeable and untidy. In our increasingly complex, interdependent world, narrow answers will not succeed. The "interdisciplinary moment" is not a fad, but a fundamental and long-term restructuring of the nature of scholarly activity.

Our goal is not to force scholars to conform to the new "mantra" of interdisciplinarity, however. Not all interdisciplinary endeavors are good; neither are all disciplinary efforts bad. High quality interdisciplinary work will look different in different disciplines, and even for different individuals in the same discipline. For some pursuits, scholars may need to shift from the current "small think" to "big think." They may be able to overcome their lack of specialized knowledge, especially in areas like engineering and the sciences, when intelligent software agents will roam far and wide, instantly and effortlessly extracting details from networks containing the knowledge of the world. For some exceptional scholars, the solution may be appointments to University-wide positions. We will need to learn to value a diversity of approaches and develop a more flexible vision of faculty career paths. There should be places for eclecticism, places for extremely specialized research, and places for colleagues to learn from each other. We will need to learn to work both in isolation and in communities. ۛۛ

THE CHANGING NATURE OF SCHOLARSHIP: FROM LINEAR THINKING TO REVOLUTION

[The danger of excessive departmentalization is that] students have imagined that the universe, in some mysterious way, is actually departmentalized.

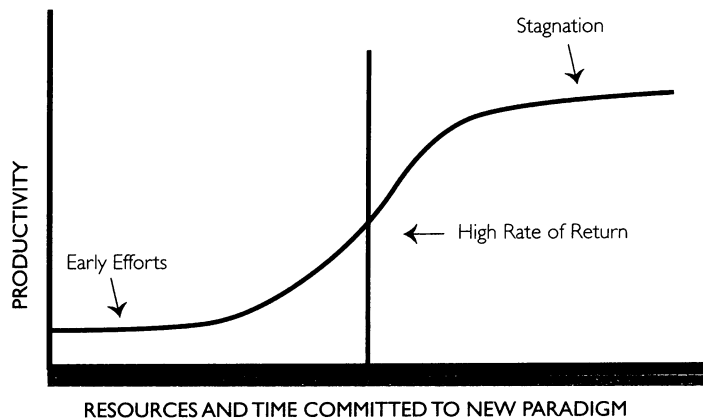
—President Marion LeRoy Burton, 1921



What we sometimes think of today as *traditional* disciplines actually only represent current incarnations, the result of profound alterations over time. To cite only one example, James Winn, former director of the Institute for the Humanities, has pointed out that anthropology has evolved over only a few decades from “skull measuring” into a true social science; the field continues to develop today, beginning to focus on the humanities. Intellectual upheaval like this has shaken all areas of scholarship in recent years. Few still believe in some stable foundation for knowledge. We have experienced too many examples of new concepts that have blown apart long-held traditional views. In my own area of physics, for example, Einstein’s theory of relativity and quantum mechanics have revolutionized the way we see the physical world.

Most of us were trained to think about change as a linear, causal, and rational process. We were taught that by looking at the past, we could predict the future. Yet current scholarship in both the sciences and the humanities has shown that this kind of confident prediction is only a fantasy. Radical critiques and collisions between different cultures and disciplines increasingly threaten our sense of intellectual coherence and stability.

Over the short-term, however, there does seem to be a pattern to the development of new disciplines. Within an embryonic field of inquiry, knowledge seems to grow, not linearly, but in an S-shaped curve. In the earliest phase, growth is slow and risky, flat, as early participants, generally a few exceptional individuals, make extraordinary contributions. But as the discipline matures, growth in knowledge becomes exponential. This is the stage that produces the most return from investments of time and money. It is “safest” to work at this stage, easiest to get grants and achieve tenure. Finally, as the field grows older, growth trails off, flattens out again; a law of diminishing returns sets in as most of the potential of the new area is depleted. All too often, much of our work drifts into this stage, and stagnates.



Even in the short run, however, this description is only a sketchy outline. It assumes that fields of knowledge operate in some predictable and coherent way. Complex systems—like disciplines—often appear stable but actually fluctuate constantly, held in a precarious state of equilibrium. Chaos theory has taught us that even very small changes can threaten this complex balance of forces. The popular press dubs this the “butterfly effect,” because it suggests that the minute disturbance of a butterfly’s wings could effect major weather patterns half-way around the globe. Thus, dramatic change in knowledge is often triggered by a single new idea or exceptional individual.

This vision of disciplines as complex, chaotic systems is very similar to philosopher Thomas Kuhn’s theory of “Scientific Revolutions.” In essence, Kuhn argues that individual disciplines operate under what he calls “paradigms.” In a sense, a paradigm is what the members of a community of scholars share, their accepted practices or perspectives. Paradigms are *not* rules, but more like subjects for further study and elaboration, beliefs in certain metaphors or analogies about the world, shared values. For Kuhn, most research consists not of major breakthroughs, but of mopping up, or sweating out the details of existing paradigms. Major progress is achieved, new paradigms are created, not through gradual evolution, but through revolutionary, unpredictable transformations after the intellectual field reaches saturation.

Translated into more human terms, what both of these conceptions tell us is that intellectual transformations are frequently launched by a few extraordinary people. Those who invent new paradigms, who destabilize the structure of a field, are often very young or very new to their field. Uncommitted to current disciplinary rules, they are, as Kuhn says, “particularly likely to see that [these] rules no longer define a playable game and to conceive another set that can replace them.” They also, however, must be willing to take serious

risks, to participate in the early, flatter, and less productive portion of the learning curve where the broad outlines of new fields are hammered out. This may be one of the reasons why the varied perspectives of feminists, minorities, and Third World scholars are so important. They lend rich new vitality to our scholarship while challenging the status quo.

One of the greatest challenges for research universities, then, will be learning to encourage more people to participate in the high risk, unpredictable, but ultimately very productive confrontations of stagnant paradigms. We must jar as many people as possible out of their comfortable ruts of "conventional wisdom," fostering experiments, recruiting restive faculty, turning people loose to "cause trouble," and simply making conventionality more trouble than unconventionality. ↪

THE DEIFICATION OF THE DISCIPLINES, AND THE LOSS OF A COMMON INTELLECTUAL COMMUNITY

New faculty members are too often chosen not for commitment to wider aims of scholarly service, but for narrow disciplinary expertise This view of knowledge is destructive, first because it isolates department from department, and [second] because it isolates individual from individual within those departments It has made for a trivialization of aim and a narrowing of focus, . . . and it has led to a massive loss of institutional loyalty Only by seeing knowledge as a common quest can our institutional life be restored.

—Frank Rhodes, President of Cornell University

Academic disciplines dominate the modern university, developing curriculum, marshaling resources, administering programs, and doling out rewards. Faculty increasingly focus their loyalty on their disciplines instead of their home institutions. As a result, I fear, we are losing the cohesiveness of a broad community of scholars. As we have built stronger and stronger disciplinary programs, we have also created powerful centrifugal forces that threaten to tear our community apart.

The process of faculty evaluation, which has increasingly rewarded specialization, is a major culprit. We need only look at how narrowly new faculty positions are defined. Our “business” style of faculty appraisal depends upon very crude measures of achievement. We look more at the *quantity* of one’s publications than at the *quality* of a person’s scholarship or teaching. Of course, faculty soon learn that the best way to succeed in this system, to proliferate their publications, is to specialize even further. In a very real sense, because of our failure to develop more sophisticated measures of accomplishment, we are forcing faculty into very narrow roles.

The truth is that most of us have what Professor Lynn Conway, professor of electrical engineering and computer science, has called a “clan instinct.” We feel most comfortable when we belong to an identifiable group, a tribe, a discipline. We even define ourselves by our disciplines. “I’m a physicist. You’re a historian.” This identification often leads us to resist interdisciplinary scholarship and teaching. In fact, our research proposal review panels and curriculum committees often look down on broader efforts as simply hodge-podge collections of watered down material.

This predominance of “narrow think” has been intensified by traditional funding patterns, especially in the sciences. For years, universities have been dominated by the single-investigator model of sponsored research, in which each individual faculty member is expected to secure whatever resources are necessary for research and graduate training in his narrow area. This pattern has diverted faculty from broad institutional goals and directed them toward personal, specialized career tracks. As Joshua Lederberg, Nobel Laureate and former president of Rockefeller University, notes, “The project funding system has [exacerbated] specialization. Many able professors have little experience and little culture beyond the domain of their discipline. The project system further preempts the loyalties that might be directed to one’s colleagues and one’s institution.”

Former President Harold Shapiro argues that our disciplinary narrowness is one of the reasons for the perceived deterioration of undergraduate education. He feels we have failed “to distinguish between the transmission of [specialized] knowledge and the development of a [general] capacity for inquiry [in undergraduates] . . . Our predicament is that the faculty are transmitting what they know—and love—with little awareness of what the student needs to learn.” At a recent conference on undergraduate education, attendees agreed that much of our curriculum is not only disconnected from contemporary reality, but so fragmented that little useful understanding is possible. The conference concluded that “the rigid institutionalization of the disciplines is a barrier to both creative thinking and curricular change. The disciplines need to be integrated, and in some cases, seriously reformed. This will require considerable restructuring of our educational institutions.”

Disciplinary rigidity is also reducing the effectiveness of our Ph.D. programs, which traditionally served as a training ground for the next generation of academicians—in other words, self-replication. The current system produces scholars who are trained for increasingly narrow—and increasingly limited—academic and research positions, largely ignoring the broader interests of our best students, their increasing diversity, and the complex and rapidly widening societal role played by those with such advanced training. Ultimately, this narrow definition of the Ph.D. does not serve either the nation or the student well. In the future, a large proportion of Ph.D.s will work outside the academy; and our training needs to reflect these broader roles in government, business, and education. Universities have barely begun the difficult work involved in re-designing the Ph.D. degree so that it prepares students for a more diverse future.

There are signs of change, however. Many major funding agencies have begun to shift away from a traditionally disciplinary focus, fueling a rapid increase in the amount of federal support going to multidisciplinary teams of investigators instead of isolated researchers restricted to a single discipline. This is especially true in the natural and social sciences, but a nascent movement in this direction is also visible in the humanities. And despite the pressures, a few faculty stress simply doing interesting things—their research or teaching—instead of allowing themselves to be pigeon-holed into a discipline. These all-too-rare scholars often develop an intellectual span that not only carries them across disciplinary boundaries with ease, but allows them to collaborate with colleagues from quite different fields. They are the potential seeds for a new and vibrant intellectual community—human connections between the isolated bulwarks of different departments. Yet, clearly these small shifts are not nearly enough. ↷

A VAST GULF: THE HUMANITIES, THE NATURAL SCIENCES, THE SOCIAL SCIENCES, AND THE PROFESSIONAL SCHOOLS

The distance between the English department in Haven Hall and the Chemistry Building across the street is enormous What do I sound like as an English professor when I talk about the poetry of racism or manifest destiny? What does a physicist hear? What does the Business School hear?
—Lemuel A. Johnson, Professor of English

We have some sense of the economic and technological shifts that are coming. What we haven't established are the cultural and social reverberations of these changes. We don't know how all of this will affect us as humans.

—Muge Gocek, Assistant Professor of Sociology

As inquiry of all kinds has expanded our intellectual horizon, it has also begun to show us how truly small our Spaceship Earth really is. As technology and the international economy connect us ever more intricately with communities across the globe, we realize how much the actions of each of us affect all the others. Increasingly we must accept the consequences our new discoveries create. This challenge suggests that the current state of separation between the humanities, social sciences, natural sciences, and the professions is simply not tenable anymore. Those who work to expand human technical knowledge must seek common ground with those who explore the implications of this knowledge for our society.

I am not proposing that scientists should always be “looking over their shoulders.” The goal is not to place restrictions on research but to have discussions together about how our advances will be used best to benefit mankind. As an example, the new Media Union on North Campus is designed to be an important factor in fostering these campus-wide discussions. The Media Union will provide opportunities for engineers, artists, architects, and musicians to collaborate, so together they can consider the use, durability, and aesthetics of their products.

I am also not arguing for a shift from “pure” or “basic” research to more applied projects. The argument that justified huge appropriations of government funding has always been that pure research generates an unfathomable but incalculably valuable resource for the future, and the NSF, for example, was created to further basic research. Studies actually estimate that about

30 percent of the economic development of the United States after World War II was a byproduct of *basic* research. The search for truth, for knowledge simply for the desire to know, will continue to be a core pursuit of university scholarship, even as we seek ways to build more relationships with industry and others. The current trend toward treating universities as contractors, through a process of "procurement," represents a tragic loss of faith in the benefits of the unconstrained search for truth. Both applied and basic research will benefit immensely from an environment where restrictions and barriers preventing the free movement of thought are removed.

Professor Johnson is correct when he observes that "most hard scientists are nervous about getting involved in such alien discussions." Today, programs such as the Comparative Study of Social Transformation, American Culture, and Women's Studies struggle mightily with the comparatively small distances between the social sciences and the humanities. Truly interdisciplinary work that regularly combines the much more separated world views of scientists, humanists, lawyers, or anthropologists will not come without deep alterations in the structure and assumptions about the workings of our community. Professor Nicholas B. Dirks points out that "the humanities are too important to be left to the humanists." Yes. And the sciences are surely too important to be left to the scientists. ↷

MICHIGAN TODAY: AMID CHALLENGES, A STRONG FOUNDATION FOR THE FUTURE

The current structure makes for schizophrenic beings. It asks junior faculty especially to be infinitely more conventional than you would imagine or desire an emerging generation of scholars to be.

—Michael Awkward, Associate Professor of English and
Director of the Center for Afroamerican and African
Studies

At the end of the day, I am paid by my department, assigned to committees by my department, do my undergraduate teaching in my department, and fund my graduate students through my department. Those of us involved in interdisciplinary work face frequent frustration and heavy overloads of work. It would be much simpler to stay in our departments. But we are truly interested in breaking down the traditional constraints that bind us.

—Nicholas B. Dirks, Professor of Anthropology and of
History and Director of the Center for South and
Southeast Asian Studies



We must find ways to adapt the disciplines to a new reality that is intolerant of stasis and inflexibility. Departments are beginning to realize that if they do not learn to bend, they will surely break. The creation of a sustained dialogue over an extended period of time is as important to most interdisciplinary work as it has been to the disciplines. Departments set standards, evaluate faculty, monitor quality, and provide the University as a whole with a sense of its overall mission. Our goal is not to eliminate these coherent dialogues but to open them up, encourage new foci, wider communities, and perhaps entirely new paradigms. In fact, many argue that departments, as they evolve, are the most promising organizational unit to guide our process of transformation. I am becoming increasingly convinced that the university of the future will be far less specialized and far more interconnected through a web of structures, some real and some virtual, which provide both horizontal and vertical integration among the disciplines.

At Michigan we already have a strong foundation of interdisciplinary work upon which to build. For example, the number of multiple offices that our professors have in different units is something of a standing joke (as well as a financial challenge). It is not unusual to see a calendar on a professor's door listing a different office almost every day of the week. There is no other

research university in the nation with this kind of tradition, where scholars wear so many "hats." We also have an unusually large number of successful interdisciplinary programs, such as Population Studies, American Culture, Women's Studies, the Ultrafast Science Laboratory, and Bioengineering. The new International Institute, bringing our many interdisciplinary Area Studies Centers under a coordinating umbrella, is an important advance.

Historically, new proposals at Michigan tend to win out over those to sustain or strengthen ongoing programs. While this can be dangerously faddish at times, it also represents an ability to look forward and a growing capacity for phasing-out efforts that have outlived their productivity. At the same time, as I have noted, new outside funding policies have increased the already considerable funding flowing across rather than down disciplinary lines. Yet, despite these promising strengths, there are still examples of worn-out programs across the campus that manage to limp on, draining resources from more vital areas. And despite the balance in resource flows across and within disciplines, most other forms of power and authority here, as elsewhere, reside in narrow specialties.

Despite our accomplishments and our strong reputation for interdisciplinary work, we are not doing enough. In my many meetings across campus, faculty express a great frustration with the constraints placed on their teaching and scholarship. Most faculty see their work as increasingly interdisciplinary, but are stifled by the current University structure. One group actually made a list of enemies to creative scholarship: curriculum specialization, disciplinary boundaries, provincialism, and an "entrenched wisdom group" of faculty unwilling or unable to recognize broader scholarly efforts. These concerns are shared by many others across campus. For example, in a recent survey of Michigan faculty interested in environmental issues, 74 percent felt that our academic climate does not adequately encourage or support interdisciplinary work. Indeed, many view today's organization of the university as not only obsolete, but a hindrance. ↪

DIRECTIONS FOR THE FUTURE

The central “talent” of the University is our ability to form communities. To stay at the cutting-edge, we must find new ways to facilitate collaboration, to encourage intellectual synergy across the entire campus.

—Daniel E. Atkins III, Dean of the School of
Information and Library Studies



The University of Michigan simply must face up to the challenge of change. To retain the traditional character, mission and values that we cherish, we *must* transform ourselves, or risk becoming as irrelevant to the twenty-first century as the early nineteenth century college became for the twentieth. Success will require committed participation from all levels of our community—fundamental change is simply not amenable to edicts from the top.

Many have made suggestions for reducing the constraints on faculty. One approach would create a number of University-wide professorial chairs, allowing these faculty to roam widely, teaching and conducting research in a variety of arenas. Such faculty would help cross-pollinate ideas across disciplinary lines. Mary L. Brake, associate professor of nuclear engineering, has proposed another interesting alternative: actively encouraging faculty to take their sabbatical leaves in universities and disciplines far removed from their usual intellectual and geographical homes. An engineering professor might spend her time in history or social work in Africa. A humanist might join a professional school in Australia. This would both widen our professors' horizons while, perhaps, stirring things up a bit in their temporarily adopted homes.

Ernest Boyer, president of the Carnegie Foundation for the Advancement of Teaching, suggests that we think even more broadly, developing comprehensive “creativity contracts” in which faculty define their professional goals for a multi-year period, perhaps shifting from one scholarly focus to another. For example, a faculty member might devote most of her early career to specialized research, and expand to broader concerns later in life. Or vice versa. Still later, the creativity contract might focus on an applied project, one that would involve the professor in school consultations or as an advisor to a government body. These contracts would give us more flexible methods of evaluating faculty, setting individual goals, while creating a mechanism to allow wider, occasionally high-risk pursuits.

Encouraging interdisciplinary work within the structure of graduate education also poses a challenge. Recent surveys indicate that one of higher education's most intransigent problems is in funding interdisciplinary graduate students. In fact, it is frequently difficult for graduate students interested in non-traditional, often cutting-edge issues even to find a place to study in our narrowly compartmentalized University. In response to these problems, many universities are reorganizing their teaching and scholarship, particularly at the graduate level, into broad divisions and away from specialization. It is my belief that we should seriously consider more mergers and integration. Of course, this would be a great challenge to those wedded to the old vision of our community.

This same integrative approach might also improve education for undergraduates. Our undergraduates will pursue multiple careers during their lifetimes. The quickly shifting nature of knowledge means, for example, that much of the training received by our graduating engineering students has already become obsolete *in the years of their undergraduate studies*. As a result, education and re-tooling will become a lifetime commitment. Instead of offering extremely specialized undergraduate majors, perhaps we should design an undergraduate education that would prepare a graduate to move in many directions: teaching them to learn, not to know; providing a facility for inquiry instead of facts. In our introductory chemistry and math classes, for example, we are already moving in this direction. Instead of giving students the *facts* of math and science, in a world where these facts change every day, we are initiating them into the *worlds* of scientists and mathematicians.

However, as knowledge becomes more integrated and information technology more advanced, limited attacks on specific problems like these may miss the point entirely. The transformations our society is undergoing may well invalidate most of our current assumptions about the future of our University. We need to explore new social structures, new modes of community capable of responding to the pace and immensity of the changes we face. One possible approach is the "collaboratory" concept, first proposed in an NSF workshop by Joshua Lederberg and others. The collaboratory would use multimedia information technology to relax constraints on distance, time, and even reality, supporting close intellectual teamwork. Perhaps some form of the collaboratory will be the "infrastructure" of the university of the future.

One way to explore the possibilities of the collaboratory would be to create a small "university within a university" that could serve as a test-bed for possible

futures of a twenty-first century University. This "New U" could be an academic unit, consisting of students, faculty, and programs. Its mission would be to provide the intellectual and institutional framework for constant innovation. Highly interdisciplinary, its programs could be organized around such themes as global change, social dilemmas, and economic transformation. It would connect students, faculty, and alumni, helping them to work together as they address real societal problems. It would act as a crucible for the evolution of new disciplines; and its programs could infect the larger University and society with its ideas through collaboration, internships, and exchanges of students and personnel. We could also use the "New U" to develop new organizational models for Michigan, experimenting with different kinds of communities, lifelong education, new concepts of faculty and student roles, and community service, intentionally trying to stay twenty or thirty years in the future. Although this might seem too speculative or "blue skies" to some, it is important to note that our new Media Union opening in 1996 on North Campus is at least a first step toward this vision. 37

RESPONDING TO FINANCIAL CONSTRAINTS: "VALUE-CENTERED MANAGEMENT"

Incremental budgeting simply isn't tenable anymore. With the fiscal problems facing Michigan, we cannot avoid re-thinking our financial future. Value-centered management (VCM) is the right intellectual approach. But the "devil" is in the details. There is a lot of VCM that we have yet to work out . . .

It turns out that, under the new plan, the School of Dentistry is getting the largest per-student subsidy of any division of the University. This does put us in the "hot seat." But if VCM truly accounts for effort, contributions to the community, and quality, then I feel fine. If we think of different schools as "cookie-cutters," then no, you can't train a dentist like you train a lawyer. Training dentists is an expensive business. The truth is that we're a bargain, generating the majority of our own budget. Compared to our peers, our per-student subsidy from the University is pretty reasonable; we rank fifteenth in the nation. I have no problem showing we're worth the money we're getting. But if quality and excellence don't win out, then we're not really a University, and I don't want to be a part of it anyway.

—Bernard Machen; Dean, School of Dentistry; Interim Provost



ew initiatives are not free. To succeed, given the increasingly restricted resources available to higher education, we must develop new ways to establish priorities and allocate our funds. This monograph is not intended as a "sales pitch" for our new fiscal management approach; but, in fact, we simply cannot avoid the issue of funding if we are to speak realistically of intellectual transformation. The university of the twenty-first century must be lighter on its feet, more flexible, and able to make tough decisions. With vision must come pragmatism: if we don't make the difficult decisions ourselves, we will find they have been made for us.

For the past half-century, the University has relied on a system of "incremental budgeting." Each unit began each fiscal year with its base support from the previous year, altered slightly according to the unit's needs and the additional funds available to the University. This system worked well enough during the 1950s, 1960s, and 1970s when increases in state funding outpaced inflation. However, erosion of state support began in the late 1970s, a decline that continues today.

Given our new fiscal environment, it is clear that continued incremental budgeting will lead only to intellectual stagnation. Indeed, as the state spigot slowly closes, the status quo approach to budgeting will eventually lead to fiscal starvation in all areas of the University.

The solution we have come up with is called "value-centered management" (VCM). The plan will make individual units more conscious of the funds they generate and the costs they incur. Our goal is not to promote a "sink or swim" mentality, however. Instead, VCM develops incentives for units to improve their efficiency, while creating a shared sense of responsibility for generating revenue in areas where it seems reasonable. We hope VCM will give us greater flexibility in distributing centrally controlled resources such as the annual state appropriation. The pool of funding created by the plan should enable the University to better support interdisciplinary teaching and scholarship centrally, funding new initiatives and providing the seed capital for increasing external support.

As a concept, VCM clearly represents the direction we need to be moving. Yet, many important questions, especially in regard to its effect on interdisciplinary work, have yet to be answered to any of our satisfactions. In response, we are starting the plan slowly, and have created a faculty committee to monitor our progress and ensure that VCM does not threaten Michigan's position of intellectual leadership. One thing is clear, however: without the flexibility of new decentralized budgeting systems, intellectual life at the University cannot hope to flourish given the serious fiscal challenges that lie ahead. ۰۳۷

REDISCOVERING OUR INITIAL 'SPARK'

I think that when you love something over a lifetime, it's like all relationships; it goes through stages. It can become stale or boring, and you think back and fondly remember when you were first falling in love. You wish for that initial excitement. To me, what multidisciplinary research does for you is to allow you to keep falling in love again and again.

—Huda Akil, Professor of Psychiatry and the Gardner C. Quarton Professor of Neurosciences



If there is one common theme that runs through all my conversations with faculty about the need for intellectual transformation, it is a sense of excitement. We are all here because we love what we do. Many of us seek desperately for ways to overcome the institutional barriers that often keep us from renewing the enthusiasm that initially brought us into the academic world.

To succeed, we need to learn to tolerate more ambiguity, to take more risks. This may mean we will be less comfortable in our scholarly neighborhoods; we may have to relax the relatively stable “professional selves” that we have preserved for so long. I think we will find working together much more fulfilling than working apart. Ultimately this will release incredible creativity.

“Intellectual Transformation” is merely a catch-phrase until we discover what it really means for Michigan. A promising blueprint, it will only develop into reality as we struggle to put it into practice. As President Burton warned more than seventy years ago, the world is not divided into departments. The disciplines are powerful tools that have served us well for more than a century. We need to find ways to make sure that these tools continue to work for us and do not define or restrict us. ٤٦

Thank you to the many faculty and staff who generously shared their ideas about transforming Michigan's intellectual milieu. They made a significant contribution to this monograph.

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